



**EXPLORING LECTURERS' REFLECTIONS ON THE USE OF MOODLE TO TEACH
PHYSICAL SCIENCE MODULES AT A SOUTH AFRICAN UNIVERSITY**

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**This dissertation is submitted in fulfilment of the requirements for the
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Declaration

I, Cedric Bheki Mpungose declare that this Dissertation contains my own work. All sources that were used or quoted have been dully referenced accordingly. This research has not been previously accepted for any degree and is not being currently considered for any other degree at any other university.

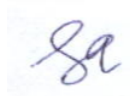
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Dr. Simon Bheki Khoza

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Dedication

This dissertation is dedicated to my family and extended family through the guidance of my ancestors from Mpungose or Mabona family (Mkhulu Mqgibelo and others). A very warm thank you to my family who were with me through all my highs and lows during this study. To my mother, *Tryphina 'Kuteshu'*, and my father *Thelelina 'sigogo sakhe, yakhala ingane, ilambile ingane'*, in your various ways of encouraging me to continue and finish this study, may God bless you. Thank you to my all my brothers for their huge support, they helped me to complete this study. Friends and colleagues, who wished me well through this lonely journey, thank you very much.

Abstract

This dissertation presents the qualitative action research study of five lecturers who reflected on their teaching of the Physical Science modules using the Moodle learning management platform at a South African university. The study adopted a critical methodological paradigm. This study was conducted with the main purpose of exploring the lecturers' reflections on the teaching of Physical Science modules using the Moodle learning management platform (LMP) at a South African university. As a result, reflective activity, one-on-one semi-structured interviews, and artefacts were utilised for data generation in order to ensure the process of triangulation during the exploration of lecturers' reflections. Non-probability sampling methods, including purposive and convenience samplings were used in selecting this specific group of five lecturers' because I needed lecturers with whom I was familiar and who were also accessible. The study used guided analysis to analyse generated data through the use of inductive and deductive reasoning/processes to conceive nine themes. Issues of dependability, confirmability, credibility, and transferability were ensured in this study in order to ensure trustworthiness. Further to this, ethical issues were also considered such as consent letters, anonymity, withdrawals, beneficence and others.

Furthermore, the study was guided by three research question namely: 1. What are the lecturers' reflections on the use of Moodle in teaching Physical Science modules?; 2. How do lecturers' reflect on the use of Moodle in the teaching of Physical Science modules?; and 3. Why do lecturers' reflect in particular ways on the use of Moodle when teaching Physical Science modules? As a result, the following research objectives were informing research questions respectively as follows: 1. Understand lecturers' reflections on the use of Moodle to teach the Physical Science module; 2. Explain the lessons that can be learned from teachers' reflections on the use of Moodle to teach Physical Science module; 3. Explain what informs lecturers' reflections on the use of Moodle when teaching the Physical Science module. Consequently, the research question guided the study to review the relevant literature on curriculum signals/principles based on three levels of reflections, namely, informal, formal, and non-formal levels of reflections. As a result, this study

adopted Technological Pedagogical and Content Knowledge (TPACK), and it was then contextualised into Reflections, Resources, Procedures, And Module Signal theory (RRPAMS), which then yielded to the discovery of the new theory termed as Theory of Equilateral Moodle curricula which emerged from this study.

The major findings indicated that lecturers were driven by all levels of reflection such as informal, formal, and non-formal reflection when teaching science modules using the Moodle learning management platform. The study confirmed that lecturers were highly operating at the level of informal reflection rather than that of formal and non-formal reflection. This was due to the fact that there was no online learning policy guiding teaching of modules on Moodle LMP in place given by the university. As a result, this led to unbalanced curriculum signals (content, time, character, platform, activities, justice, permission, resources, and assessment) and this had a negative impact on the university throughput, such as produced graduates per annum. The study therefore recommends the balance of Moodle curricula (non-formal, informal, and formal curriculum) and ensures the development of an online policy document to be in place in order to address the societal/student needs, module needs, as well as the individual needs of lecturers teaching science modules on an online Moodle platform. Lastly, it is in the best interest of this study that further research can be undertaken in all spheres of curriculum, including different spheres of online learning platforms in order to enrich the literature and bring the awareness in the universities which adopt emerging learning management platforms, especially in universities from African countries.

Keywords: Curriculum, Lecturers, Moodle LMP, Needs, Signals/principles, Reflections

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CHAPTER ONE

The overview, context, and objectives

1.1 Student statement of reflection

I undertook this study because I wanted to grow in my personal life, my academic life (education and curriculum studies), and my societal life. As a result, undergoing this PhD study has equipped me with concrete frames of reference for all kinds of situations at my disposal. Consequently my statement of reflection is on the basis of non-formal reflection, formal reflection, and formal reflection. With reference to non-formal reflection, I am from a disadvantaged family of four boys and I am the third born. My parents taught me to be innovative (skills) and they instilled some human life values and attitudes to me like respect, passion, humanity. This shaped my non-formal identity at an early stage of my life which ensured that I developed a love and passion of education. As a result, I was and am still able to take decisive decision about my personal life.

Based on my formal level of reflection; I never failed any grades during my primary and high school level of education, and I received my matric certificate passed with distinction. This then propelled me to further my studies at a tertiary-level where I graduated with a Bachelor of Science (BSc.) Junior Degree from the Department of Computer Science. Formal reflection prevailed in the completion of this degree because this qualification assisted me to understand the world as a platform with one answer or solution in any challenge or action. As a result, one has to look for a relevant theory or formula to solve the challenge or understand any action in the surroundings. In other words, I had to undergo formal reflection in order to understand the actions and be able solve all the life challenges through a well-structured plan. This was formally influenced by solving Physical Science /mathematics/computer science' problems that has one answer to any action or challenge. Thereafter, I went on to pursue Postgraduate Certificate in Education (PGCE) and Physical Science, Computer Applications and Mathematics subject were my major modules. This qualification has equipped to understand that the formal reflections are competing with informal reflections. As a result, I noticed that societies have different opinions about the ways of getting to the solutions where facts sometimes are not important because of the societal dominating

opinions. Thus, informal reflections prevailed because I learnt that societies/community have many answers to challenges or actions depending on a strong stated and supported argument.

Moreover, it was not enough of me to have these qualifications since I wanted to develop myself in the field of academia and I still wanted to explore the formal world of research. Thus, I spent two years doing an Honours Degree in Education and I discovered that the formal world of research is driven by different world views (methodological paradigms) and literature (formal written studies). This then had an influence on me to be driven by critical paradigm principles that does not only seek the researcher to only understand the phenomenon but also wants the researcher to change and empower human's social lives (societal need), in particular to empower teachers in all challenges faced in the world of teaching and learning (education and curriculum studies). Furthermore, I therefore went for Master's Degree in Education and Curriculum Studies, and I started to fall in love with research. With reference to formal reflection, this qualification helped me with understanding of curriculum or teaching signals (curriculum reflections, goals, content, resources, assessment, character, platform, justice/goals, time and permission). As a result, I have undertaken this PhD. study in order to gain a clearer understanding about the theoretical frameworks and literature guiding Education and Curriculum Studies. This qualification has equipped me with relevant research skills in order to provide more input in my field through publications; developing and contributing the inputs on theories guiding education and curriculum studies; and with curriculum signals guiding the teaching and learning of any module/subject including levels of reflection (formal, informal and non-formal) of interpreting situations. Most importantly, the PhD. qualification helped me to understand my own non-formal identity. In other words, I clearly understand my real strengths and weaknesses, based on my subconscious cognitive processes, which guide my behaviour during teaching and learning. In support of this I understand why people do what they do (informal reflections); I understand why people write what they write (formal reflections).

With reference to informal reflection, I have 12 years of experience as a teacher and a lecturer in both high school and in tertiary institutions. I have realised, that while I was at a high school level I was mostly driven by informal reflections (societal needs) because I often relied on what the

other, more experienced, teachers were saying. On the contrary, immediately after I finished my Master Degree and started teaching at a university, my non-formal reflection (personal needs) and formal reflection (module/subject need) influenced my teaching practices. In other words, level of reflection (non-formal, formal, and informal) are always balanced equally so that all needs (personal, module/subject, and societal) can be addressed during the process of teaching and learning.

Thus, this lonely journey equipped me with skills of addressing societal needs in the working environment. In other words, it taught me to be conscious of my colleagues, students, and management team present in the teaching and working platform. This always makes me to cater for their societal needs where necessary, and capacitate them with social life skills that can assist them with moving their lives forward.

1.2 Introduction

Chapter One intends to introduce the study with the purpose to explore lecturers' reflections on the use of Moodle to teach Physical Science modules at a South African university. This chapter lays the direction taken by this study including all processes as to how this study unfolds. Further to this, this chapter outlines the study's title, purpose, and location. It also states the rationale of conducting the study in terms of non-formal, formal, and informal level of reflections. The chapter then further indicates the statement of the problem followed by the brief reviewed literature which indicated the gap that was closed by this study. Research questions and objectives are outlined in this chapter including the synopsis of the research design and methodology (qualitative approach, paradigm, style, sampling, data generation methods, data analysis, trustworthiness, ethics, and limitations of the study). Lastly, the overview of chapters in this study is illustrated to give the reader an idea of how this study unfolds.

1.3 Project title

Exploring lecturers' reflections on the use of Moodle to teach Physical Science modules at a South African university.

1.4 Focus and Purpose

The purpose of this study is to explore lecturers' reflections on the use of Moodle to teach Physical Science modules at a South African university.

1.5 Location of the study (delimitation)

The study was conducted in one of the School's of Education at a South African University in the KwaZulu-Natal Province. The School of Education incorporated six clusters as follows: Education/Curriculum Studies, Science and Technology, Social Science Education, Mathematics and Computer Science Education, Languages and Arts Education, and leadership and Management. The campus's Local Area Networks (LAN) is used by all lecturers for the purpose of teaching and learning.

1.6 Rationale

My decision to embark on this proposed research study rests on three main reasons. Firstly, I have been noticing, with concerns, that universities in South Africa have been introducing different types of LMP to enhance teaching, learning, and research processes. However, on the one hand, studies indicate that the practice of avoiding the use of digital technology in teaching occurs most frequently those who were born before 1982 because they are identified as digital immigrants or refugees (need training before using technology) (Dlamini', 2009; Khoza-, 2013a; Khoza & Manik, 2015; Prensky, 2001). On the other hand, studies indicate that students demand the use of digital technology because they are termed as digital natives (using technology without any training administered) (Khoza and Mpungose (2017). This suggests that there is a need for an intervention strategy that may help to empower lecturers to overcome this challenge and address the students and university needs. Schön (1983) points to the reflection process as the most important

intervention strategy that forces lecturers to transform and allow new changes to occur in their teaching.

Secondly, studies further revealed that reflections are a conscious response to a particular situation in order to change and improve a certain practice (Bates*, 2016; Bulman & Fairlie, 2016; Lehtinen, Nieminen, & Viiri, 2016; Schön, 1983). These studies further assert that reflections are divided into professional reflection (module need), societal reflection (social needs), and personal reflections (personal needs). Teachers are required to be cognisant of curriculum reflective signals, namely: goals, content, resources, assessment, character, platform, justice/goals, time, and permission during teaching and learning practice. In other words, when teachers do not reflect on these curriculum signals, there are possibilities that the slow rate of pedagogical use of any adopted learning management platform can prevail and lecturers become reluctant to use those platforms at the universities. Thus this study closes the gap to the latter.

Thirdly, my passion for teaching education and curriculum studies modules has prompted me to explore lecturers' reflection on the use of Moodle when teaching their Modules at a university. As a result, this study is useful to lectures and university management including university policy makers for online learning policy. Note that although studies into lecturers' reflection have been on-going for some time now, especially in developed countries like the UK and USA (Amory-, 2015; Singh* & Mabasa, 2015), research studies on lecturers' reflection on the use of Moodle LMP are relatively new on South Africa's research landscape. Thus, this study intends to close that gap by contributing to the body of knowledge (lecturers' reflection on the use of Moodle LMP).

1.7 Brief motivation/Background of the study/statement of the problem

As a postgraduate student since 2014, and subsequently as a staff member in one of the universities in South Africa, I found that the university had adopted Moodle as its on-line learning management platform for both staff and students since 2010. Further to this, during my Master's degree programme, I used Moodle for submission of my assignment to Turnitin in order to check

plagiarism and downloading of my learning resources (module outline & readings). Furthermore, I noted that, as students we used Moodle via discussion forum in order to share ideas about particular concepts of a module. This, to me, made the teaching and learning process (curriculum implementation) simple and more accessible at any time, irrespective of the location. On the other hand, I also observed that some lecturers were eager to use Moodle but the majority were reluctant to use Moodle during the teaching and learning process. For instance, out of five modules over two years (2014-2015), there were only two modules taught using Moodle. In addition, as a staff member, I have noticed that lecturers' usage of Moodle is varied in such a way that most lecturers depend on other lecturers for assistance. This creates chaos in the process of curriculum implementation. As a result, in 2016, the university Deputy Vice-Chancellor (DVC) decided to phase in the use of Moodle LMP as mandatory, over a three (3) year period (2016-2018) to facilitate its optimum potential as a LMP. Thus, the problem of varied and reluctant use of Moodle LMP to lecturers triggered me to conduct this study and enhance me to put more focus particularly on how Moodle LMP is being used during teaching and learning at a South African University. As a result, I saw the need to conduct this study with a main purpose to explore lecturers' reflections on the use of Moodle LMP to teach modules like Physical Science, with a view to gain an in-depth understanding and empower those lecturers in their situation (teaching modules using Moodle LMP). I believe that lecturer's reflections may be based on their teaching experiences prior to the adoption, during the adoption, and after adoption of Moodle LMP as mandatory.

International and local studies like Ayers (2011) as well as Tshabalala, Ndeya-Ndereya, and van der Merwe (2014), share the same view that Higher Education Institutions (HEIs) were striving to provide solutions to issues of large number of student who access universities, high lecturers' teaching workload, addressing the imbalances of the past, etc. Thus, these factors created a lot of tensions and pressures towards teaching and learning in HEIs. As a result, part of the solution to these tensions was the adoption of LMP technology like Moodle, Blackboard, etc. (Dlamini-, 2015; Hutchison & Woodward, 2014). The adoption of any LMP requires continual training, more support for e-Learning strategies, and the task of maintenance for online resources. Furthermore, LMP facilitates the process of teaching and learning. However, the adoption of a LMP brings with it different problems such as inadequate skills to use the adopted LMP and lack of resources, especially in developing countries (Bozalek, Gachago, et al., 2013).

In addition to the above, the use of LMPs is highlighted via lectures' reflection in both international and local literary articles including Ngubane-Mokiwa and Khoza (2016), Amory (2014), Maxwell (2013), and Bozalek, Gachago, et al. (2013) which respectively looked at lecturers' reflection on the use of technology in higher education, the use of framework to support teaching and learning with technology, why Moodle is used in higher education, and the use of information communication technology (ICT) by blind students at a university. These studies share the same view that the current development of technologically-based educational applications which support learning are key areas of focus for all sectors including sector of higher education around the world in order to bring flexibility during teaching and learning process. In other words, lecturers are required to receive, use, and reflect on Moodle LMP in order to unpack how to use that particular adopted LMP during the teaching and learning process of a module (Bates, 2000).

Moreover, Dewey (1933), Schön (1983), Pedro (2005), as well as Loughran and Corrigan (1995), emphasise the frame of reflection as a process or activity that is central to developing or improving one's practices and reframe one's experiences in the process of teaching and learning. Reflection must be brought out because at times, individuals become unaware of their behaviour, practices, and the consequences thereof (Boud*, Keogh-, & Walker', 1985). These studies outline that lecturers' model of reflections can consist of reflections during the act of planning the lesson (anticipatory reflection), during the actual teaching of the lesson (contemporaneous reflection), as well as after the lesson (retrospective reflection). In other words, lecturers may reflect on the use of Moodle based on these three levels, which may be before adoption of Moodle, during the adoption of Moodle, and after the adoption of Moodle. This implies that lectures may become aware of the consequences of their actions in the use of any LMP like Moodle provided their reflections embodies three levels of reflection. However, there is insufficient evidences in the body of reviewed literature to indicate that university lecturers are aware of the consequences of their reluctance to use of Moodle during teaching and learning. Existing literature has overlooked lecturers' reflections, specifically on the use of Moodle LMP at a university. Literature is silent as to how lecturers use Moodle LMP during the teaching and learning process (gap). In bridging this gap, this study explored lecturers' reflections on the use of Moodle during the teaching of Physical Science module. Thus, this study attempted to understand why lecturers were reluctant to use a LMP (Moodle) and the study assisted lecturers to reflect in order to transform, empower and

improve their practices by integrating technology with curriculum. Consequently the significance of the study entails its uniqueness in the field

Therefore, this study was uniquely significant because it contributed to the body of literature on reflections and LMP, especially the use of Moodle. It also intended to improve the lecturers' practices on the use of technology during the teaching and learning process. The results of the study were useful to redirect the efforts of university policy makers on curriculum implementation (teaching and learning) and inform the University management, lectures, and students, on issues surrounding the use of Moodle LMP.

1.8 Review of Literature

Various international studies like Chung and Ackerman (2015), Cavus (2013), Downes (2010) and others, argue that the higher education sector is undergoing rapid globalisation alongside other sectors of the world. The globalisation of education goes hand in hand with an increase of learning with technology in higher education, supported by a rising use of online-based electronic learning (e-learning) platforms (van Raaij & Schepers, 2008). E-learning platforms (ELP), or virtual learning platforms (VLP), are rapidly becoming an integral part of the teaching and learning process (Pituch & Lee, 2006). Further to this, Bennell and Pearce (2003) emphasise that, for many, learning via the internet makes activities easier even though it has become a recent phenomenon in our digital age.

In addition to the above, international scholars like Brusilovsky and Peylo (2003), Yam and Peter (2012), as well as Cole and Foster (2007), share the belief that the use of web-based education platforms have raised the bar in higher education system in the last few years as they are encouraged by the fact that neither students nor teachers are compelled to be in a specific location. Thus, this form of online-based education is virtually independent of any precise contexts or platforms. Specifically, VLP encourages collaborative communication tools that are becoming broadly used in higher education contexts. Furthermore, various VLP are installed by universities, community colleges, schools, businesses, and even individual instructors in order to add online technology to their environment and to supplement traditional face-to-face platforms. Further to this, Bri, García, Coll, and Lloret (2009), outline that VLP are sometimes also known as Course

Management Systems (CMS), Learning Management Systems (LMS), Learning Content Management Systems (LCMS), Managed Learning Platforms (MLP), Learning Support Systems (LSS) or Learning Platforms (LP), depending on the institution. In the context of this study, these systems were referred to as a Learning Management Platform (LMP).

Furthermore, Romero, Ventura, and García (2008), as well as van Raaij and Schepers (2008), state that a LMP provides the platform for this type of learning platform by enabling the management, delivery, tracking of learning, testing, communication, registration process, and scheduling. The typical LMP offers lecturers a suite of flexible functions to help both lecturers and learners to decide if they have to be physically present at the same location during teaching and learning process. LMP assist both teachers and learners to achieve their goals through the use of problem-solving teams, question and answer sessions, and online simulations, rather than just sending e-mail or distributing hand-outs. As a result, the literature indicates that there are a variety of and popular LMPs used by schools and university to integrate or mediate teaching and learning. The study conducted by Falvo and Johnson (2007) discovered that the most popular LMP used at colleges and universities in the United State was Blackboard, and the second most used system was WebCT. This suggests that there are few studies done on the use of Moodle Platform. In other words, it is apparent that LMP usage, through various platforms, is increasing day by day and there is a need for it to be adopted by higher education institutions worldwide.

However, in the study conducted by Leslie (2004), it is concluded that there are many different LMPs. It is further suggested that some LMPs on the Internet that can be obtained for free such as Moodle, Claroline, and ATutor, but some can be obtained through payment like Blackboard, WebCT, and MOOCs. According to Brandl (2005), the most commonly used LMPs are as follows according to their ascending order of percentage: Blackboard, Moodle, MOOCs, WebCT, etc. LMPs normally allow content management, curriculum mapping and planning, student engagement, and administration, as well as communication and collaboration in the process of teaching. However, Brandl (2005) further articulates that one of the most commonly and currently used LMPs by universities around the world is Moodle which is free and enables the construction of a powerful, flexible, and engaging online courses with reflections. This suggests that, systems

such as Moodle can offer various angles to facilitate blended or hybrid information sharing and communication between lecturers and student in the process of teaching and learning. In other words, Moodle enables lecturers to distribute information to students, produce content material, prepare assignments and tests, and engage in informative discussions via discussion forums and chats.

In addition to the above, in African contexts, various higher education institutions including basic education schools have adopted various LMPs such as Moodle in order to integrate technology with teaching and learning processes. This adoption has been studied through various research conducted by Bakari, Mbwette, and Salaam (2010), Ngubane-Mokiwa and Khoza (2016), Prensky (2001), Amory' (2010) as well as Unwin et al. (2010). These studies suggest that African higher education institutions, such as those in Ghana, Nigeria, Kenya, Cameroon, Senegal, Mozambique, Tanzania, and South Africa, have adopted the use of information communication technologies and different LMPs, like Moodle and Blackboard, in order to facilitate the process of teaching and learning. These studies indicate that there are a number of significant problems in the adoption of LMPs in the African context, such as: the lack of funds, poor infrastructure, digital immigrants, lack of support, and lack of awareness by university staff and students. Nevertheless, studies indicate that research has been done on the use of technology but little research has been done on the adoption of LMPs in African higher institutions. This suggests that there was still a need for studies to delve further and explore lecturer' reflections on the use of LMPs (Moodle) during teaching and learning within the African context so that lecturers can use LMPs to its maximum potential. In other words, lecturers need to know the LMPs that are adopted by their universities and understand how to use them.

Furthermore, Moodle is a web-based Learning Management System, it stands for Modular Object-Oriented Dynamic Learning Environment (Chavan & Pavri, 2004). Further to this, according to Trombley and Lee (2002), Moodle is a LMP tool which is used to refer to the on-line interactions of a variety of activities that take place between students and lectures. A tool is defined as anything that helps learning to take place (Criticos, Long, Moletsane, & Mthiyane, 2005) or “any person or thing that communicates learning” (Khoza, 2012, p. 75). Thus, Khoza (2015c) concurs with Amory' (2010) that Moodle, as a tool in learning, can be a soft-ware, hard-ware, and pedagogical-

ware. Amory' (2010) further outlines that both soft-ware and hard-ware forms the technology in learning tools while the pedagogical-ware forms the technology of learning tools.

Thus, the study conducted by Brandl (2005) further outlines that, Moodle is an Open-Source Software tool. This means that users are able to download, use, and modify Moodle without charge. Thus, Soft-ware tools are any tools used with hard-ware tools to display data (Khoza, 2013b). This is also in line with the interpretive case study conducted by Martín-Blas and Serrano-Fernández (2009). The main aim of the study was to present an overview of the undergraduate online Physics module that is implemented in the Moodle platform. The study concluded that modules in a Moodle soft-ware platform create an on-line learning community which helps both teachers and students to have a virtual space where they can share knowledge through different kinds of supervised activities, chats, and forums. This suggests that Moodle, as a soft-ware tool, plays the primary role for lecturers to interact with students towards the teaching of the modules (Physical Science). In other words, Moodle, as a soft-ware platform, provides an unlimited way for teachers to organise, manage, and deliver module materials via the internet.

Moreover, interpretive case studies by Khoza (2013b) as well as Dougiamas and Taylor (2003) articulate that Moodle, as a hard-ware tool, is any tool or machine used in education. These studies further indicate that Moodle has been designed to be compatible and flexible enough for use in any hard-ware with the following basic requirements; Disk space: 5GB is probably a realistic minimum; Processor: 1GHz (min), 2GHz dual core or more recommended; Memory: 512MB (minimum), 1GB or more is recommended. This suggests that Moodle can run on any computer platform with a basic minimum hard-ware requirement, in other words, Moodle as a hard-ware is not costly.

Furthermore, both Khoza (2013b) and Amory' (2010) share the view that it is useless to have soft-ware and hard-ware (technology in learning) without pedagogical-ware (technology of learning). These studies further outline that technology of learning are tools that we cannot see and touch in education such as teaching methods/pedagogy/theories. Further to this, technology of learning tool

are the key tools that drive the teaching process in education in order to attain curriculum goals (Khoza, 2013b). This suggests that Moodle LMP, as a technology in learning, is a pedagogical-ware which may be used in teaching and learning of modules like Physical Science. Moodle as pedagogical-ware connects/integrates basic learning theories such as behaviourism, cognitivism, and constructivism to digital technology (Siemens, 2014). In other words, lecturers' might use Moodle as pedagogical-ware in order to supplement their basic learning theories (behaviourism, constructivism, and cognitivism). However, various studies are moving towards developing a variety of theories as pedagogical-ware of using Moodle. For instance, some of the theories from different authors in different studies of learning theories such as Technological Pedagogical and Content Knowledge (TPACK) (Koehler & Mishra, 2009), Five-stage model of learning (Salmon, 2004), connectivism (Siemens, 2014), Cultural-Historical Activity Theory (CHAT) (Engeström, Mietinen, & Punamäki, 1999), as well as Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003). One will wonder if these theories are new, but what is common to them is that they all articulate discussions around the curriculum spider-web teaching and learning signals such as rationale, goals, content, learning/teaching activities, tools, teacher role, accessibility, time assessment (Van den Akker* et al., 2009). As a result, the theoretical framework of this study will emerge after the interrogation of these above-stipulated theories. Getting further, reflections may assist lecturers in order to master how to use Moodle as pedagogical-ware during the teaching and learning process in this digital age. That is the reason why lecturers should always reflect in order to improve their teaching practice (Van Manen, 1977).

Furthermore, the importance of reflections is highlighted from various studies; see studies by Boud- and Walker (1998), Van Manen (1977), Schön (1983) and Dewey (1933). These studies are of the view that reflection has been defined as central to the ways in which knowledge and improvement can be determined through a cyclical process of identification, review, questioning, and reconstruction of our own practices. These studies further outline that reflections are a purposeful and systematic inquiry into practice. Studies further propagates that reflections can be on the bases of the three vital levels: technical level of reflection, practical level of reflection and critical level of reflections. These levels enhance lecturers to reflect based on past actions, during action and after actions of teaching. Similarly, Zeichner* and Liston (1987) also outlines that both

reflection-on-action and reflection-in-action depend on the depth of reflection and nature of those actions that lecturers reflect upon. This suggests that, lecturers' reflections of their knowledge and the utilisation of Moodle LMP could provide clarity, understanding, and solution or answers to Moodle usage/adoption by any university. Various surveys have been conducted for university DVCs who are in power to reflect on the adoption of LMPs (see the quantitative survey conducted by Bakari et al. (2010) of 43 university DVCs which reflected on the adoption of LMP such as Moodle). Bakari et al. (2010) Study concluded that the adoption of LMPs (Moodle) comes with certain expense. This literature indicates that there is an in-depth need to conduct studies that will explore the lecturers' reflections (the oppressed) on the use of Moodle. This means that, reflective thinking by lecturers may address practical problems and also allow the resolution of doubt and perplexity before possible solutions are reached. Thus, lectures' reflections may lead to the exploration of various lecturer's rationale behind the usage of Moodle. Thus, rationale are central to the implementation of any curriculum (Khoza-, 2013c).

According to (Amory', 2010), Berkvens, van den Akker, and Brugman (2014), lecturers' use of Moodle can be on the bases of non-formal rationale, informal rationale and formal rationale. Furthermore, Khoza (2015c) concurs with the case study conducted by Amory (2011) on pre-service teacher development. The main purpose of this study was to explore the use of game-mediated learning with pre-teaching and learning. The study concluded that lecturers did not see any need to use computer games during teaching and learning since they did not have any firm grounds. This suggests that, the lack of self-ground, informal grounds, and formal grounds, on the use of Moodle (LMP) might lead to the non-fulfilment of curriculum goals. Thus, balancing grounds on the use of Moodle may assist lecturers to develop their technological skills in order to observe other curriculum signals or themes (Van den Akker* et al., 2009).

Furthermore, Khoza (2015) concurs with Van den Akker* et al. (2009) that the grounds act as the core signal to other curriculum signals like teaching goals, teaching activities, tools, instructional assessment, organisation (location, time, and accessibility), teaching strategies, and content. To conduct the course of learning (currere), one needs to administer the curriculum signal in all different levels of the curriculum like intended, implemented, and achieved curriculum (Hoadley

& Jansen, 2009; Pinar-, 2005). This suggests that, lecturers need to firstly possess curriculum signals before the use of Moodle LMP during teaching and learning processes. In other words, the use of Moodle is driven by teaching signals. Thus, lecturers' reflections on curriculum signal could assist them to improve the use of Moodle.

In bridging the gap, most of these studies were done from the interpretive paradigm framing. This means that, these studies were trying to understand the use of information communication technology, Turnitin, use of computer games, as well as the perceptions and reflections of DVCs, lecturers and students on adoption of Moodle LMP. On the contrary, the literature was silent on lecturers' reflections on the use of Moodle during teaching and learning of modules in higher education institutions, especially in the African context. Further to this, it can be concluded that studies from the literature did not attempt to empower anyone, including lecturers, during the teaching and learning practices. This is an evidence that there are few studies done and framed by critical paradigm with a view to empower and transform lecturers' practice on the use of LMP. Further to this, there are still few studies done to explore lecturers' reflections on the use of Moodle specifically on the teaching of Physical Science. There was a clear indication that there was still a need to conduct this study with the intention of not only understanding lectures reflections on the use of Moodle in this digital age but also transforming them from being digital foreigners to being digital natives (Khoza, 2015c; Prensky, 2001).

1.9 Research Objectives

- Understand lecturers' reflections on the use of Moodle to teach Physical Science module
- Explain the lessons that can be learned from teachers' reflections on the use of Moodle to teach Physical Science module
- Explain what informs lecturers' reflections on the use of Moodle when teaching Physical Science module

1.10 Research Questions

- What are the lecturers' reflections on the use of Moodle in teaching Physical Science module?
- How do lecturers' reflect on the use of Moodle to teach Physical Science module?
- Why do lecturers' reflect in a particular ways on the use of Moodle when teaching Physical Science module?

1.11 Research design and methodology

1. 11.1 Qualitative research

The study adopted a qualitative approach. In a qualitative approach the researcher is given an opportunity to try to understand and describe the ways in which different individuals make subjective sense of their lives as outlined by Christiansen, Bertram, and Land (2010) as well as Cohen*, Manion, and Morrison (2011). Further to this, “qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them” (Denzin, Lincoln, & Giardina, 2006, p. 3). This approach also attempted to gain an in-depth understanding by asking questions that not only informs the researcher but also stimulates participants to reflect on why they engage in particular activities (Mouton, 1996). Qualitative researchers deal with socially constructed realities and qualities that are complex (Creswell-, 2012). Their task, therefore, is to attempt to describe, understand and interpret how various participants in a social setting construct the world around them (Maree, 2007). Babbie' (2004) also asserts that the aim of qualitative research is to promote better self-understanding (empowerment and transformation) and to increase insight into the human condition. This suggests that the qualitative approach was appropriate for this study because it might drive me to explore the social phenomenon (reflecting on the use of Moodle), in a social context (teaching a module), while involved with social elements (lecturers). I might also have had the opportunity to understand and interpret lecturers 'autobiographical lived experiences (currere) on the use of Moodle (Pinar-, 2005). As a result, lecturers may make subjective sense of their lives when using Moodle as a learning management MLP since “qualitative research is about action not about a practitioners” (Bradbury, 2010, p. 2). This means that, lecturers (participants) might undergo an emancipatory process during this study and be transformed after constructing the world around them (Moodle platform) through their actions.

1. 11.2 Research Paradigm

This study was conducted in a critical methodological paradigm. A critical paradigm is described as a paradigm or research philosophy in which a researcher aims to not only describe and understand, but also to change society in order to become more just (Cohen', Manion, & Morrison, 2013). Further to this, it is emphasised that the study in a critical paradigm focuses on bringing social change which will help those groups of people who have little power, and few opportunities or choices because of their sex, race, and class (Creswell', 2013). It is assumed that, in a critical paradigm, the nature of reality (ontology) is subjective and constructed on the basis of issues of power (authority) whereas the nature of knowledge (epistemology) is constructed by involving participants reflectively in order to bring justice and transformation (Creswell-, 2012). As a result, I chose this paradigm because I wanted to understand lecturers' reflections on the use of Moodle after the directive given by the DVC who is in power in terms having authority. This might assist lecturers who are oppressed (decision-making) to integrate technology and curriculum in order to transform and improve their technological knowledge and skills since Moodle is mandatory in their university. Given the purpose of this study and its focus, I therefore opted to use the critical paradigm as the most appropriate paradigm in this study on the assumption that within an ontological perspective, reality is characterised by social, political, cultural, and economic values as well as the history of the society.

In fact, we may all have “different beliefs or perceptions, but ultimately, there is only one reality and one truth” (Christiansen et al., 2010, p. 28) since the research findings from the critical paradigm are subjective and are not replicable (the results would be different if the same study was done in a different context). This suggests that the findings of this study may expose social injustice via reflections so that participants can be transformed whilst using Moodle. The results of this study were not generalised but other university lecturers have referred to the findings and recommendations from this study. The literature indicated that most studies used an interpretive paradigm in exploring lecturer's reflections. Thus, to bridge the gap, I saw the need to use a critical paradigm to explore lecturers' reflection, specifically on the use of Moodle.

1. 11.3 Research style

Furthermore, this study employs the qualitative action research style in the critical paradigm as it is defined by Reason and Bradbury (2001). Action research is a research process which is participatory and democratic, and is concerned with the practical knowing of human actions. It seeks to bring together action and reflection, theory and practice, in participation with others in order to find the practical solution to issues of pressing concern in the society. Further to this, Stenhouse (1979) believes that action research should contribute to the practice and theory of teaching used by lecturers. This suggests that, action research encourages the collaborative or participative approach in finding a solution towards the practical problem experienced by participants (Maree, 2007). In other words, when lecturers are acting and reflecting collaboratively with others, it may lead to community transformation, organisational transformation and most importantly, personal transformation.

In addition, action research is unlike any other research style; it is unique since “it is done by researchers on their own practice” (Christiansen et al., 2010, p. 45). As a result, this indicates that I researched my own practice on the use of Moodle in order to increase my own awareness, improve practice, and to change the lecturer’s reluctance on the use of Moodle for the better. Action research in education assumes that lectures/teachers know best what is happening during the teaching and learning process (Creswell', 2013). Therefore in this study, I took lecturers as the best people to participate in order embrace the action research principles of participation, reflection, empowerment, and emancipation. Berg and Lune (2004) Outline three approaches of action research: technical collaborative approach (researcher comes up with a research problem to participants); practical collaborative approach (both the researcher and participants come up with a research problem); and emancipatory collaborative approach (both researcher and participants come up with a problem from a political point of view). This study chose emancipatory collaborative approach.

Furthermore, Christiansen et al. (2010) termed the above-mentioned approaches as participatory action research which involves four stages: strategic planning (stage 1), implementing the plan (stage 2), observing of the plan (stage 3), and reflecting on the plan (stage 4). As a result, in stage

1, I worked together with lecturers and we formulated questions based on the given reflective activity on the use of Moodle, and the problem was identified in order to come out with an intervention. After finding answers to questions, stage 2 propelled us to implement the solutions/intervention towards the identified problem (action to implement the plan). Stage 3 then assisted me to observe lecturers' attitudes/interaction towards the intervention. At stage 4, we therefore shared the results from the intervention with each other to see if the intervention did work or not work and this may lead us to another cycle/phase. Moreover, the study had two cycle/phase in order to ensure that each participant performed all allocated duties that may led to the improved use of Moodle. Thus, in all stages, participants were expected to perform a particular duty that may contribute towards the emancipation of using Moodle during the teaching of Physical Science Moodle.

In addition to the above, Freire (1985), believes that solutions should not come from the oppressors but from the oppressed. This means that solutions towards the reluctant use of Moodle might come from lectures (no authority) not from the DVC or management (have authority). In others words, involvement of lectures in this participatory action research may assist them to solve their own problems on the use of Moodle for transformation and emancipatory purposes in order to improve teaching and learning practices. One of the weaknesses of action research is the difficulty of conducting the research on a large-scale basis (Reason & Bradbury, 2001). As a result, I intended to overcome this weakness by localising this action research in a local context of Edgewood campus lectures who are using Moodle LMP to teach science modules at the University of KwaZulu-Natal.

1. 11.4 Sampling

Sampling is described as making decisions about which people, setting, events, or behaviours to observe or study (Creswell', 2013). Kerlinger (1964) reveals that sampling is referred to as a process of choosing a smaller, more manageable number of participants to take part in the research. Factors such as expense, time and accessibility often prevent researchers from using the entire population to gain information needed. Therefore, a small group or a sub-set of the population was used in such a way that it was representative of the whole group. This suggest that, in this study, I

used non-probability sampling in order to select a manageable number of five lecturers from the School of Education's Science and Technology discipline. My specialisation in teaching science modules enhanced me to choose those lecturers who were offering these science modules at a university. Specifically, I used purposive sampling in order to include lecturers whom I knew were offering science modules. However, sampling was also convenient because I chose easily accessible and available lecturers in the very same university. Hence, sampling in this study had no intention of generalising findings, as it was intended for the purpose of changing the status quo. (Christiansen et al. (2010). Bias in sampling is one of the core weaknesses in research. As result, in overcoming this weakness, I ensured that the lecturers that were reluctant to use Moodle and those that maximised the usage of Moodle were equally represented in the sample.

1.12 Methods of Data generation

The study adopted three techniques in data generation/production: an open ended questionnaire for participants' reflective activity, artefacts, and one-on-one semi-structured interviews.

1. 12.1 Reflective activity

Cohen* et al. (2011) describe a reflective activity as a written activity that asks participants (lecturers) to complete a short series of questions about the issue studied (reflect on the use of Moodle). As a result, in this study, I designed an open-ended questionnaire as a reflective activity that was guided by curriculum spider-web signals for the five lecturers to complete. This provided the foundation for one-on-one (individual) semi-structured interviews. Cohen' et al. (2013) reveal that a researcher designs and provides a questionnaire to participant with the expectation that they will be honest in their responses. This suggests that it was not easy to ensure honesty from participants' responses. In overcoming this weakness, I provided enough time (two weeks) for my participants to complete the reflective activity (series of questions) and also emphasised the issue of honesty in their reflections. I collected the activity from participants three days before the commencement of interviews.

1. 12.2 One-on-one (individual) semi-structured interviews

I also used one-on-one semi-structured interviews for data production. McMillan and Schumacher (2006), define semi-structured interviews as open response questions that elicit participants' meanings in order to make sense of important events in their lives. "It does allow for the probing and clarifications of answers and it usually requires participants to answer a set of predetermined questions" (Maree, 2007, p. 87). This suggests that semi-structured interviews was most suitable for this study because it allowed participants to give more detailed responses based on the very same set of questions asked during reflective activity. As a result, I was friendly with the five participants during interviews in order to allow flexibility in their responses. I gave each interviewee the freedom to relax which yielded more information as I was probing their responses. Moreover, Christiansen et al. (2010, p. 6) assert that, "interviews generate large amounts of textual data". Thus, in overcoming this drawback of time and length of textual data, I conducted this interview for a duration of approximately 30 to 45 minutes per session. Interviews were not transcribed during the interview but were recorded using a recording device and the transcription was taken directly from the device. This allowed me to have relevant data in order to have a successful data analysis.

1. 12.3 Artefacts

The study used artefacts in order to supplement data generated during the reflective activity and interviews with the aim of interpreting lecturers' reflection. According to Cohen' et al. (2013), artefacts are defined as objects that convey message about the particular phenomenon being studied. Artefacts include pictures, maps, display materials, and symbols that can stand for, signify, and help us to articulate our research interests in a non-linguistic manner (Samaras, Hicks, & Berger, 2004). This suggests that, artefacts were useful in this study because they provided clear emotions from lecturers' reflections on the use of Moodle LMP. Thus I allowed the participants to draw or show an artefact (picture) symbolising their reflections about the good and the bad practices of Moodle. The strength of drawing or having an artefacts is a democratic process (Wang- & Burris, 1994). Similarly, lecturers in this study may be given the freedom to bring or draw any image that will express their feelings and emotions about the use of Moodle without my interference. However, Cohen' et al. (2013) assert that artefacts are easy to observe but difficult to

interpret. As a result, in overcoming this misinterpretation from artefacts, I requested lecturers to provide meaning of what transpired from their artefacts by recording themselves using a recording device and they also requested to do a write up giving clarity to the artefact. Thus, I had a clear interpretation of what an artefact is about from their write up from artefacts and this helped during data analysis.

1.13 Data Analysis

This study used qualitative data analysis. Cohen* et al. (2011) define qualitative data analysis as the creation of sense through data in terms of the participants' definition of the situation, noting patterns, themes, categories, and regularities. For the purposes of data analysis, the use of qualitative data analysis might unpack the question of what the data says and how is it interpreted in order to provide meaning to the readers. Thus, I adopted a guided analysis which included both inductive and deductive reasoning processes. Guided analysis is when categories are developed in priori to research and analysis is guided by categories that are modified through interaction with data (Samuel (2009). Furthermore, I enhanced inductive reasoning by ensuring that the categories emerged from the produced data because inductive reasoning is exploratory and open-ended. On the other hand, I started with a set of categories, which was then mapped onto generated data for the purpose of deductive reasoning because deductive reasoning is narrower and focused (Christiansen et al., 2010). As a result, guided analysis may allow me to utilise an open coding which is defined by Cohen* et al. (2011) as the simple new label that a researcher attaches to a piece of text to describe and categorise that piece of text. Therefore, I used guided analysis to code participants' responses directly from the recorded source in order to overcome data analysis weakness of loss meaning from transcription. Analysing data directly from the recorded source also affirmed trustworthiness.

1.14 Trustworthiness

The term trustworthiness refers to the way in which the enquirer is able to persuade the audience that the findings in the study are worth paying attention to and that the research is of a high quality (Guba & Lincoln, 1994). Furthermore, Guba and Lincoln (1994) reveal that paying attention to the following dimensions will increase trustworthiness in a qualitative study: credibility,

transferability, dependability, and conformability. Therefore, I ensured the trustworthiness in this study by ensuring that the above stated dimensions are adhered.

Furthermore, both Guba and Lincoln (1994) as well as Cohen' et al. (2013) describe transferability as the applicability of the research findings to another context. Thus, in this study, I may enhance transferability by ensuring that the accurate findings from the study will be beneficial, applicable, and exemplary to other university lecturers who may not be involved in the study but who may be in another context (university using Moodle) with similar characteristics or commonalities to those of my study.

In addition to the above, dependability relates to reliability and reflexivity and is about providing correct and direct information in the study (Guba & Lincoln, 1994). Shenton (2004) is in line with Guba and Lincoln (1994) when stating that, in order to address the dependability issue more specifically, the processes within the study should be stated in detail in order to enable a future researcher to repeat the work, if not necessarily to get the same results. This suggests that in this study, I guaranteed dependability by ensuring that the research design and its implementation was clearly described, planned, and executed. Further to this, I used direct quotations and references from scholarly work.

On the other hand, according to Shenton (2004), confirmability in qualitative study is associated with objectivity in the quantitative study. As a result, confirmability is consent with whether the findings reflect the experiences and ideas of the participants without being influenced by the researcher (Shenton, 2004). According to Cohen* et al. (2011), for a research to be trustworthy the findings must be confirmed by participants as true reflections of their responses after using different data generation methods (Triangulation) in order to reduce the effect of researchers' bias. Researchers must acknowledge any bias and circumstances that may affect the data in any way. As a result, I therefore acknowledged that I did not use my power as a researcher to influence the findings to ensure coherence and consistency. I also allowed lectures to confirm their findings in order to ensure transparency.

Moreover, Guba and Lincoln (1994) describe credibility as the findings reflecting the ‘reality’ and lived experiences of the participants. Further to this, ensuring credibility is one of the most significant features in establishing trustworthiness. I ensured credibility by allowing participants to check if the reality of findings captures or is congruent to their reflections (Shenton, 2004). In assuring confirmability in this study, I used what Guba and Lincoln (1994) call ‘member checks’. As a result, I arranged for the participants to come and view if written findings match what they actually intended and check if what was recorded, was accurately captured. According Shenton (2004), peer scrutiny of the research project affirms credibility. Consequently, I used my supervisor to scrutinise this study in order to make input to perfect the study.

1.15 Ethical Issues

Ethics is defined by Cohen' et al. (2013) as a matter of principled sensitivity to the rights of others, and that, while truth is good, respect for human dignity is better. Furthermore Christiansen et al. (2010) also outline that ethics in research is vital, especially when it comes to research involving humans and animals because all research studies must take into account the rights of participants to be protected from any harm potentially caused by the research. Further to this, Cohen' et al. (2013) clarify that ethics are situated. This suggests that they had to be interpreted in a specific local situation. Thus, in this study I sought permission to conduct the research by writing to the Edgewood and the permission was given. After permission was granted, I contacted the participants by writing emails and letters, and telephonically, to ask their permission to participate in the study

Furthermore, Cohen' et al. (2013) emphasise the ethical principles of autonomy, non-maleficence, and beneficence. This means that, after participants have agreed to take part in the study; I briefly explained the purpose of the study to them. I informed all participants in writing and verbally of their rights to confidentiality, anonymity, and about their voluntary participation. I made them aware that they were free to withdraw consent and participation at any time. I ensured their rights to privacy by using pseudonyms (L1, L2, L3, L4, and L5) instead of their real names. I made them aware that any information they provided was confidential. In addition, I assured them for the sake of honesty and transparency that their information was only going to be used in this study and not

for any other purposes. Further to this, I informed each participant that the study was beneficial to them (beneficence) in such a way that I did not pay them, and that the study would do no harm (non-maleficence). Following this, participants committed to the process by signing consent forms. All the above-mentioned rules were adhered to in order to minimise the chance of research limitations

1.16 Anticipated Problems/Limitations

For the fact that, I was a doctorate student and a staff member using Moodle at the very same university of KwaZulu-Natal at School of Education, I acknowledged that I held a certain bias and personal interest while conducting this study. However, during the study I did not raise any opinions, knowledge, and experiences that I had about the use of Moodle. I therefore allowed the participants to provide their own data, without being influenced by me, during the interview process. One of the limitations, like all other qualitative research, is that this study was small scale and thus its findings and results were subjective, personal, and contextual and therefore cannot be generalised but can be transferred. Thus, anyone or any reader can use findings of this study for the sake of transferability rather than generalisation.

1.17 Chapter overview

1.17.1 Chapter One

This chapter seeks to provide the reader with the general background of the study. This chapter also shows the title, the focus, research objectives, and research questions of the study as well as the location of the study. Chapter One indicates the rationale or background of the study which outlines my personal reasons for undertaking the study; what the literature says about the study phenomenon (lecturers' reflections) and study focus (use of Moodle); as well as the significance of the study. In addition, this chapter briefly looks at the literature review as based on the phenomenon (reflections), the focus (use of Moodle to teach science modules) as well as curriculum signals. Chapter One also highlights the synopsis of research design and methodology.

1.17.2 Chapter Two

This chapter provides the reader with the reviewed literature on lecturers' reflection on the use of online Moodle LMP. In other words, this chapter interrogates lecturers' reflections, Moodle as resource, and theories associated with online learning.

1.17.3 Chapter Three

Chapter three provides a detailed literature review on construction on curriculum and also provide detailed literature on curriculum signals which includes ensuring justice when teaching, teaching activities, assessment, platform, time, permission, content, and teacher's character. These signals were unpacked according to their propositions framed by reflections.

1.17.4 Chapter Four

This chapter provide details on the contextualising of adopted theory, Technological, Pedagogical And Content Knowledge (TPACK) by unpacking its main knowledge domains into the context of teaching Physical Science modules using Moodle LMP to produce Reflections, Resources, Procedures And Module signal (RRPAMS) theory. In the contextualisation of TPACK theory this chapter used the Moodle training guide and module outlines in replacement of the university online learning policy.

1.17.5 Chapter Five

Chapter Five conceptualises reflections into action in the field context by unpacking the methodological paradigm (qualitative, quantitative, and pragmatic) as well as metacognition paradigm (critical, positivist, and interpretive). Strengths, competences, and advantages is unpacked in each paradigm.

1.17.6 Chapter Six

This chapter actualise lecturers' reflections by outlining the style (Action research) which is used in conducting this study. It also unpacks research methods (reflective activity, artefacts, and one-on-one semi-structured interviews). Sampling (convenience and purposive sampling), trustworthiness (credibility, transferability, dependability, and conformability), guided analysis (inductive and deductive reasoning), ethical issues and the limitations of the study are also unpacked based on definition, strength, weakness and the processes that prevails in this chapter.

1.17.7 Chapter Seven

This chapter presents, analyses, and discusses the findings from lecturers' accounts generated in the action research. This chapter display how guided analysis is used through the deductive and inductive process. This chapter also shows how emerged concepts are developed into themes (lecturers' reflections, resources, permission, Justice/goals, teaching activities, character, assessment, platform and time, and content) which then form categories that are aligned with the three levels of reflections (informal, formal, and non-formal).

1.17.8 Chapter Eight

This chapter outlines the overall purpose of this study by interpreting lecturers' reflections using artefacts. Principles that create negativity and positivity are discussed in line with levels of reflections. This chapter discusses the principles that lead to the development of theory of an equilateral Moodle curriculum. The summery of the key findings based on the curriculum signals are discussed in order to address the three research questions of the study. Similarly, the summary of key responses to key research questions and educational implications are addressed in this chapter and this led to conclusions from the complete thesis.

1.18 Conclusion

This chapter introduced the study and laid the background of exploring lecturer's reflections on the use of Moodle to teach Physical Science subjects. In support of this, the chapter has outlined the title, purpose, location, rationale, problem statement, and brief of the reviewed literature. Further to this, Chapter One managed to show that this study is doable by outlining the skeleton of research design and methodology which includes the research approach, paradigm, style, sampling, data generation methods, data analysis, trustworthiness, ethics, and limitation. Interestingly, this chapter outlined the overview of all chapters from Chapter One to Chapter Eight. This chapter then leads to the start of Chapter Two.

CHAPTER TWO

Lecturers' reflections on the use of Moodle in teaching Physical Science modules

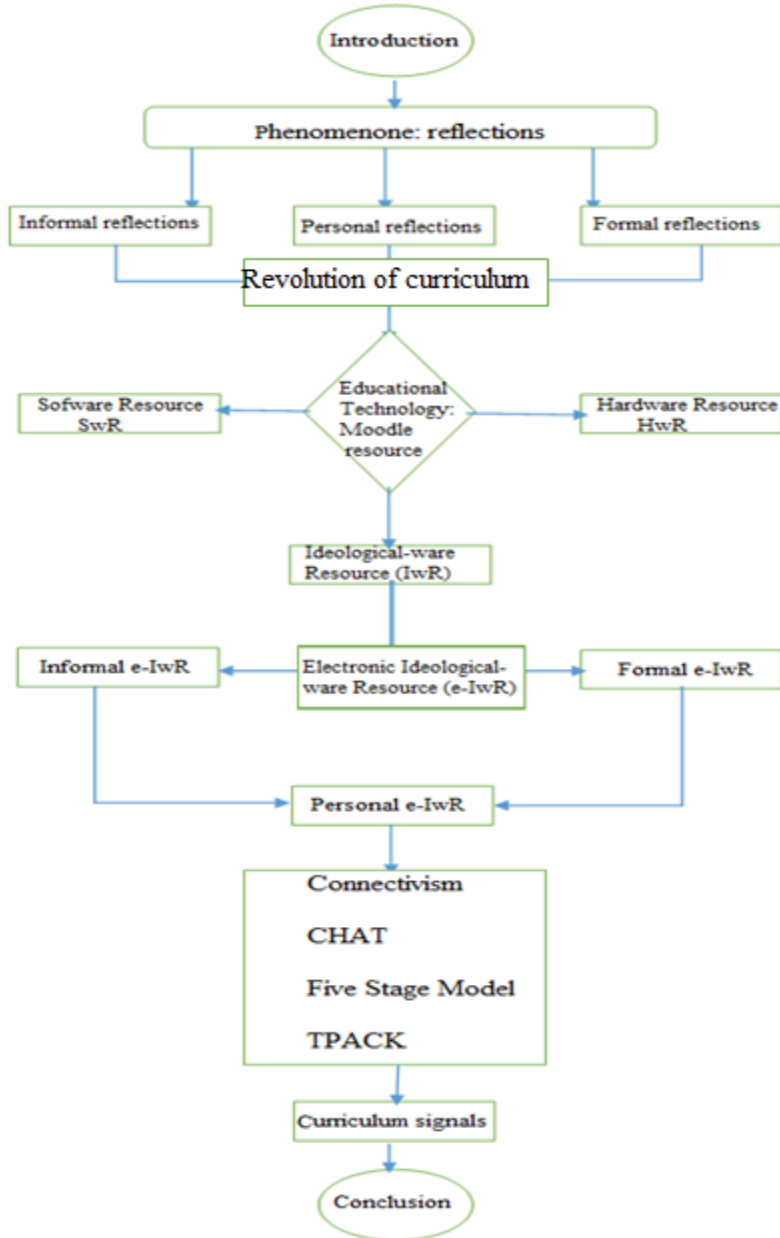


Figure 2.1: Chapter 2 flow chat

2.1 Introduction

The previous chapter outlined this study on the basis of its background. The study background focused on study location, research aims and objectives, research questions, preliminary literature, importance of the study, basic review on theoretical framework, research and design. This chapter will unpack lecturers' reflections (phenomenon). Thus, this chapter intends to look at the background definition of the reflections by discussing the trends of reflection as from 1933 to 2017. Furthermore, this chapter invents an emerging definition of reflection, which is embedded on the grounds of three categories as personal reflection, formal reflection, and informal reflection. Be that as it may, this chapter also intends to unpack the literature on educational technology: Moodle resource, which are divided into three namely, hard-ware, soft-ware, and ideological-ware resources (Govender & Khoza, 2017). Moreover, the ideological-ware resources are further discussed in order to show that electronic ideological-ware resources are divided into three types, namely, informal, formal, and personal electronic ideological-ware resources. It is one of the main objectives of this chapter to show that personal electronic ideological-ware resources merge the two electronic ideological-ware resources (informal and formal) through the discussion of various teaching and learning theories, which includes connectivism, Cultural Historical Activity Theory (CHAT), five-stage model, and Technological Pedagogical and Content Knowledge (TPACK). Towards the end of this chapter the importance of curriculum signals will be highlighted before conclusion is drawn which will lead to the next chapter.

2.2 Let them define reflection phenomenon in their own context

Seemingly, "...everybody has his or her own (usually undisclosed) interpretation of what reflection means, and this interpretation is used as the basis for trumpeting the virtues of reflection in a way that makes it sound as virtuous as Motherhood" (Smyth, 1989, p. 285). Basically, the work of Dewey' (1933) in, "*How We think*", as the founder of reflections, reveals various ways of thinking or thoughts. These kinds of thoughts are: consciousness, invention/imagination, and beliefs, but most important are reflections. The first of these other thinking is a phase of consciousness, which all lecturers are reluctant to use in all the time (Rodgers, 2002). Thus, Dewey' (1933, p. 4) articulates that this kind of thinking is an "uncontrolled causing of ideas through our heads". In other words, this kind of thinking does not have any specific time to occur, it is always

there in lecturers' mind as professionals/practitioners. This suggests that this phase of consciousness is often the kind of thinking most lecturers always do, which is personal depending on their daily habits. Moving further, the second phase of thinking is invention which according to Dewey' (1933) is also called imagination since it is the thinking that is not based on the conceptions of facts. In other words, the imagination phase of thinking is not on the grounds of truth or facts but is on the grounds on what you can picture and what others are saying, and this is an informal kind of thinking influenced by others from the surroundings (society). Moving further, according to Rodgers (2002), lecturers are always engaged in believing as the third phase of thinking. Believing is characterised as “prejudgments, not conclusions reached as the result of personal mental activity, such as observing, collecting, and examining evidence” (Dewey', 1933, p. 7). This suggests that belief occurs because there are facts that still need to be verified before conclusions are made, and this is formal since it is driven by written facts from readings. On the contrary, some beliefs can be accepted without examined proofs (Lowe & Kerr, 1998). Moreover, the vital fourth kind of thoughts/thinking is reflections, It is taken as an overall of all other three kinds of thinking because it involves personal, informal, and a formal category of thinking (Dewey*, 1938). Be that as it may, reflections “constitutes active, persistent and careful consideration of any belief or supposed form of knowledge in the light of grounds that support it and the further conclusions to which it tends” (Dewey', 1933, p. 9). This suggests that reflections are as a result of proven, verified, and examined facts, and active engagement with others for personal growth.

In addition to the above, the literature on reflections leaves one with the idea that reflections are well understood in education profession. While closer examination reveals that, this is not the case. As a result, various authors use multiple terms to describe reflections, for instance: reflective thinking (Dewey', 1933); reflection-in-action and reflection-on-action (Schön, 1983); reflective learning (Boyd & Fales, 1983); reflective teacher education and moral deliberation (Liston & Zeichner, 1987); critical reflection metacognitive (Mezirow, 1990); reflection (Fogarty, 1994); promoting reflection in professional course (Boud- & Walker, 1998); developing reflective practice (Loughran, 2002); societal, professional, and personal reflection (Khoza-, 2015d); and mindful reflection (Langer, 2016). Further to this, both Holland (2000) and Sherman' (1994)

articulate that the reflections may also be taken as self-introspection or meditation process. This suggests that there are different terminologies used to define what reflection is, and those terminologies may be personally, informally, or personally driven. That is the reason why it is essential for this study to discuss the definition of reflections.

Furthermore, Dewey' (1933) refers to reflections as a special form of problem-solving and a certain way of thinking that can be used by professionals in order to resolve a particular issue or a problem. That is the reason why Dewey' (1933) is of the view that reflections are defined as a meaning making process, a systematic way of thinking which requires attitudes that recognises the personal growth and its need to happen in the interaction with others. Furthermore, according to Dewey* (1938), the first part of the definition (meaning making process) involves the experiences on the bases that practitioners (lecturers) should be involved in the process of interaction between the self and other material (readings) in order to constitute the truth or facts about the experiences. Thus, interaction is one of the most vital elements in the experiences in order to enhance continuity in the development of practitioners (Rodgers, 2002). This definition suggests that the lecturer, as practitioners in the meaning making process, draws facts from their experiences by interacting with the available researched sources of information, which provides formal facts about a certain phenomenon. Thus, this suggests a formal reflections, which are informed by a vertical curriculum because lecturers have to read manuals, articles, books, and other formal sources about a particular adopted Learning Management platforms (LMPs) in order to draw facts on how to use those LMPs (Hoadley & Jansen, 2013; Sator & Bullock, 2017).

In addition to the above, the second part of the definition stipulates a personal growth through cognitive constructivism (Piaget, 1976; Wadsworth, 1996). In other words, reflections are concerned with conscious thinking of lecturers' own experiences and their own personal actions so that they can interpret them, in such a way that they can get a lesson for personal development (Boud- & Walker, 1998). This suggests that reflections assist lecturers to maintain personal positive attitudes and values for intellectual growth. Note that there might be a need for personal reflection since academics should be driven by their own conscious thinking about their daily use of an adopted technology (Moodle), which may have a personal positive impact during the

teaching and learning process (Meierdirk, 2016). In other words, in any usage of the LMPs, it should start with the self-interrogation, which may enhance good personal development towards the use of LMP. In the last part of the definition, there is an element of interaction with others, that is why “experiences has to be formulated in order to be communicated” (Rogers, 2001, p. 856). Thus, thinking without expressing your thought is incomplete, therefore, practitioners (lecturers) should express their thinking about their experiences to others (society) in order to develop the public (Dewey*, 1938). Note that reflection involves the process of sharing experiences, habits, ideas, and opinions about what lecturers do or practice (Zeichner- & Liston, 1996). This then suggests an informal reflection because lecturers have to interact with their colleagues who are familiar with any adopted LMP in order to know how to use it. In other words, lecturers should attend workshops or support structures organised by the university to get ideas and opinions on the use of and adopted LMP. There are few definitions of reflections by various authors taken from the work of John Dewey.

Furthermore in the 1970s, according to Van Manen (1977), reflections were not new in the education profession, especially during the teaching and learning process. See the study conducted by van Manen (1977) on teachers’ reflections in curriculum practices. It is revealed that reflections is about looking at the experiences based on the past actions and present actions in order to shape the future actions. Reflections give academics (lecturers) a chance to analyse difficult situations, tackle the problem, and to think differently in order to find the solutions to problems (Van Manen, 1991). This suggests that reflections involve the personal thinking and interrogation process in order to find the solution. This is evident when Dewey' (1933) emphasises that reflections assist lecturers and teachers to move from routine action which are influenced by traditional beliefs, habits, and HEIs or school policies; into reflective actions which are as a result of self-assessment, and self-development. This suggests that during the process of reflection there should be a change and transformation for developmental purposes in the profession (education). Thus, the major outcome of reflection in the education profession is transformative learning (Dreyer-, 2015). As a result, in defining reflections, Van Manen (1977) came out with three categories of reflections namely: technical reflection, practical reflection, and critical reflection.

Moreover, the literature elaborates more on the above-mentioned categories of reflections by first outlining that, in technical reflection lecturers are only worried about technical application of professional knowledge in the teaching and learning space, ensuring whether teaching goals (aims, objectives, and outcomes) have been achieved (Korthagen, 1992; Van Manen, 1977, 1991). Thus, this reflection is based on researched facts in that particular profession (education) (Waghid- & Davids, 2016). This suggests that technical reflection requires teachers to read the literature about their subject and profession in order to find facts from the researched work so that they can easily adapt to any kind of introduced LMP (Moodle) in the midst of technology integration with curriculum. In other words, this category of reflection seems to be a formal reflection since lecturers' reflections should be based on facts that are written in black and white from research based sources during the teaching and learning process (Van Manen, 1991). Secondly, in the practical reflections, lecturers are concerned with their practices during the teaching and learning process in the classroom or institutions. The lecturers' teaching practices should be in line with what the university community pronounces (Zembylas, 2017). In other words, lecturers' actions are influenced by following the university ideas, habits, culture, and what other lecturers are doing during teaching and learning. As a result, these reflections are based on ideas of the society members (university). Further to this, this then suggests a informal reflection since lecturers need to reflect based on what the university society says, and what has been said from support structures or attended workshops on the use of LMPs (Moodle).

Thirdly and lastly, critical reflection allows lecturers to become aware of their personal moral issues during the teaching and learning process so that they may be more concerned or think about themselves during the teaching and learning process in order to improve their practices (Van Manen, 1977). In other words, this reflection is about self-development via the interrogation of self-actions, and this may be concluded as a personal reflection since it encourages good personal morals, and positive attitudes in the teaching and learning process (Van Manen, 1991). This suggests that personal reflection may assist lecturers for self-development on the use of the new adopted LMP.

During 1980s, the field of reflection was dominated by the work of Schon (1987); (Schön, 1983): “*The reflective practitioner: how professionals think in action*”, “*Educating the reflective practitioner Jossey-Bass*”; in trying to elaborate on how practitioners meet and resolve the challenges of their work in their profession so that they can improve their practices. These studies were trying to bring together the theory of reflection and the practices in a particular context (learning institution). Schön (1983) work on reflection was trying to address the work of Dewey' (1933), which indicated problematic situations, problem framing, problem solving, and the use of critical thinking in all action taken in a profession. As a result, that is the reason why Schön (1983) study outlines that for professional growth of any practitioner (lecturer/teacher), it starts when a lecturer begins to look at things with a critical or personal lens, by interrogating and critiquing his or her actions. This study clearly outlines that uncertainty or doubts bring about a way of thinking that questions and frames situations as problems or challenges in the profession. This suggests that, practitioner such as lecturers or academics should be able to think about their situations during teaching and learning, and interrogate themselves in order to verify if they have done justice on their actions. In other words, lecturers should affirm their ability to solve emerging challenges by systematically questioning their experiences in order to try to find solutions the perplexing situations. Moreover, reflections are basically unpacking the understanding and development of professional practice because it is argued that the implementation of theory within the practice is driven by reflection (Schön, 1983). That is why Schön (1983) introduced the concept of reflection-on-action and reflection-in-action to define reflections.

In addition to the above, reflection-in-action can be defined as the capacity of a practitioner (lecturer) to think and react quickly, within any given present moment, when faced with a professional issue, a practitioner usually bonds with their feelings, emotions and prior experiences to address any situation directly (Schön, 1983). From this view, reflection-in-action can be taken as “... an important human activity in which people recapture their experience, think about it, mull over & evaluate it. It is this working with experience that is important in learning” (Boud* et al., 1985, p. 43). This suggests that this kind of reflection happens by critically and personally looking at the current or present actions/experiences during any challenging situations in a working environment. In other words, reflection-in-action involves personal self-questioning of any current

or present practitioners' actions in order to develop an awareness of the bad or good consequence of actions. This then suggests that these actions may be informed by a personal reflection emerging from context of self-interrogation. Further to this, reflection-on-action takes place after a practitioners' activity has taken place. It also involves thinking what happened, how and why happened as well as what changes can be made to improve the practice (Schön, 1983). Additional to this, Kolb (2014) sees reflection-on-action as the process of reflecting effectively on the past experience in such a way that there should be time set aside during each working day to reflect & analyse practices. Note that, reflection-on-action calls for practitioners (lecturers/teachers) to sit down and evaluate if their practices or actions are according to their profession (discipline/education) (Meierdirk, 2016). In other words, this involves the interrogation process of whether lecturers' actions, practices or experiences are according to the policies of the institution (universities/school) in order to improve and change themselves or lead to a new understanding of a practice (Boud* et al., 1985). This then suggests that, this kind of reflection is a formal reflection since lecturers' reflections should be based on written facts (university policies), researched work (studies/readings) and try to improve their practices based on what is stipulated in black and white.

In addition to the above, in both types of reflections (reflection in and on), lecturers take their teaching and learning actions by doing what they feel is good, and also be guided by relevant theory (policies or studies) in order to build new understandings to shape their action in the unfolding circumstances (Finlay, 2008). This is evident when (Schön, 1983, p. 68) articulates that "the practitioner allows himself to experience surprise, puzzlement, or confusion in a situation which he finds uncertain or unique. He reflects on the phenomenon before him, and on the prior understandings, which have been implicit in his behaviour. He carries out an experiment which serves to generate both a new understanding of the phenomenon and a change in the situation". This therefore suggests that, when lecturers meet with a puzzling circumstance such as difficulties in the use of the Moodle learning management platform, they should reflect in and on its use. This can be achieved by drawing from their own practical experience, also follow and engage with what the theory says (policy procedures) in order to generate the new understanding of using Moodle through the process of personal and formal reflection.

While Schön (1983)'s work on reflection "*in and on*" action is widely recognised and has inspired many practitioners including scholars, it has also drawn criticism. See studies conducted by (Grushka, McLeod, & Reynolds, 2005) and (Khoza', 2016a) who fault the work for missing the context of reflections based on the future actions which are informed by informal reflections. Thus, these studies added or advocated for inclusion of reflection-for-action in the practices of practitioners. Further to this, "reflection-for-action seek into account future actions" (Khoza', 2016a, p. 3) and it also drives practitioners to think for the future event (reflection-for-action) by involving the society opinions rather than to think after the event (reflection-on-action) and to think during the event (reflection-in-action) (Govender & Khoza, 2017). This suggests that those lecturers' future actions on the integration of LMP and curriculum is basically informed by informal reflections and are grounded on what they did before and what they are doing currently within the university society. In other words, if lecturers can only reflect on and in without reflecting for, it means there may be no clear or a successful future on the use of Moodle in High education institution around the world because personal identity that is ignored (Mgqwashu, 2017).

In the 1990s, the work of Dewey' (1933), Schön (1983) and Van Manen (1977) was still influential in the field of education and training in such a way that they were still developing studies on reflections (Finlay, 2008). For instance, there are various studies conducted on reflections, see studies which have done major research in bringing more discourse for clarity of reflections especially in the field of education (Boud' & Walker, 1993; Boud_ & Walker, 1991; Brookfield-, 1995; Loughran, 1996; Morrison, 1996; Zeichner- & Liston, 1996). Moreover, these studies (Boud' & Walker, 1993; Boud- & Walker, 1998; Boud_ & Walker, 1991) dominated the field of reflections in education in 1990s. Hence, it is outlined from these studies that reflections should advocate for experiential dimension rather than personal subjectivity. In other words, the process of reflection should take into consideration the socio-economic factors of practitioners (holistic) during reflection, and this seeks to avoid dehumanisation of practitioners in the process of reflection (Boud- & Walker, 1998). This suggests that the process of reflection should not only consider the profession or module need as well as societal need, but it should also take into account the personal or human need for self-development and identity. As a result, in defining reflections, Boud- and Walker (1998) focus on a significant part, that of critical reflection, which is defined

as, “an active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends” (Dewey', 1933, p. 9). This involve self-development via the critical interrogation of self-actions (Clift, Houston, & Pugach, 1990; Van Manen, 1991). This reflection advocates the individual or self-reflection of practitioners in their own environment or their own profession like education, (Boud- & Walker, 1998). That is why Zeichner- and Liston (1996) emphasised that critical reflection influences the range of each individual’s beliefs about teaching, learning and schooling in order to bring the professional mandate. This suggests that the discourse of reflections during 1990s was advocating for a personal critical reflection, which address the need of the individual lecturer or practitioner in education profession.

In addition to the above, studies aver that any reflections by lecturers become critical when all their actions are being questioned (Boud- & Walker, 1998; Brookfield", 1995). This does not mean that if a reflection is not critical it is not important but what is emphasised is a reflective practice that will enhance a critical reflection of the practices (Loughran, 1996). As a result, studies conducted by Boud- and Walker (1998) as well as Brookfield" (1995) on lecturers’ reflection on curriculum practices, are of the view that critical reflection directly addresses the profession since it is characterised by some characteristics such as: it is deeper, more intense, it draws from research sources and it is a probing form of reflection in order to bring clarity of various dynamics in the working environment. This suggests that in a critical reflection lecturers or teachers should not just merely reflect on their actions but they should question, interrogate, and assess, specifically their own individual actions by engaging themselves in a long-life learning process (Clift et al., 1990; Korthagen, 1992). In other words, lecturers should always make research and read policies from relevant profession or discipline in order to do what is relevant. This may assist lecturers to frame their actions as according to the university policies. For instance, lecturer’s actions of using Moodle should be interrogated by referring to those Moodle policies in place and based on what the research is saying (Bates*, 2016). This suggests that both formal and personal/critical reflection addresses the need of a module or professional need (education) and of lecturers.

Furthermore, most of studies conducted in the 1990s, were addressing reflections or reflective practices on the basis of individual and professional practice, few studies addressed the reflections by focusing on the group or the society (student, academics, staff, and parents) (Boud, Keogh, & Walker, 2013). However, in the early 2000s studies like Boud (2006), Høystrup and Elkjær (2006), Boud, Cressey, and Docherty (2006), as well as Pedro (2005), supported the move of reflection from individual and professional practice to the notion of collective or productive reflections. Thus, the study conducted by Boud et al. (2006), on lecturers reflections outlines that in the productive reflection lecturers as individual are working as a group of people in a particular context towards achieving a certain goal, that is, lecturers should consider all other stakeholders (society) during the process of reflection. The literature indicates that productive reflection is characterised with some vital characteristics which includes: collective orientation (reflection leads to action with others), contextualised within work (work/organisation drives reflection), multiple stakeholders (group need to work under common ground), generative focus (generate ideas), developmental (contribute to problem-solving in the organisation), and it is dynamic (cannot be predicted) (Boud et al., 2006; Høystrup & Elkjær, 2006; Schenkel, 2006). This suggests that, productive reflection involves informal reflection where lecturers or practitioners may reflect in order to address the societal or the community need (Mpungose*, 2016). In other words, the informal reflection by lecturer may take into consideration the presence of students, parents, and other university staff in order to achieve the common aims, objective, and outcomes (goals) (Khoza-, 2015d).

Moreover, the trend of defining reflections even moved further in the twenty-first century; see the qualitative interpretive case study conducted by Pedro (2005) on five pre-service lecturers. The main aim of the study was to understand reflections in order to understand their reflective practice in teacher preparation. The study concluded that lecturers had their own general understanding that reflection is based on different contexts. As a result, the study reveals that lecturers' reflections were based on self-reflection (personal identity or attributes), verbal reflection (communicate with others), written reflection (readings and completed journals). These findings concur with the study conducted by Singh and Singh (2012) exploring the 30 pre-services science teachers in rural South African schools. The aim of the study was to find the reasons for collapse of science in schools via

teachers reflections. The study outlined that teachers were not confident about the content (self reflections), the schools and universities do not support them with relevant books and readings (written reflections), and there is less support from their colleagues (verbal reflections). Moreover these studies suggests a certain trend which suggests that reflection may be based on personal identity, ability, development in order to address the self-need (personal reflection); ideas and opinions from others in the society (informal reflection); and facts from readings or research (formal reflection).

Furthermore, the recent literature on reflections reveals that both students and lecturers may undergo personal reflection (helps teachers and student to construct their own unique individual identities), professional reflections (helps teachers and student to rely of facts from their profession/research/readings), as well as societal reflection (enhances teachers and student to entertain other peoples ideas or oponions) (Khoza', 2016a; Khoza-, 2015d; Ngubane-Mokiwa & Khoza, 2016). The study conducted by Mpungose* (2016) on teachers' reflection on the teaching of Physical Science module refer to reflections as a rationale since the rationale seem to be the drive of all actions of lecturers in the teaching profession. This study reveals that lecturers can be driven by a personal rationale (addresses the individual need), societal rationale (addresses the community need) and content rationale (address the module need). Similarly, Khoza* (2016b) defines reflections as visions which includes personal vision (self-propelling vision), societal vision (vision influences by the society) and professional vision (vision influenced by education profession). This study reveals that teachers cannot teach without an understanding of curriculum visions. While all these above-mentioned studies and others indicates various terminology in defining reflections, the main concern from these studies is the major and common factor in the definition of reflection. In other words, what is common in all definitions is that, reflection may be personal (addresses individual need), informal (addresses societal need), formal (addresses subject, addresses a module or profession need). In the context of study, this then suggests that there is personal reflection, informal reflection, and formal reflection that can be undergone by both student and lecturers in education profession.

Moreover, the recent literature such as Govender and Khoza (2017), further avers that reflections are concerned with actions both lecturers and students take during the teaching and learning process. This study reveals three modes of reflection namely, scientific-technical reflection, practical-deliberative reflection and critical-emancipatory reflection. Scientific-technical reflection according to this study requires lecturers to have a scientific knowledge in order to solve problems during the teaching and learning process. Practical-deliberative reflection considers actions and experiences that are supported by other peoples involved during the teaching and learning process, whereas critical-emancipatory reflection enhances personal improvement, development and emancipation from any kind of oppression. Further to this, Wamba (2017) asserts that these reflections help professionals to understand their actions in order to increase self-awareness, change their practices for the future purposes, and to engage in professional studies for learning. That is why Alexander, Khabanyane, and Ramabenyane (2010) take reflection as a nucleus in all actions involved during the teaching and learning process, especially in the use Moodle. All these above-mentioned studies on reflections draws the same pattern of three types of reflections namely, personal reflection (personal development), informal reflection (ideas from other people), and formal reflection (scientific knowledge from readings) which can address all lecturers' and students' actions in the education profession.

In addition to the above, Sator and Bullock (2017) conducted a study at a university in Canada on teachers' reflections on the integration of technology with curriculum. The study uses Schön (1983) conception of reflections for generation and analysis of participants who reflected on the use of educational technology (maker pedagogy lab). The study outlined that teacher's reflection on maker pedagogy lab provides them with a way to understand their teaching practice. This study therefore concludes that individual teachers' thinking about teaching and learning. In other words, this study provides the importance of personal reflection where university teachers are expected to use their mind to think about possible solutions wherever they meet challenges in their practices, especially on the use of technology. However, this study did not address the importance of informal and formal reflections. On the contrary, the findings from the study conducted by Jesup, Lucas, Nelms, Woodruff, and Shields (2017), at the University of Florida, United State of America (USA), concurs with the findings from the study conducted by Peabody and Noyes (2017), at the

University of Southern Maine, because these studies reveal the importance of reflections for both student and lecturers that they must not only rely on the mere thinking ability (personal reflection), but must incorporate peer and professional relationship in order to have an influence on the improved practices. In other words, personal reflection alone is not enough without being supplemented with informal and formal reflections (Behari-Leak, 2017). This suggests that, among these three reflections (personal, informal, and formal), no one is innocent, that is, they all need each other in order to improve the process of teaching and learning (Khoza', 2016a). Thus, the above-stated literature on the defining of reflections outlines that, there are three types of reflections in education namely personal reflection (habitual), informal reflection (opinion), and formal reflection (facts) as depicted in Figure 2.2 below

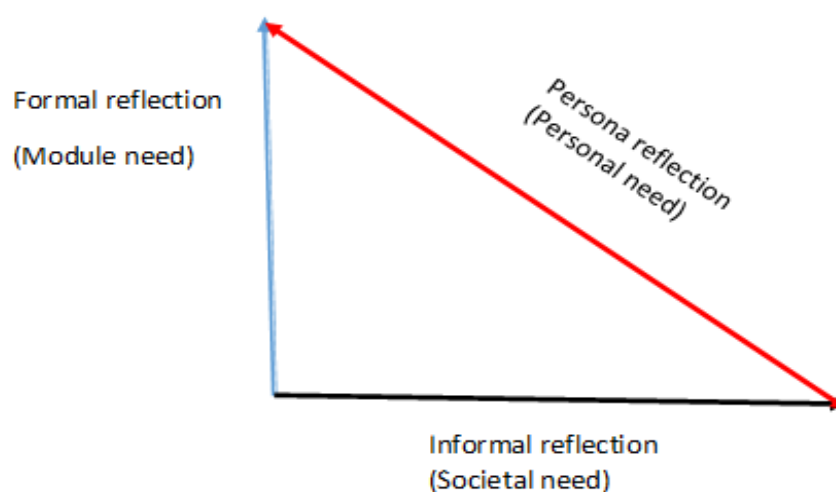


Figure 2.2: Definition reflection in the context of this study

2.3 Informal reflection

Furthermore, informal reflection places society at the centre of the teaching and learning process in order to address the societal need (lecturers and students using Moodle). This reflection produces the competence, integrated, horizontal curriculum (Bernstein, 1999; Khoza*, 2016b). Thus, Hoadley and Jansen (2013) outline that the use of Moodle in a horizontal curriculum is understood by looking at students' control over the curriculum (selection), students' role towards enactment of the curriculum (modules), teaching/learning methodology (focus), knowledge (every

day), assessment (presence or absence), as well as the teaching and learning platform. As a result, competence curriculum is driven by informal reflection since it encourages built-in competences to emerge from students in order to build their skills during the teaching and learning process (Myers, 2016; Ngubane-Mokiwa & Khoza, 2016; Ozerbas & Ucar, 2014). That is evident when Bates* (2016) asserts that informal reflection enhances a students' skill and ability to have a measure of control over the way in which they are taught (selection), when they are taught by lecturers (sequence), and how quickly they learn after being taught by lecturers (pace). In other words, lecturers may put more emphasis on horizontal curriculum signals such as learning outcomes, soft-ware resources, assessment as learning, physical access, facilitator role, weeks, chemistry, online learning, and societal-centred activities (Bernstein, 1999; Langer, 2016; Myers, 2016).

Moreover, informal reflections are dependent on opinions and ideas from other people in the society involved during teaching and learning, and it acts as a drive in the society in order to administer horizontal curriculum signals during the implementation of the curriculum (Dewey', 1933; Khoza*, 2016b). Further to this, learning outcomes addresses learners' intentions in order to fit visions as per the horizontal curriculum (Hyland, Kennedy, Ryan, & 2006; Khoza', 2016a). All learning activities are societal-centred in the context of informal reflection. This allows students to socially construct their own ideas being assisted by lecturers. Note that Chemistry activities (Physical Science module) are done online where students and lecturers socially interact through scheduled discussions on weekly basis in order to share ideas on the module. This seek lecturers act as facilitators in order to meet the needs of students (Govender & Khoza, 2017; Piaget, 1976). This suggests that informal reflection drives the societal or community teaching and learning process by addressing societal needs (students, lecturers, and others) (Maharajh, Davids, & Khoza', 2013; Ramrathan, 2017). Thus, informal reflection is not enough alone, it needs to be supplemented by a function of formal reflection during the process of teaching and learning (curriculum implementation).

2.4 Formal reflection

Moreover, Bernstein (1999), Hoadley and Jansen (2013), and Khoza (2016b) further outline that a formal rationale is a reflection that places a module at the centre during the teaching and learning process. This kind of reflection produces a performance, collection, or vertical curriculum where content knowledge (prescribed content) are given preference (Bernstein, 1999; Pinar, 2012). This suggests that when lecturers are driven by a formal reflection, they are addressing the module needs because they should know details about the discipline, subject, or module taught (Bernstein, 1999; Taylor, 1993). As a result, the main emphasis is on the module to be taught in such a way that each module stands on its own and has its own collection of terms, signals, or concepts (Hoadley & Jansen, 2013; Khoza*, 2016b). Thus, the formal reflection drives lecturers to focus more on the pedagogy of the module where module content is from the lowest to the highest levels of the cognitive domain (Bloom, 1956; Dewey', 1933). This suggests that a module need is attributed to formal school knowledge such as researched knowledge (studies, policies, and facts) (Khoza & Manik, 2015). In other words, a formal reflection during teaching and learning enhances lecturers to focus on vertical curriculum signals like objectives, hard-ware resources, assessment of learning, instructor, financial access, days, face-to-face lectures, mechanics, and content-centred/cognitivism (Hoadley & Jansen, 2013; Khoza, 2015).

In addition to the above, in a formal reflection, objectives are broad and specific statements that are generated according to the lecturers' intentions; it uses keywords such as introduce, understand, and so on (Hyland, Kennedy, Ryan, et al., 2006; Khoza-, 2013c). Assessment of learning, "tries to summarise the student learning at some point in time and it has been described as end-of-course assessment" (Hyland, Kennedy, Ryan, et al., 2006, p. 21). Lecturers act as instructors in order to give directives and instructions to be followed by all students in a formal platform irrespective of their ability to learn (Govender & Khoza, 2017; Khoza', 2016a). Thus, Bates* (2016) avers that the formal reflection encourages students to have funds for credits so that they are able to print hardcopies of their learning materials. Formal reflection is driven by face-to-face environments for contact sessions during the teaching and learning process, and formal reflection maintains content-centred cognitive learning activities which are based on mechanics as part of the Physical Science module which encourages a formal or cognitive thinking (Hoadley & Jansen, 2013;

Maharajh et al., 2013). These curriculum signals suggest that formal reflection is driven by a formal curriculum, a vertical, or professional curriculum, in order to meet the module needs (Bernstein, 1999; Hoadley & Jansen, 2013; Motsa, 2017). Note that the signals from formal reflection advocate a need for a formal reflection (based on researched facts) to address the need of a profession or module during the teaching and learning process (Dewey*, 1938; Khoza*, 2016b; Mpungose*, 2016). As a result, according to Ngubane-Mokiwa and Khoza (2016), formal reflection is highly recognised in the field of education since in each module there is prescribed content to be covered and taught. In other words, there will be no teaching without formal reflection. On the contrary, if lecturers are only grounded with the formal reflection and informal reflection without the personal rationale, which is based on autobiographical experience (currere) for personal development, there will be no quality on the curriculum implementation (Ayers, 1992; Berkvens et al., 2014; Pinar', 2010).

2.5 Personal reflection

Personal rationale places personal identity (lecturer/student) at the centre of Moodle usage and creates a platform that assists both students and lecturers to construct their own unique individual self-identities as well as their own specific needs development (Khoza', 2016a; Ngubane-Mokiwa & Khoza, 2016). That is why Rizvi and Lingard (2010) ascertain that personal reflection becomes the background of informal and formal reflection. This suggests that lecturers need to first be grounded on their personal identities or self-development (lecturers' needs) before they can address the needs of the module (vertical curriculum), and the need of the society (Horizontal curriculum) (Pinar', 2010; Pinar, 2012). Moreover, personal actions address the needs of the individual lecturer or student and are mostly generated from their unique and different backgrounds or autobiographical experience (Khoza-, 2016b; Langer, 2016; Pinar, 2012). This suggests that a personal reflection is a major rationale among the two others (informal and formal). As a result, personal reflection seeks that lecturers and student reflect on personal curriculum signals such as aims, ideological-ware resources, formulae, researcher, hours, blended learning, cultural access, assessment-for-learning, and lecturer-centred approaches (Khoza-, 2016b; Mpungose*, 2016; Schoenfeld, 2016).

In addition to the above, Govender and Khoza (2017) as well as Lee Grange- (2016) refer to aims as long-term broad visions for lecturers, and aims gives the broad teaching drive of a module like Physical Science (formulae) (Hoadley & Jansen, 2013; Mpungose*, 2016). Siemens (2014), Khoza' (2016a), and Amory (2014), emphasise that learning theories like cognitivism and connectivism, are ideological-ware resources which are referred to as cognitive processes that allow lecturers to do more research so as to find facts about their centrality during the teaching and learning process. That is the reason why Mpungose* (2016) outlines that the lecturers role of being a researcher helps them to ask questions (assessment-for-learning) which gives them a direction to establish if students are ready to learn using blended platforms (online and face-to face) in order to assist student to find their own personal identity. This suggest that the personal reflection is the basic reflection of the two others (Informal and Formal) because it allows both students and lecturers to include their unique and lived experiences, cultural identities, and personal talent development so that they will produce new knowledge in the process of teaching and learning (Khoza', 2016a; Mbembe, 2015; Reddy & le Grange, 2017). Curriculum signals in this platform suggest the need for personal reflection which is capable of addressing the personal identity of individuals (lecturers and students) in order to understand their actions and reactions so as to improve and empower themselves to shape their practices (Khoza*, 2016b; Maxwell, 2013; Mpungose*, 2016; Msibi, 2012).

However, the literature (Hoadley & Jansen, 2013; Pinar, 2012; Van Manen, 1991) outlines that most studies address the horizontal curriculum which is driven by the informal reflection (societal need) and address the vertical curriculum which is driven by formal reflection (module need), but what seems to be missing are studies about the curriculum which are driven by a personal reflection (lecturer/student need). This suggests that lecturers' and students' personal needs seem to be largely ignored by education profession, despite the expectation that they should enhance proper teaching and learning to address the module needs and societal needs which is a huge challenge (Mpungose*, 2016; Ngubane-Mokiwa & Khoza, 2016). Be that as it may, various scholars such as Schoenfeld (2016), recommend that in HEIs personal reflections should be taken as the best resource to help lecturers and students to find their identities before they have relevant knowledge,

skills, and values for improvements in horizontal and vertical curricular, and this may seek them to reflect on their own context of the South African curriculum (personal identity).

2.6 Reflections on South African curriculum

The literature (Behr, 1984; Hoadley & Jansen, 2013; Jansen, 1990; Pinar', 2010) done on the history of South African curriculum outlines that, periods of curriculum in South African history are divided into distinct periods namely: pre-colonial period, colonisation or apartheid period, Curriculum 2005 (C2005), National curriculum statement (NCS), and Curriculum and Assessment Policy document (CAPS). All these periods had been embedded on various educational ideologies, which guided the implementation of the policies. Further to this, the history of the South African curriculum started way back before the colonial period, and that period is termed as pre-colonial or traditional education. The indigenous (Khoikhoi, San and Bantu people) believed in their traditional or informal education. Ideology of this education was on the bases of communalism, believing that African children are raised in the community by the community (Horsthemke, Siyakwazi, Walton, & Wolhuter, 2013). In other words, pre-colonial education was informal, social, and without any racial discrimination among various native or indigenous tribes. This suggests that indigenous people were teaching their children various skills based on their gender including hunting, cooking, herding, farming, and housekeeping.

In addition to the above, during the colonial period, after the European settlers came to South Africa in 1652, in the Cape colony, formal schools were established. The first biblical schools were established after six years in 1658 based on racial segregation in such a way that there were schools for slaves, Khoisan, Bantu people, and white people separately, all these schools were driven by religious ideology (Eisner, 1985). This suggests that, basically, the South African education system or curriculum started or formed on the grounds or basis of racial segregation and social adaptation as from the colonial period (Zembylas, 2017). As a result, slaves, indigenous people and whites were living in the same colony or country doing different curriculum driven by the same ideology of religion. In other words, native people and slaves were colonised in order to do away with their own traditional, informal curriculum, and follow the colonised, formal curriculum (Mgqwashu', 2017).

Furthermore, Millar (1984), Walton and Rusznyak (2016), as well as Hoadley and Jansen (2013), clearly outline that during the industrialisation period in 1910, the four provinces: Orange Free State, Natal, Cape colony, and Transvaal were combined to form one government/state and education was centrally controlled. This suggests that all education systems were organised based on racial segregation because white schools were controlled by the state whereas black schools were controlled by the church. In other words, the state was providing a formal education (professional education) to the whites' schools, who were taken as masters/superiors, whereas the church was only providing the teachings of the bible (social education) to the blacks' schools as domestic workers or slaves so that they may bow and obey their masters (Jansen, 1990). This further indicates that blacks were only taught hand work, work skills, and respect so that they will respect and assist their masters in the field of work (Hoadley & Jansen, 2009). This is an indication that the curriculum was designed at a particular time to serve the purpose of the authorities of that particular time and place (Bernstein, 2000). That is the reason why Eisner (1985), and Hoadley and Jansen (2013), further reveal that in the 1940s and 1950s (19th century) during the apartheid period, there were various educational institutions in various levels of education in South Africa which includes primary schools, high schools, and tertiary institutions. These studies outline that the curriculum of these educational institutions were designed on the bases of social adaptation and racial segregation in such a way that there were black schools only and white school only.

In addition to the above, the studies outline that, in the basic education level, blacks' schools were offering courses/subject as from standard 1 to standard 8 (grade 10). Note that the only subject that were offered was vocational and technical at a lower level such as typing, metalwork, farming, etc (Eisner, 1985; Hoadley & Jansen, 2009; Khoza-, 2015d). Studies indicate that blacks were not allowed to do Physical Science and Mathematics subject which enhance cognitive thinking (formal learning) but they only had an allowance to those subjects equipping them with skills of work (informal learning) in the field. Studies outline that unqualified teachers, who were very authoritative, taught only black learners. This then suggests that black learners were taught only skills and competences to do field of work, that blacks were only taught at a lower cognitive level of understanding and recalling since their teachers were also unqualified (Bloom, 1956; Purvis, Aspden, Bannister, & Helm, 2011). In other words, according to Bernstein (1999) and (Khoza-,

2016b), during the Christian National Education (CNE), blacks were offered a competence-based, integrated, or horizontal curriculum, because teachers were only given a content driven syllabus which was prescribed, and teachers were given less hours to teach the content but more hours were given to them to teach hand work (skills) as well as to do physical training. Thus, teachers were taken as technicians only to deliver the content through rote learning (Msibi, 2012; Samuel-, 2008). In other words, teachers were not given any opportunity to engage in the curriculum development and training. As a result, this made students to be reluctant receivers of the content because even textbooks were encouraging teacher-centeredness because there were only summarised content, examples, and exercises (Hoadley & Jansen, 2013). Thus, this curriculum only produced people with practical skills because of this horizontal curriculum. As a result, few black learners had access to the tertiary institution but they were only hired to work in companies. Further to this, after a long working experience , blacks would be than given a trade test certificate because of their skills (horizontal curriculum) (Hoadley & Jansen, 2013; Khoza*, 2016b)

Similar to the above context, according to the studies by Pinar' (2010) and Behr (1984), white schools' education offered various subject as from standard 1 to standard 10. It outlined from studies that white learners were allowed to do technical and vocational subject at higher and international level only such as Mathematics and Physical Science in higher grade as from standard 8 to standard 10. From these studies, it is clear that offered subject were supporting the academic stream (formal education) where learners were equipped with high levels of understanding the subjects because of formal education that supported internationally recognised knowledge from researched work. White learners were taught by teachers who were trained, qualified, and resourceful in engaging them to resolve real life problems during the teaching and learning process (Hoadley & Jansen, 2013). This then suggests that learners were actively engaged in constructing their own knowledge during the teaching and learning process and their schools were well resourced in such a way that they taught formally, academically, and professionally in order to be able to compete at an international level (Piaget, 1976). In other words, whites were given a performance-based or vertical curriculum since white learners were taught to think at a higher level (application, synthesis, and evaluation) based of school knowledge so that they can have access to higher education (Bernstein, 1975; Bloom, 1956; Khoza*, 2016b). As a result, white learners were

assessed following a vertical approach where learners have to start from simple content to complex content with a purpose of grading from one standard to another (Bernstein, 1999). For this reason, most of them were privileged to have access to tertiary institutions to gain their qualifications within a specified period of time through the implementation of the vertical curriculum.

Moreover, the above-stated South African history of education outlines the battle of the two curricular; where the horizontal curriculum was addressing the social need of the majority of South Africans whereas vertical curriculum was addressing the formal or professional need of the minority of the south Africans (Jansen, 1990). This suggests that various higher education institutions around South Africa and Africa were and are still affected by the above-highlighted history because universities are still influenced by both students and lecturers who are from the very same context of South African history of education. As a result, both the local and international community are still calling for the balance of the two curricular (Vertical and Horizontal) in higher education institutions; see Higgs (2016) as well as Sellar, Gale, and Parker (2011) who advocate that curriculum is the major element in the transformation of higher education. Thus, higher education institutions like universities requires to take into consideration that the presence of both students and lecturers when implementing the university curriculum is important. In other words, universities must observe that the implementation of the curriculum should take care of both the formal need (vertical curriculum) and societal need (horizontal curriculum) of the university community (lecturers and students).

Furthermore, see the interpretive case study conducted by Khoza* (2016b) in one of the South African universities with an aim of exploring two of the twenty postgraduate students' understanding of curriculum visions and goals in teaching their subjects after graduation. The study revealed that postgraduate students as the community/society of the university were not aware of the visions that drive their teaching of the current South African curriculum. The study also revealed that the most important visions that drive learners are societal vision and professional vision. This suggests that informal or social vision places society at the centre during the implementation of the curriculum, this context of implementation of the curriculum is called competence or integrated or horizontal curriculum (Bernstein, 1999). On the other hand, this suggests that formal or professional vision places a discipline or profession (module) at the centre

of the curriculum implementation and this context is termed to be performance, collection/vertical curriculum (Bernstein, 1999). In other words, this is an indication that both students and the lecturers should be aware of the discourses around horizontal and vertical curriculum.

In addition to the above, see the literature which indicates that horizontal or competence curriculum consists of integration of subjects for example, Mathematics, Physical Science, and Technology were are combined into a single learning area called Science (Ayers, 1992; Davids, 2013; Mpungose*, 2016; Stenhouse, 1975). Competence curriculum is driven by learning outcomes where everyone is expected to achieve at the end of a module/subject. This curriculum does not care about the Bloom (1956) cognitive levels of outcomes (lower, middle or higher order). This suggests that teaching and learning is driven by aspects of socialisation towards the achievement of learning outcomes at a local context. In other words, student learning is influenced by informal opinions from their peers and lecturers and they passively engage or receive information since they do not engage with the researched work. This suggests that this curriculum addresses the social need of students and lecturer. As a result, this curriculum advocates that, “knowledge is mostly generated horizontally from simple sources or local known sources” (Khoza*, 2016b, p. 107). This means that vertical process of constructing knowledge is not the case during teaching and learning in this curriculum.

On the other hand, profession, subject, or discipline, is a major element in the implementation of the curriculum in both schools and universities Heystek and Lethoko (2001). That is the reason why Bernstein (1999), Tyler' (1959), and Khoza* (2016b) outline that in the vertical or performance curriculum modules, subjects or disciplines are on their own vertical and they consist of relevant terminologies which include concepts, theories, language, culture, ideologies and knowledge of specific subjects without any integration. This suggests that this curriculum addresses the subject or professional need during teaching and learning since it is based on specific facts which addresses the specific content, module, or subject (Biggs, 1996). Further to this, vertical curriculum is driven by internationally recognised content where all students construct their own knowledge of the same profession from the lowest to the highest cognitive level (Bloom, 1956; Piaget, 1976). The emphasis in this curriculum is that of researched facts, school knowledge

which address the subject or module content, and international standards are to be reflected during teaching and learning to address the professional need (Khoza-, 2016b).

Moreover, teachers, lecturers, schools, and the universities including officials from department of basic education and department of higher education lack the understanding of the influence of the nature of vertical curriculum related to the nature of horizontal curriculum (Bernstein, 1999; Pinar, 2012). That is why Khoza* (2016b) stipulates that teaching without understanding curriculum nature or vision is a high risk. This suggests that, for instance, (refer to Figure 2.1 below or overleaf), teaching without understanding both horizontal curriculum (x-axis) and vertical curriculum (y-axis) is a high risk especially at a university level because no curriculum is innocent or more important than each other. In other words, they all need each other during the teaching and learning process as from the start. Most surprisingly, lecturers or academics from the university fail to balance the two structures of curricular (Myers, 2016). This is evident on the studies (Bates*, 2016; Khoza', 2011; Wahab, Ali, Thomas, & Al Basri, 2013) conducted on the use of Moodle as a learning management platforms by both students and lecturers. Studies outline that Moodle was designed for constructivist learning. This suggests that student can use skills and ideas to socially construct the knowledge by interacting with the surrounding of Moodle space during teaching and learning (Piaget, 1976). In other words, this suggests that Moodle addresses the student, societal, or informal need (horizontal curriculum). On the contrary, the literature (Bates, 2000; Bernstein, 1999; Pinar', 2010) outlines that lecturers, as professionals, who are driven by formal or vertical curriculum fail to use Moodle to accomplish formal, professional, subject, or content need during the teaching and learning (curriculum implementation) process. This then suggests the problem in the implementation of the curriculum. As a result, when you refer to Figure 2.3, my study than claims that there is a missing link between student, informal, or societal need (horizontal curriculum), and formal, professional, module, or subject need (vertical curriculum). Be that as it may, my study therefore advocates the connecting link between the two curricular in order to close the gap, a link which can connect the two curricular by addressing the personal need of lecturers or teachers (personal curriculum) in order to bring an understanding between vertical and horizontal curriculum.

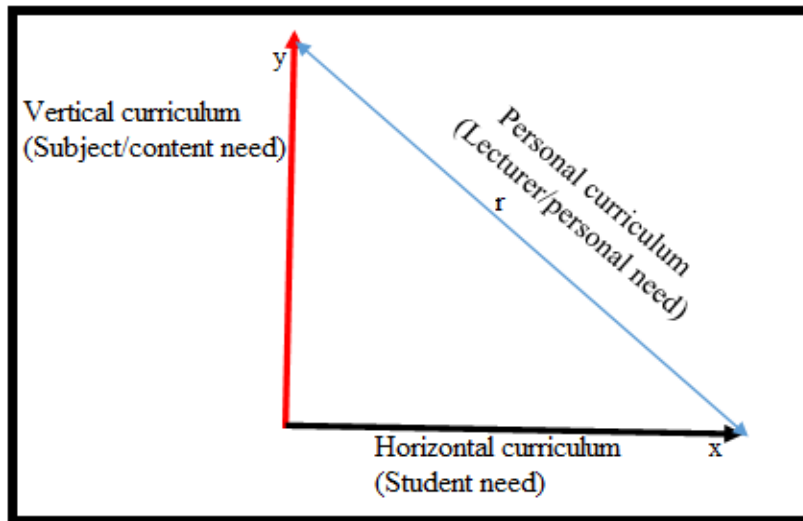


Figure 2.3: Gap identification

Furthermore, both Bates* (2016) and Ngubane-Mokiwa and Khoza (2016) are of the same view that after adoption of Moodle most lecturers silently boycott the use of Moodle. This suggests that universities adopted Moodle for constructivism learning (student needs) such as the use of Moodle chat rooms and discussion forum. On the other hand lecturers only use Moodle as a tool for displaying material (slides and readings) and not as a tool for engaging students to interact for themselves in order to bring the understanding of the module content (subject need). Thus, my study claims that in spite of the learning management platforms (Moodle) being adopted by the universities, there is still a continuum that leads lecturers to not to use Moodle. Moreover, my study further questions as to how we can address the personal lecturers' needs after this silent rejection of Moodle. In other words, referring to Figure 2.1, the study is concerned about the claim of socialisation (societal/student need) pushing towards the horizontal or informal direction to infinity societal needs, and the profession (module need) is also pushing on the vertical or formal direction to the infinity. This then suggests a problem if there is no ending point or connecting point on the directions taken by both these two curricular (horizontal and vertical), and there are few studies trying to address this problem (personal needs-lecturers). In fact, that is why this study is making a move of introducing personal curriculum, which addresses lecturer's needs as a connector in order to do away with infinities of the other two curricular when using Moodle during the implementation of the curriculum. As a result, lecturers' reflection (personal needs) on the use

of Moodle will assist them to understand the use of Moodle (societal needs) in order to teach the module content (module needs).

In addition to the above, various studies further elaborate on the problem that this study is trying to address. See the study conducted by Maher and Elkington (2015) in Australia which reveals that skills and accuracy of both teachers and lecturers in learning institutions in the area of technology integration with curriculum is inadequate, in such a way that there are few examples of excellence in technology integration especial in the use of LMPs. Bates* (2016) outlines the importance of variables that have influence in technology integration with curriculum which includes technological infrastructure, human support mechanisms, and rationale/reasons toward the use of technology (computers/LMPs). The literature also suggests that although teachers and lecturers in schools and higher education settings have established benchmarks or standards for the integration of technology into learning spaces, there is a lack of rationale that drives them to use any adopted technology (Moodle LMP) in order to substantiate technology with actual classroom practices (Brown* & Mayisela, 2015; Mills, 2001; Solomon, 2000)

Furthermore, Moodle is a widely used LMP by various HEIs which includes Monash University (Australia), University of KwaZulu-Natal (UKZN) (South Africa), University of California (United State of America), University of Kent (United Kingdom), and others (Kaka, 2015). In higher education institutions like UKZN, Moodle has just been adopted in 2010 and made compulsory in 2016 as a teaching and learning resource to be used by all lecturers during the teaching and learning process ("Phasing in of Moodle," 2016). In this cases, there are conflicting matters in such a way that lecturers are taken as digital immigrants (need training before the use of any technology) in this digital world, whereas students are termed to be digital natives (do not need any training before the use of any technology) (Ngubane-Mokiwa & Khoza, 2016; Prensky, 2001). This then suggests that in most cases, lecturers do battle to adapt themselves into new adopted educational technology systems (Moodle). In other words, lecturers are failing to use Moodle as an ideological-ware resource (tool for teaching and learning pedagogy) but instead they only use it as a hard-ware and soft-ware resource (tool for displaying teaching and learning resources) (Khoza, 2016a). Moreover, the South African press also reported that the University

(UKZN) has implemented the “one student one laptop” policy with the intention of phasing in Moodle. On the contrary, lecturers were complaining about phasing in of Moodle indicating that reading and teaching from a screen would be a challenge for them (Jeff, 2015). This indicates that there is a problem in the integration of technology with curriculum, especially in developing countries like South Africa.

In addition to the above, literature outlined that most lecturers from HEIs of the developing countries still believing in legacy content (James & Punzalan, 2014; Maher & Elkington, 2015). That is, lecturers still believe in using the traditional way of using hardcopies (photos, transparency, course packs, books, etc.) during the teaching and learning process. On the contrary, students believe in screen content where everything should be digitised via education technology (Moodle, presentation/slides, e-books, electronic resources). This suggest that the process of transition (digitisation) from legacy content to screen content is a challenge to lecturers and it will always come with confusion which may result in the reluctant use of any adopted educational technology (Moodle). This is an indication that academics (lecturers) are not familiar with Moodle educational technology. Be that as it may, it is still believed that “...something can be done to empower teachers to reflect upon their own situation, to speak out in their own ways about the lacks that must be repaired; the possibilities to be acted upon in the name of what they deem decent, humane, and just” (Greene, 1978, p. 71). This suggests that, lecturers’ reflections seem as the solution in this process of transition in such a way that it will dig deeper in finding the rationale or the reasons that will positively address the personal need of lecturers on the use of Moodle LMP (Bulman & Fairlie, 2016; Schön, 1983).

Moreover, the use and understanding of any educational technology such as Moodle, requires teachers or lecturers reflections (informal reflection, formal reflection, and personal reflection) in order to improve its use during teaching and learning (Govender & Khoza, 2017). This suggest that if lecturers do not undergo informal reflection, formal reflection, and personal reflection, their personal development on the use of any educational technology may not improve, and societal, subject, or module need may not be addressed as well (Khoza-, 2016b; Mpungose*, 2016). Jackson (2017) and Bates* (2016) aver that it is important and necessary for lecturers to have an

understanding of any adopted LMP; in the context of this study, lecturers need to understand what Moodle educational technology is. As a result, the following section discusses Moodle educational technology.

2.7 Defining technology

The term technology is commonly used by everyone all over the world from different fields or industries without a mere understanding of its definition and its origin (Bates' & Poole, 2003). Nevertheless, the technology is taken as one of the crucial constituents of education, especially in the 21st Century, because of its ability to improve everyone's teaching and learning practice (Bates, 2000). As a result, the word 'technology', according to Mannix and Stratton (2005), was uncommon during the 300 years before the 20th century, and it was referred to as the field of study of skills and methods and strategies of practical subjects like manufacture and craftsmanship. This study further outlines that the word technology became more popular in the early stages of the 20th century; in the 1930s technology was commonly referred to as an industrial arts, that is "technology includes all tools, machines, utensils, weapons, instruments, housing, clothing, communicating and transporting devices and the skills by which we produce and use them" (Read, 1937, p. 2). That is why a study conducted by Wilkinson (1963) further outlines that technology is broadly defined as entities, both material, and immaterial, that can be used as machines and tools to solve the real life challenges and improve people's life. This then suggest that both lecturers and students should reflect in order to define the technology they use during teaching and learning.

As a result, during the 21st century, the history and definition of technology as tools and techniques was then linked with lives of people (humanity) and technology is therefore referred to as "a means to fulfil a human purpose" (Arthur, 2009, p. 28). Moreover, Bijker (2010) outlines that technology is what is invented to reveal and prolong human interests and social activities. This suggests that, technology may be referred to as all personal, informal, and formal reflections or activities (tools and techniques) done in order to improve peoples' lives. Thomas (2004) further reveals that definition of this technology is not easy thing to do, it is messy and complex; sometimes it is difficult to define and understand. Be that as it may, technology is emphasised to be taken as "a creativity process involving human ingenuity" (Thomas, 2004, p. 3). As a result, technology is all

about using the tools, skills, and knowledge we have in order to address personal (individual identity), informal (societal need), and formal needs through reflections (module/subject need) (Bijker, 2010; Garud, Gehman, & Giuliani, 2016)

Furthermore, the current literature still outlines that the definition of technology is not simple “but it can be understood as a branch of knowledge that deals with creation and use of information” (Govender & Khoza, 2017, p. 66). Moreover, studies outline that this branch of knowledge uses digital, electronic, and technical resources in order to improve peoples’ life in the society, and technology covers several professions which include engineering, science field (Science and Mathematics), education and others (Chatterji, 2016; Garud et al., 2016; Govender & Khoza, 2017). These studies further outline that technology makes life easier for everybody because it enhances the quick and easy access to any kind of updated data that is useful. That is why Glover and Miller (2001) outlined three of the most important categories of technology: the first is Medical technology which is about the use of machinery and equipment as well as science for diagnosis and controlling of operations for patients, like dialysis, chemotherapy, and surgeries; and it is informed by formal reflections. Second, is technology of productivity which uses equipment and machinery in order to speed up occupational activities like mining, fishing, manufacturing and farming; and it is informed by societal reflection in address the needs of society. The third and last, is about the use of machinery, equipment and programmes for teaching and learning; it is about personal reflection because it caters for personal growth of individual. This study is more concern about educational technology, which encourages personal developments. That is why Bulman and Fairlie (2016) further emphasises that educational technology has been said to facilitate teaching and learning process by motivating both students and lecturers to undergo reflection in order to improve and develop their lives.

In addition to the above, see the qualitative case conducted by Ngubane-Mokiwa and Khoza (2016) at the Technical and Vocational Education and Training (TVET) institutions. The aim of the study was to explore the experiences of lecturers teaching Science, Technology, Engineering and Mathematics (STEM) subjects to blind student using technology. Purposive and convenience sampling were used to selected teachers as participants. The study revealed that teachers were

lacking technological competency in order to address all curriculum concepts during the teaching and learning process. Therefore, this study concluded that teachers should address their personal need, informal need, and subject (formal) need, through the process of reflection in order to improve the teaching of STEM using technology. This study concurs with the findings from the study conducted by Khoza- (2016b), which was an interpretive case study of university lecturers. The aim of the study was to explore lecturers' reflection on their understanding of Educational Technology at a South African university. Purposive sampling and convenience sampling were used in selecting the six lecturers to participate in the study. One-on-one semi-structured interviews and focus group discussions were used for data production. The study revealed that the lecturers did not understand the educational technology that was adopted for teaching of a university curriculum. As a result, the study concluded that there should be a clear definition of educational technology in order to capacitate lecturers on the use of educational technology. The study also concluded that educational technology should be taken as the discipline that generates theories on the integration of technology with curriculum. These findings from the two studies suggest that the clear definition of educational technology may enhance the improvement of lecturers and students' capability or awareness on the use of technology in the universities or colleges. These findings further suggest that if lecturers are not well versed with educational technology and are not undergoing the process of reflection (informal, formal, and personal), there might be a collapse of the implementation of the curriculum (Amory, 2014; Khoza-, 2016b). As a result, this study puts more focus on defining what educational technology is. It is for this reason that, the following section will discuss the meaning of, and elaborate more on, educational technology.

2.8 Defining Educational Technology

There are various definitions of educational technology, but this study refers to educational technology as “the effective use of technological tools (resources) in teaching and learning” (Govender & Khoza, 2017, p. 67). While educational technology was criticised during the 20th century, see Einstein (1931) who argued that educational technology surpasses both student and lecturers actions during teaching and learning in such a way that universities will have a generation of idiots. On the contrary, most scholars in the 21st century have a different perception on the use

of educational technology; see Amory' (2010) and Khoza- (2016b) who are of the different view that, educational technology plays a major role in the lives of university society (lecturers, and students, and others), and that educational technology improves the quality of the teaching and learning process. This suggests that the introduction of educational technology in higher education institutions catalyses the process of teaching and learning by addressing informal need (university community), formal need (quality of subject/module offered), personal need (student and lecturer) through the process of reflection (Garud et al., 2016). This then indicates the need for the process of reflection (informal, formal, and personal) to occur in order to address all human needs in light of defining educational technology.

Furthermore, the study conducted by Govender and Khoza (2017) outlined that educational technology concepts were known as audio-visual education around the world, up until the United State of America (USA) and other countries introduced Instructional Technology (IT) to replace educational technology. This suggests that the attempt to replace educational technology with other concepts did not prosper because the term educational technology is still in place in universities around the globe. Further to this, in the United Kingdom (UK), the concepts of educational technology are referred to as Technology-Enhanced Learning (TEL) which are defined as, 'any online facility or system that directly supports learning and teaching' (R. Walker, Voce, & Ahmed, 2012, p. 2). Moreover, in the South African context, this concept of Educational Technology is referred to as Information Communication Technology (ICT) or Classroom Technology (CT), which is normally defined as all resources used for processing, accessing, and storing information for communication fulfilment which support electronic learning (e-learning) (Govender & Khoza, 2017; Ngubane-Mokiwa, 2013). This then shows the need for academics to reflect (personal, informal, and formal) so that they can have an understanding of different terminologies of which educational technology is referred to in all parts of the world. Through reflections, academics and students will understand different types of educational technology. As a result, there are various educational technologies which includes Lecture capture in classrooms designed, Massively open online courses (MOOCs), Distance learning programmes, Paid online course-ware, Educational Content creation, Hard-ware equipment for classrooms, Learning management platforms (Blackboard, WebCT, Moodle) and others (Bates*, 2016; Michael, 2014). Thus, this study is

concerned with Moodle LMP as one of the educational technologies that is most adopted and used by the majority of HEIs around the world because it is an informal, formal, and personal platform (Govender & Khoza, 2017; Jackson, 2017). Therefore, Moodle LMP will be discussed as follows

2.9 Defining Moodle as a resources

Moodle LMP stands for Modular Object-Oriented Dynamic Learning Environment (Moodle) as a teaching and learning resources in order to supplement the diminished human resource; it was developed by Martin Dougiamas, a computer science and education graduate on the bases of social constructionist and constructivist epistemology in teaching and learning (Chavan & Pavri, 2004; Fish, 2016; Naicker, 2016). Thus, Brandl (2005) outlines that, Moodle is an Open-Source Software, which implies that users are free to download it, use it, modify it, and it is free of charge in terms of the General Public License (GNU). Further to this, a resource is defined as anything that helps in order for learning to take place (Criticos et al., 2005) or “any person or thing that communicates learning” (Khoza', 2012, p. 75). Furthermore, the findings from an interpretive case study conducted by Khoza- (2013a) on university lecturers who were using online environments in teaching their modules are in line with findings from the studies conducted by Amory' (2010), as well as Govender and Khoza (2017). These studies reveal that Moodle, as a resource, is divided into two major categories; Technology in education (TIE) and Technology of Education (TOE). These studies further outline that TIE is referred to as Soft-ware Resource (SwR) and Hard-ware Resources (HwR) and TOE is referred to as Ideological-ware Resources (IwR). This then suggests that Moodle LMP consist of SwR, HwR, and IwR. In other words, Moodle consists of and informal Moodle platform (SwR) – which addresses community needs via informal reflection, a formal Moodle platform (HwR) – which addresses subject or module need via formal reflection, and a personal Moodle platform (IwR) – which addresses personal needs via personal reflection (Downes, 2010; Khoza', 2016a). This indicates the need for informal, formal, and personal reflections for both students and lecturers in order to understand these Moodle platforms, which consist of IwR, SwR, and HwR.

2.9.1 Moodle Hard-ware resources

Furthermore, Govender and Khoza (2017), aver that HwR are any physical resources that can be used to perform logical and basic functions in teaching and learning such as tablets, overhead projectors, notepad, chalk board, digital white board, desktop computers, laptops, smart boards and smart phones, televisions, and others. According to Newby, Stepthic, Lehman, Russel, and Ottenbreit-Lefwich (2011), HwR act as the brain of all other resources because it allows an input of information or the start of any process, and also processes and stores that information in order to be displayed as an output. This suggest that HwR can act as input hard-ware (keyboard Mouse, touch screen, etc.), processing and storing hard-ware (internal memory or processor, hard disk, etc.) and output hard-ware (monitor, printer, microphone, etc.) (Cruz, 2013). Moodle as a HwR possesses certain specific hard-ware requirements which includes the following: hard disk space: minimum of 5 Gigabytes; Processor: minimum of 1 Gigahertz; internal memory: minimum of 512 Megabytes (Hollowell, 2011). This definition of HwR suggests that all these physical resources are for formal use because the usage of any HwR is guided by any written and vertical guidelines in a manual which shows a step-by-step means on how to use that particular HwR. In other words, HwR are informed by formal reflections, which then address the subject or module need by following a vertical curriculum approach (Bernstein, 1999; Peabody & Noyes, 2017). In other words, Moodle as a HwR is influenced by a vertical curriculum (Ngubane-Mokiwa & Khoza, 2016).

In addition to the above, vertical curriculum can be understood by first defining what curriculum is. As a result, these studies (Hoadley & Jansen, 2013; Khoza-, 2016b; Pinar, 2004) aver that curriculum in the context of Moodle as a HwR is referred to as a plan of teaching and learning, and curriculum can be presented as intended curriculum. This definition suggests that curriculum consists of formal or vertical curriculum. This suggest that, all vertical curriculum activities may be informed by a formal reflection, which address all activities or module needs done on intended curriculum (plan of teaching and learning) (Govender & Khoza, 2017; Khoza', 2016a; Pinar, 2012). Further to this, vertical curriculum is influenced by the product approach where the focus is on the product during teaching and learning and is focusing on understanding the prescribed content of a subject or a module (Bernstein, 1999; Taylor, 1993). As a result, a formal reflection

in this context plays a huge role in bringing the awareness of factors like the student, lecturers, module pedagogy, knowledge, assessment, and location during teaching and learning (Bernstein, 1975).

Moreover, Hoadley and Hoadley and Jansen (2013), as well as Khoza' (2016a), reveal that the main focus of a vertical curriculum is on the module or subject to be taught and its content to be covered. This suggests the focus is on teaching and covering what is planned, written and prescribed in a document. In other words, lecturers should follow and teach students what is prescribed in a module outline (planned curriculum) following a particular pedagogy or teaching strategy (Bernstein, 1975). Further to this, Bates* (2016) believes that Moodle as HwR is used to display and print all learning materials, such as readings, of a particular module. This suggests that, teaching and learning using Moodle as HwR assists both lecturers and students in knowledge construction and understanding of module concepts following a particular specified sequence or route until a particular product is reached (Tyler', 1959). In other words, the formal use of Moodle HwR requires academics to follow certain steps or prescribed sequences (Jackson, 2017). This suggests that, it is not possible to access Moodle HwR without following certain steps, like user login into the system and display any process or functions done in Moodle usage.

Moreover, vertical curriculum is concerned with and encourages the use of school or researched formal understanding or knowledge during teaching and learning (Khoza, 2015). In other words, Moodle HwR usage requires lecturers to use of Moodle based on facts, written down instructions and internationally recognised content or information during the teaching and learning process (Kashora, van der Poll, & van der Poll, 2016). For this reason, Mohammadyari and Singh (2015) as well as Mpungose* (2016) outline that a formal reflection plays a huge role in this context higher education because it requires academics (lecturers) to reflect on their control over sequences and the pace of teaching and learning process. This suggests that lecturers are the ones who initiate the process of teaching and learning using Moodle HwR; for instance they are the ones who select the type of activities to be done or discussed in the discussion forum or chat rooms with students.

In addition to the above, assessment in the use of Moodle as HwR requires students focus more on what is absent or deficient (what a learner does not know) in order to develop more understanding, and this creates a sense of reaching a particular performance (knowledge/understanding) rather than a competence (skill) (Bernstein, 1999; Hoadley & Jansen, 2013). This suggest that the use of formal reflection may influence lecturers to use Moodle to give assessments that provide understanding of concepts during the teaching and learning process, and assessments that try to find and discover new ideas about the module taught. Note that vertical curriculum encourages the use of Moodle HwR at a certain specific location (Bulman & Fairlie, 2016). This suggests that Moodle, as HwR, may be used in a particular selected location like a learning site where formal education can take place.

Further to the above, it is emphasised from a study conducted by Ngubane-Mokiwa and Khoza (2016) that vertical curriculum encourages modules to be clearly demarcated, and modules are not interlinked but each module stands on its own properties. This suggests that academics may be required to formally reflect on each standalone module during the teaching and learning process. In other words, Moodle as HwR demarcates each module from others; this allows each module to stand on its own with its functions (Chat room, Quizzes, lesson, and others) which are not linked to other Modules (Hollowell, 2011). This is an indication that Moodle HwR is addressed by a formal reflection, which requires both academics and students to reflect on facts in order to address the module need which in turn may assist them to understand the content of a module when using Moodle as HwR (Jackson, 2017). However, Moodle HwR cannot work properly without Moodle SwR in place (Hollowell, 2011).

2.9.2 Moodle as Soft-ware resources

Moreover, Bulman and Fairlie (2016) and (Khoza-, 2016b) assert that SwR is any resource that is used to enhance the HwR to display information or data such as computer application soft-ware (Microsoft PowerPoint, spreadsheet and others), YouTube, Twitter, Web 2.0 tools (blogs), animations and simulation soft-ware, Facebook, LMPs (Moodle, Blackboard, Webct), Skype, and others. Furthermore, soft-ware are programs that comprise a particular HwR and SwR, and made up of sets of instructions that tells a HwR how to perform a particular task (Newby et al., 2011).

The study conducted by Pearson (1994) outlines that there are two types of soft-ware, and they are application soft-ware and system soft-ware. The study further reveals that operating systems are a master control program which are made of programed instruction (massages/ideas/opinions) for all activities in resources such as Microsoft Windows, Linux, and others; Whereas, application soft-ware are made to perform a specific function after it is instructed by the user such as word processor, PowerPoint, database, and others. This suggests that the functions of Moodle SwR is influenced by informal reflection, where actions or practices are based on a given instruction or ideas in order to address the societal or community need. Note that, there are minimum requirements for Moodle SwR which include the following: Moodle SwR can run operating system like Linux and Windows XP/2000/2003, Solaris, and Netware 6; The web server can be Apache HTTP or Internet Information Services (IIS); Programing language can be PHP version 5.3.2; Database can be MySQL 5.1.33, Oracle 10.2, PostgreSQL 8.3; and the minimum browser can be Firefox 4, Internet Explorer 8, Safari 5, Google Chrome 11, or Opera 9.

It is clear from the above-stated definition of Moodle SwR, that there are programed instructions, which drive all activities, and this then suggest that Moodle SwR is driven by instructions or ideas from other people (Arthur, 2009; Schoenfeld, 2016). This definition (SwR) is further advocating for the informal usage of resources, which provides a social space where everyone can suggest ideas or opinions during teaching and learning (Govender & Khoza, 2017). Thus, this is a clear indication that SwR may be informed by informal reflection where everyone in the society or community feels comfortable and praised (student and lecturers) for his ideas and opinions (Jesup et al., 2017). This then suggests that SwR is influenced by implemented mode of curriculum. The study done by Khoza' (2016a) and Hoadley and Jansen (2013) outline that implemented curriculum involves the ways in which both student and lecturers put curriculum into implementation or practice. This suggests that Moodle SwR tries to provide a space where lecturers' actions may transform the intended curriculum into practice. That is why Govender and Khoza (2017) affirm that actual teaching of a curriculum using Moodle SwR allows information-sharing of students' and lecturers' experiences in order to invent new behaviours, understanding, and practices. This suggests that lecturers become the interpreters of the intended curriculum during the

implementation process which then requires them to undergo informal reflection in order to address the societal need in a HEIs.

In addition to the above, Moodle as a SwR can be viewed as the “carrier of the curriculum” because it allows the space for interaction or sharing of ideas between students and lecturers (Van den Akker-, Branch, Gustafson, Nieveen, & Plomp, 2012). This suggests that Moodle SwR is informed by horizontal curriculum approach where student, lecturers, module pedagogy, knowledge, assessment, and location are given the priority (Bernstein, 1999; Reddy & le Grange, 2017). According to Hoadley and Jansen (2013) the horizontal curriculum provides a space that encourages students to come up with their own skills during teaching and learning which is not to be imposed, and this advocates for informal reflection. This suggests that Moodle as SwR (driven by horizontal curriculum approach) provides spaces like discussion forum, which allows students to show, share, and reflect on emerging skills during the teaching and learning process. Moreover, Jackson (2017) reveals that Moodle SwR enhances lecturers to give teaching activities that invokes students to share their own social experiences, which is related to everyday knowledge informed by informal reflection (local context or ideas). In others words, Moodle SwR provides platforms like chat rooms, and platforms in which students may develop skills and have confidence on the module taught irrespective of their socio-economic background (Hollowell, 2011). In a horizontal approach Moodle SwR is believed to be flexible because teaching and learning can take place anywhere and at anytime irrespective of the location (Bates*, 2016; Hoadley & Jansen, 2013). This suggest that Moodle SwR provides environment (online and virtual) for teaching and learning to occur, and also accommodate all kinds of learners whether physical challenged or physical unchallenged, at a distant or in class, face to face or online, etc.

Moreover, students become free and have autonomy and control over the content they want to learn (selection), the way (sequence) in which they want to learn, and the speed in which they want to learn (Pace) when using Moodle SwR (Khoza & Manik, 2015). This suggests that student have democracy in the manner in which curriculum is implemented as advocated by great curriculum theorist (Dewey*, 1938). Thus, according to Downes (2010), teaching and learning Moodle SwR becomes learner-centred because teachers does not directly transmit the content but it is shared and discussed. In other words, lecturers act as guides and facilitators during the teaching and

learning process. The knowledge construction in Moodle SwR is located in problem solving and projects, that is why Moodle SwR provides surveys, assignments, quizzes and others in order to allow students to engage themselves in knowledge construction (Dougiamas & Taylor, 2003; Prensky, 2001).

Further to the above, Hollowell (2011) outlines that teaching and learning when using Moodle as SwR is only concerned about reaching an outcome and it is not concerned about how and when the outcome is reached. This suggest that Moodle as SwR uses the product approach of implementing the curriculum, where students are allowed to use different ways in achieving the module outcome (Tyler, 2013b). This then shows creativity among learners during the teaching and learning process. It is therefore vital that both student and lecturers work together in addressing everyone needs (community/society) involved during the teaching and learning process. Thus, it is evident from the study conducted by Dreyer- (2015) that informal reflection plays a major role in the use of Moodle SwR because it provides a platform where student and lecturers needs are always considered. That is why it is revealed that the use of Moodle SwR encourages evaluation or assessment where a lecturer will test students based on what they know (presence) (Hoadley & Jansen, 2013). This suggests that assessments, when using Moodle SwR, focuses on the strength rather than the weakness, and that gives both students and lecturers some confidence during the teaching and learning process.

2.9.3 Moodle as Ideological-ware resources

Moreover, the findings from the study conducted by Khoza' (2012) on the university lecturers who were using the online learning platform are in line with the findings from the study conducted by Amory 2010 on the use of tool-mediated learning (playing games) in teaching students, because these studies reveal that teaching and learning is not about SwR and HwR but it is about IwR. As result, these studies define IwR as all teaching and learning activities that cannot be seen and touched and they are referred to as drivers of the lesson in education such as theories, teaching strategies and others. IwR may include teaching and learning strategies and theories such as

Cultural Historical Activity Theory (CHAT), Constructivism, Connectivism, e-learning, virtual learning, Technological, Pedagogical and Content Knowledge theory, learner-centred or teachers-centred method, and others (Engeström et al., 1999; Mishra & Koehler, 2006; Siemens, 2014; Vygotsky, 1978). This definition suggests that IwR is not all about Moodle HwR and Moodle SwR, but is all about Moodle IwR, which is about ideology behind the use of any given resource (Amory, 2007). In other words, Moodle IwR requires self or personal development in order to master theories behind the usage of Moodle HwR and Moodle SwR that can be addressed via personal reflection. Personal reflection influences lecturers or academics to look at their actions and see if are they still serving the purpose of achieving goals (goals, objectives and learning outcomes) (Bitzer & Botha, 2011; Bloom, 1956). This suggests that, through personal reflection, lecturers may be driven to personal development on how to use Moodle HwR and Moodle SwR using relevant theories (Moodle IwR).

In addition to the above, Mohammadyari and Singh (2015) conducted a quantitative study at Auckland University of Technology in New Zealand. The study used a questionnaire for data collection, and Unified Theory of Acceptance and Use of Technology (UTAUT) as a theoretical framework. The study investigated the impact of IwR in education towards the performance of university lecturers. The study revealed that the diffusion of technology (SwR and HwR) in education such as podcasts, computers, LMPs, blogs and others, plays a major role in teaching and learning in HEIs. The study revealed that most lecturers lack an ideology (online/electronic learning) behind the use of these technologies (SwR and HwR). Thus, lecturers were lacking IwR as online or electronic ideology. The study concluded that individual lecturers' lack of electronic ideological-ware (e-IwR) - online learning has a negative impact towards their performance. The study recommended personal reflections for individual or personal development in order to master teaching and learning theories (e-IwR) behind the use of technology.

Furthermore, see the quantitative survey of 684 teachers from 6 universities in China conducted by (Zhu, 2015). The study investigated one feature of educational technology, which is the use of e-IwR (e-learning). The study revealed that HEIs are progressing and educational technology plays a huge role in their transformations. The study therefore concluded that the organisational culture

influences teachers' perceptions and awareness of innovation, and the implementation of curriculum using e-IwR (e-learning). This study suggests that HEIs should emphasise the importance of e-IwR after the adoption of any LMP (Moodle) in transforming higher education. In other words, the use of e-IwR in driving teaching and learning using SwR and HwR must be taken as a major component in the transformation of the curriculum (Amory, 2007). As a result lecturers need to reflect (personal reflection) on their own use of personal e-IwR in order to understand what and how they use e-IwR.

2.10 Electronic ideological-ware Resource (e-IwR)

The evolution of e-IwR created the move from traditional teaching and learning to the more dynamic, electronic, and online assisted learning, which radically changed the learning landscape. As a result, e-IwR was introduced to further improve the process of teaching and learning, and e-IwR is a computer-based educational resource or system that enhances you to learn anywhere and at any time (van Rooij & Lemp, 2010). See Clark and Mayer (2016), who defines e-IwR as life-long individual learning and teaching that occurs through various educational technologies and it is one of the most major and growing needs for education. This suggests that e-IwR is informed through personal reflection because lecturers are obliged to adhere to personal development in order to master online teaching methods or theories.

The recent study conducted by Govender and Khoza (2017) further defines e-IwR as the use of electronic educational technology (SwR and HwR) during the learning and teaching process. This study also outlines that e-IwR may occur through the use of various learning scenarios such as computers, digital devices, operating systems, leaning management system, webbased programs, internet and others. Amory (2014) and Kashora et al. (2016) share the same view that e-IwR provides the awareness and ability to share teaching and learning resources using all kinds of formats such as slideshows, word documents, and PDFs; and through the conduction of webinars (live online classes) and computer games. Moreover, e-IwR provides the learners and teachers with an opportunity to fit learning around their own individual lifestyles, and be able to acquire or gain a new qualification (Kashora et al., 2016). This suggests that e-IwR advocate for a personal development of both students and lecturers needs. In other words, personal reflection may enhance

lecturers to use relevant and correct teaching and learning theories (e-IwR) during teaching and learning process.

In addition to the above, see a study conducted by Courtney and Wilhoite-Mathews (2015) in one of the universities in the USA. The main purpose of the study was to present an outline of the evolution of online learning (e-IwR) with a particular emphasis on current emerging methods of instruction for online learners. The study revealed that, e-IwR should provide student with building blocks like LiBGuides and Tutorials, repositories, and resources banks. This study concluded that e-IwR should be accessible to everyone irrespective of accessibility constraints (physical challenged). For this reason, (Govender & Khoza, 2017)) outline that e-IwR is “a more recent version of distance and e-learning, has been found to be valuable in improving access and educational opportunities”. The conceptualisation of e-IwR from these studies indicates that e-IwR provides chances for personal reflection in order to enhance the basis of student personal development through its flexible accessibility, and this helps lecturers to offer lectures where ever they are in order to make the teaching and learning process simpler.

Furthermore, Kashora et al. (2016) reveals that e-IwR are useful in the fast-paced world of technology because it can make a course or a module exciting for both students’ and lecturers’ needs, and e-IwR makes teaching and learning simpler because module content can be easily changed and updated in order to cater for student and lecturers’ personal needs by providing the latest information (Clark & Mayer, 2016). This then suggests important of personal reflection on the use of e-IwR by both student and lecturers so that they may be kept updated, student may gain the ability to study alone and this minimises the costs (residence and transport) (Wahab et al., 2013). Moving further, the literature outlines that there are two most common types of e-IwR which includes informal e-IwR (synchronous e-learning) and formal e-IwR (asynchronous e-learning) (Amory, 2014; Govender & Khoza, 2017; Jackson, 2017).

2.10.1 Informal e-IwR (synchronous e-learning)

See the qualitative case study conducted by Tshisikhawe (2008) Stellenbosch University in South Africa on the use of online learning. The purpose of this study was to find barriers of e-IwR of black student in HEIs. The study used observation and interviews for data generation. This study revealed that informal e-IwR is a type of learning that is the same as a lecturer and classroom method but it occurs in an online platform. The study further outlined that the teaching and learning process in informal e-IwR is live and it compels both lecturers and students to be available simultaneously. Findings from this study concur with the study conducted by Govender and Khoza (2017) because it is revealed that informal e-IwR takes places where teaching and learning can provide a platform for everyone (lecturer and student) to learn at a same time. This study further revealed that Informal e-IwR allows face-to-face interaction in the same platform, but in a distance, learning can happen at the same time in different platforms. For instance, the use of Moodle platform enhances the informal e-IwR because both students may use a live video streaming for teaching and learning; students can use chat rooms to socially share information for constructive learning; student and lecturers may both take part in class discussion using web conference tool which includes Skype and others (Govender & Khoza, 2017; Singh' & Kaurt, 2016). This suggests that informal e-IwR is informed by informal reflection where the societal needs is addressed through sharing of ideas and opinions as well as through discussion and dialogue. In other words, informal e-IwR teaching practice are informed by ideas and opinions of other people in the surroundings (society)(Mpungose*, 2016).

Moreover, informal e-IwR caters for the needs of the society (Jackson, 2017). That is the reason why the study conducted by Bozalek, Gachago, et al. (2013) emphasises that students and lecturers in higher education should be provided with social space that will be informed by informal reflection where ideas and experiences may be shared during the teaching and learning process; and this may require universities to use social networks for learning such as Facebook, WhatsApp and others. This emphasis “develop and reinforce educator–learner and learner–learner collaborative relationships” (Govender and Khoza (2017, p. 70). This suggests that informal e-IwR ensures good and healthy relationship between student and lecturer, which then encourages informal reflection amongst them in order to empower and improve their practices. On the

contrary, informal e-IwR is opposed by formal e-IwR (asynchronous e-learning) (Bozalek, Ng'ambi, & Gachago, 2013).

Furthermore, the study conducted by Garud et al. (2016) outlines that the strengths and benefits of using informal e-IwR, is that students feel involved and appreciated by their inputs; teaching and learning is in real-time with social actions and class experiences; and students feel motivated when they get feedback from the lecturer after they have asked questions. This suggests that teaching and learning is very fruitful because it allows informal dialogue informed by informal reflections (Van Manen, 1991). Similarly, the study conducted by Amory- (2015) encouraged the use of the informal e-IwR to develop cooperative problem solving whereas Prensky (2001) indicated that one of the shortcoming of informal e-IwR is the lack of skills of using IwR by both student and lecturers, and this may hinder the process of teaching and learning. This then suggests the need for informal reflection to occur so that both lecturers and student may improve their practices in this digital age.

2.10.2 Formal e-IwR (asynchronous e-learning)

The study conducted by Govender and Khoza (2017), and Mnih et al. (2016), defines formal e-IwR as a teaching and learning strategy or technique that always puts a focus on the student (student-centred) where the sharing and distribution of online resources (information) is encouraged irrespective of time and location. Further to this, formal e-IwR ensures smooth work relations between student and lecturers because it brings high standard of flexibility in learning by providing access to lectures, presentation, notes, readings, and other online teaching and learning material (Salleh, Nor, Ariffin, & Hashim, 2015). For instance, students can easily have access to the formal e-IwR course or platform from any virtual space that is suitable for them and make discussion about the module offered and download relevant learning resources.

Moreover, a case study conducted by Anderson, Upton, Dron, Malone, and Poelhuber (2015) on self-paced online university course in Canada revealed that formal e-IwR is based on the cognitive constructivism theory where learners are expected to construct their own understanding and

knowledge through experiencing things and reflecting on those experiences. Govender and Khoza (2017, p. 70) concur with these findings by outlining that formal e-IwR “emphasises the importance of collaborative learning via peer-to-peer interactions”. Note that, the formal e-IwR, teaching and learning occur by creating schemas, following the certain logic, and have the basic building blocks of thought by following various stages of development in order to make sense (Piaget, 1976). This suggests that formal e-IwR is informed by formal reflection where teaching and learning is based on logic and basic schemas in order to make meaning during the teaching and learning process. In other words, formal e-IwR addresses the module or subject need where collaborative learning via peer-to-peer interactions is emphasised and traditional classroom teaching settings and lecture teaching is enhanced (Govender & Khoza, 2017; Hoadley & Jansen, 2013)

In addition to the above, the literature (Amory-, 2015; Anderson et al., 2015; Govender & Khoza, 2017; Van der Merwe et al., 2015) outlines that there are various online platforms which constitutes formal e-IwR. This includes e-mail (send messages from one person), online discussion boards, wikis (collaborative edited web site), blogs (web-based individual journal), LMPs (module/subject management) such as Blackboard, WebCT and Moodle, and others. For instance, there are some internally adapted formal e-IwR platforms such as (Moodle) and myUNISA where student and lecturers can asynchronously communicate with purposes of teaching and learning (Govender & Khoza, 2017). Further to this, see the study conducted by (Brown* & Mayisela, 2015) on the use of Information Commutation Technology (ICT) at HEIs in South Africa, this study revealed that providing access of ICT to students does not improve the teaching and learning process. As a result this study concludes that HEIs are obliged to provide not only computer literacy (about the devices-SwR and HwR) but should also provide digital literacy (formal e-IwR), because teaching and learning is not all about the device but is also about the ideology behind the use of those devices. This suggests that all formal e-IwR platforms may support blended or virtual online interaction that supports both student and lecturers to manipulate discussions, track messages and upload and access multimedia in order to facilitate teaching and learning (Singh' & Kaurt, 2016).

Furthermore, according to the study conducted by Salleh et al. (2015) at a university of technology in Malaysia, it is outlined that formal e-IwR support the new platforms which combines online learning and traditional learning platforms, and this has been regarded as blended learning, hybrid, or mixed learning. Lecturers believe that different modes of delivery methods can motivate students' satisfaction in order to achieve module-learning outcomes (Amory-, 2015). That why Piguillem Poch et al. (2012) emphasise that blended learning is an educational programme in which a student learns in both online and face-to-face platforms. This suggests that the teaching and learning process is guided by formal reflection where all platforms (blended) are provided in order to ensure that the module need is delivered. In other words, blended learning improves the formal delivery of a module which then improves the effectiveness of meaningful formal teaching and learning (Le Grange* & Reddy, 2017). The presence of formal e-IwR and informal e-IwR without any connection to e-IwR (personal) may lead the vulnerability of the curriculum during teaching and learning process. That is why this study is advocating for a personal e-IwR that is informed by a personal reflection in order to address the personal needs of both lecturers and student. In other words, personal e-IwR provides instructional methods or major learning theories that merge a formal e-IwR with informal e-IwR.

2.10.3 Personal e-IwR

The literature reveals both types of e-learning (formal e-IwR and informal e-IwR) is guided by a variety of teaching and learning theories which includes connectivism (learning theory for digital age), Cultural Historical Activity Theory (CHAT), behaviourism, five-stage model of learning, Technological Pedagogical Content Knowledge (TPACK), Constructivism, Constructionism, Unified Theory of Acceptance and Use of Technology (UTAUT), and others (Benson, Lawler, & Whitworth, 2008; Mishra & Koehler, 2006; Salmon, Nie, & Edirisingha, 2010; Siemens & Downes, 2009; Venkatesh et al., 2003). This suggests that lecturers need to master personal e-IwR in order to bring understanding or a link between formal e-IwR and informal e-IwR for their own personal development. In other words, personal e-IwR is informed by personal reflection which advocates for a personal development and meaning making process of all actions during teaching and learning (Dewey*, 1938; Schön, 1983).

2.10.3.1 Personal e-IwR: Connectivism



Figure 2.4: Formation of network in connectivism (<http://education-2020.wikispaces.com/Connectivism>, 2017: reproduced with permission from the publisher)

Siemens and Downes (2009), as founders of the connectivism learning theory, outline that connectivism is aimed at explaining the teaching and learning process that should occur in this social digital world, and that is why it is also known as a learning theory for a digital age. In connectivism, learning normally happens through connections of networks as depicted in Figure 2.4 above; this learning theory uses the concept of a network with nodes and connections so that learning may occur by connecting and introducing new nodes, and growing social networks (Siemens, 2014; Unwin et al., 2010). Learning is believed to be actionable knowledge where the teaching and learning process must not only occur to be individual but it must be socially shared among all stakeholders (students and lecturers) of the school or the university (Siemens & Downes, 2009). Siemens (2014) believes that learning in the past was competitive and forcible, but currently, in connectivism, the ethics of learning is collaborative, social, global, and universal. As a result, socialising open learning is encouraged; this then suggests that connectivism addresses the need of the society in such a way that for teaching and learning to occur they need to socialise and know each other in order to make and grow connections so that information can be shared among themselves (Driscoll & Tomiak, 2000; Singh' & Kaurt, 2016). This then suggest that,

connectivism is neither driven by a personal or formal reflection but is driven by informal reflection because connectivism is advocating for societal-based learning where everyone involved in the teaching and learning process, should be connected in order to share societal experiences, ideas, and opinions. For instance, connectivism would want students, lecturers, resources, and others to be connected in order to fulfil the societal need so that they can easily cope during the assessment period (Reddy & le Grange, 2017; Siemens, 2014).

Moreover, see the study conducted by Marsick, Bitterman, and van der Veen (2000) in the USA, at the University of Colombia. The aim of the study was to explore the concepts of learning society. The study revealed that learning should be made open to the society, it should be interconnected among society members, and it should embrace the ethics of communication and collaboration. That is why Driscoll and Tomiak (2000, p. 11) defines learning in connectivism as “a persisting change in human performance or performance potential...[which] must come about as a result of the learner’s experience and interaction with the world”. Thus, Siemens (2014) acknowledge that connectivism is extending from behaviourism (change of behaviour), constructivism (social knowledge construction), and cognitivism (thinking capabilities). These are known as the three basic learning theories which does not include an element of using technology during teaching and learning. On the contrary, connectivism is advocating for the use of educational technology.

Furthermore, connectivism consist of various guiding principles, which includes that: learning and knowledge is made from a diversity of opinions; learning is a process of connecting information sources (nodes); learning may reside in TIE (SwR and HwR), ensure connections in order to facilitate continual learning so as to have accurate, up-to-date knowledge (Downes, 2010; Siemens, 2014). These principle suggest that connectivism is informed by informal reflections where the connectedness of the university community or society (student and lecturers) are through the use of educational technology in order to meet societal needs (Mpungose*, 2016; Ngubane-Mokiwa & Khoza, 2016). Take, for instance, when lecturers use Moodle activities like discussion forum, connectivism expects lecturers to create a platform where student should create connections by introducing themselves and sharing their own experiences among themselves before the teaching and learning process begins, students should be encouraged to use search engines like Google,

Yahoo and others and be allowed to share any updated information about a module taught in the Moodle platform (Garud et al., 2016; Motsa, 2017).

2.10.3.2 Personal e-IwR: CHAT

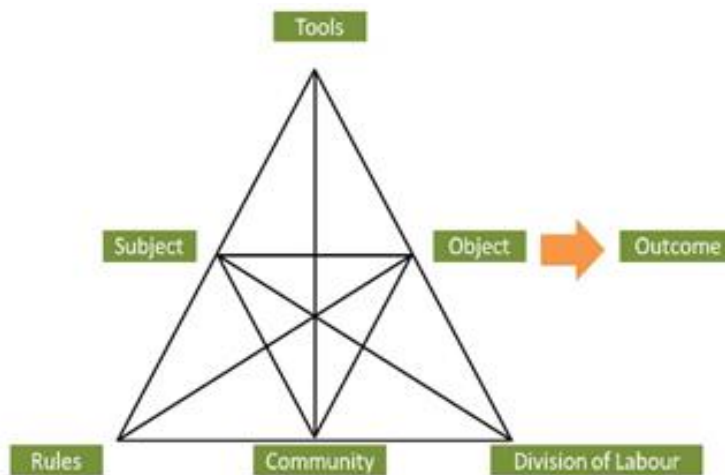


Figure 2.5: The Cultural Historical Activity Theory (Engeström, 1987, p.37)

The study conducted by Ngubane-Mokiwa and Khoza (2016) on the use of technology in teaching blind students is of the same idea as the study conducted by Amory on using games technology to mediate teaching and learning because these studies outlined that cultural historical activity theory (CHAT) was introduced as object-tool-subject network by (Vygotsky, 1933, 1978), and it is also called theory of activity. As a result, Vygotsky (1978) outlined that the main focus of CHAT is mediation in all human activities, and it is believed that all human activities (teaching and learning) have a certain structure in which mediation resources (Moodle) are supposed to be used. Further to this, Govender and Khoza (2017), and Amory- (2015), are of the idea that when using CHAT, all teaching and learning activities should be driven by educational technology resources such as Blackboard, Moodle, and others. Furthermore, regards to human activities, CHAT was extended from three basic principle made out of subject, tool, and object to seven principles comprised up of subject, tool, object, outcome, rules, community, and division of labour, as depicted in Figure 2.5 (Engeström, 1987; Ngubane-Mokiwa, 2013). CHAT as an activity system, is a vital frame used in the field of educational technology since it has an element of social mediation (Amory, 2014; Engeström, 2014). In other words, it caters for a societal need during the teaching and learning process (Mpungose*, 2016),

In addition to the above, the use of CHAT as a personal e-IwR in the context of this study of using Moodle resource (tool) during teaching and learning activities implies that lecturers and students (subject, initiators, actors) should play a major role (teaching and learning role using Moodle) in order to unpack objects (module content), and this may easily give way to achieve outcomes (goals-learning outcomes). CHAT assists subjects (lecturers and student) to follow stipulated rules (university policy on the use of Moodle) in a collaborative social space for social teaching and learning (Engeström, 1987). This theory also ensures that the university community (academics, computer technicians, student, and human resource staff) are aware of division of labour (allocated duties) among themselves for smooth teaching and learning (Engeström, 1987; Falvo & Johnson, 2007).

Moreover, the study conducted by Amory (2014) and Govender and Khoza (2017) reveal that CHAT as a personal e-IwR involves various mediation in the activity system, which results in informal reflection (societal need). For instance, when the lecturer (subject) creates ways of mediating, questioning, or unpacking the prescribed module content (objects), it is therefore easy to achieve stipulated module learning goals (Outcomes). This suggests that one of the main aims of CHAT is to achieve learning outcomes in order to satisfy the needs of university community, especially learners; in other words, CHAT is informed by an informal reflection where aims and objectives do not matter, but only learning outcomes matter (Engeström, 2014; van Rooij & Lemp, 2010). Similarly, through CHAT, both students and lecturers are taken as cultural entities living in the university community, and therefore, they are expected to involve societal, communal experience during teaching and learning activities (Engeström, 2001; Ramrathan, 2017). In other words, Moodle platforms, like chat rooms and discussion forums, should be made available by HEIs for the social construction of skills to occur in order to transform and develop teaching and learning activities (Jackson, 2017; Selwyn, 2016).

The study conducted by Govender and Khoza (2017) interrogated CHAT, and it was revealed that CHAT has various social connections from the seven principles of CHAT. This study revealed

that the majority of these connections are driven by informal reflection in order to address the needs of the society in all structured activities. The subject makes connections between the rules and university community, the Moodle resource and module content including the module content and university community. The content makes connections between the Moodle resource and subject, the university community, and subject, as well as the university community and division of labour; and the community makes connections between the subject and module content, the rules and subject, as well as the module content and division of labour. This suggests that all social connections are discovered in order to interrogate the module content so that learning outcomes are to be achieved. This suggest that any activities done without achieving goals (learning outcomes) are fruitless and it needs to be restructured in order to identify good social connections that are informed by informal reflection for a smooth achievement of learning outcomes (Bloom, 1956; Hoadley & Jansen, 2013).

In addition to the above, Ngubane-Mokiwa (2013) outlined that there are five guiding principles (Amory, 2014; Engeström, 2001; Engeström et al., 1999; Govender & Khoza, 2017) of CHAT, namely: 1. CHAT system is collective – one should understand the background of the system (community) before any activity begins; 2. All subject's voices should heard – both student and lecturers voices should be heard during teaching and learning; 3. Subjects should understand problem in order to provide relevant solutions – students and lecturers should understand what Moodle is before using it for teaching and learning; 4. Subjects should first acknowledge challenges in order to bring effective teaching and learning – lecturers should accept they are not well versed with Moodle as digital immigrants; and 5. Subjects should always focus and expect the unexpected changes – lecturers should not be aware of any changes in a system and they must not resist but adapt. These principles clearly show that CHAT is driven by informal reflection, which address the needs of the community in a system (Khoza, 2015c; Maxwell, 2013). In other words, teaching and learning in system requires social understanding and role identification in order to avoid chaos so that outcomes can be achieved (Khoza-, 2013c).

2.10.3.3 Personal e-IwR: Five stage model

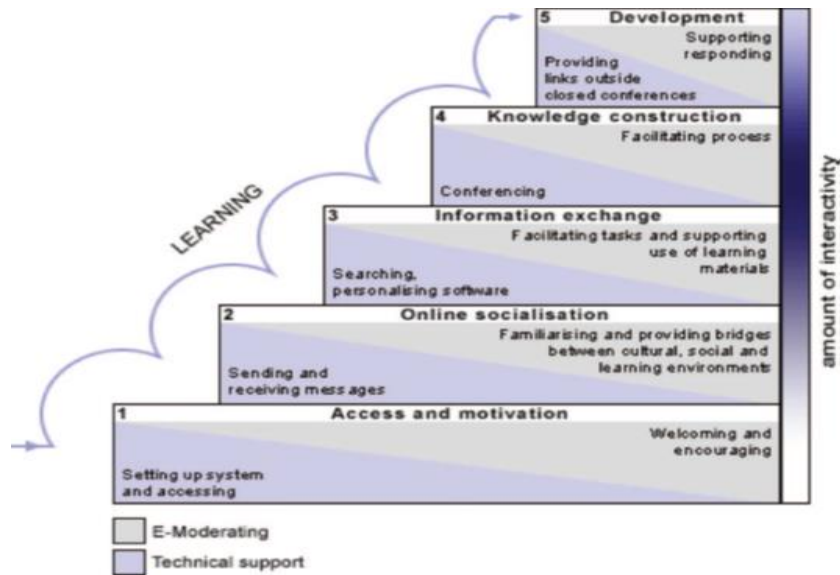


Figure 2.6: Five-stage model of teaching and learning online (Salmon, 2004, p. 29).

The study conducted by Salmon (2004) outlines that the five-stage model, as depicted in Figure 2.6, makes provision on ideologies as to how online learning (personal e-IwR) should occur. The model has five stages where e-moderator (lecturer) and e-learners (students) interact through e-tivities (online activities) done during the teaching and learning process. The major purpose of this personal e-IwR is to motivate all online users or participants to participate effectively during the teaching and learning process. The study further outlines that there are five stages which provides a scaffolding process, and each stage has its own technical skills and specific name given to it, namely: stage 1: Access and motivation; 2. Online socialisation; 3. Information exchange; 4. Knowledge construction; 5. Development. Further to this, each stage consist of e-tivities that should be performed by both e-moderator and e-learner (Salmon et al., 2010). It is outlined that technical support plays a major role because it will enhance good social intervention from the e-moderator to e-learners through the use of appropriate and authentic e-tivities (Salmon, 2013). In other words, both lecturer and students (university community) should undergo informal reflection for their own societal needs during the teaching and learning process (Salmon & Hawkrigde, 2009; Zeichner- & Liston, 1996). This suggests that all stages require social interaction between an e-moderator and e-learner in addressing their informal needs in such a way that, the teaching and

learning process should be effective and active, and have good contributions in order to achieve an increased societal satisfaction (Mpungose*, 2016; Piaget, 1976).

In addition to the above, according to various studies, stage 1, is a first and a background step of all others steps in the model (Salmon, 2004, 2012, 2013; Schön, 1983; Scully, 2012). As a result, both e-moderator and e-learner should gain access to the system in stage 1, and they should be motivated to spend more time in order to get used to logging into the system. These studies often found that most e-learners have adequate technological skills of TIE and TOE respectively. According to these studies, the main duty of the e-moderator is to provide assistance to e-learner by providing good e-tivities with clear instructions of how to have access or login details into the system, and support those e-learners with difficulties. Further to this, studies outline that, immediately after e-learners have completed the setting and accessing of the system, it is therefore the duty of the e-moderator to motivate them by providing e-tivities that motivate and provide satisfaction on the use of IwR. In other words, informal reflection should drive e-moderators to give e-tivities that will enable the e-learner to know how and why they are going to go about learning. This involves ways they have to do to take part in order to achieve societal need (Salmon et al., 2010; Schon, 1987). For instance, in the use of Moodle, students should be supported and motivated by lecturers in order to understand how to have access Moodle. Thereafter, Moodle should provide clear instructions as to how to go about navigating the platform. In this way, student and lecturers will stay motivated in the use of Moodle (Govender & Khoza, 2017; Jackson, 2017).

Furthermore, studies done by Salmon (2004), Salmon (2013), as well as Salmon and Hawkrige (2009) outline that stage 2 is about socialisation which is influenced by informal reflection, and the duty of e-moderators is to provide e-tivities for socialisation between cultural, social, and learning activities, whereas e-learners are expected to have a group or community where they will send and receive social messages. For instance, lecturers should create an introductory e-tivities through the use of discussion forum in Moodle platform, where learners will informally chat to each other about their social life experiences and background as well as sharing their culture amongst themselves; and lecturers should also provide module or course outline, let students read and share ideas about the module in order familiarise themselves about Moodle. Moving further,

these studies further outline that stage 3 is about information exchange or sharing what e-learners already know and what they can search. Thus, e-moderators are obliged to design and give activities that requires information exchange, and must be able to give immediate feedback to students (Adnan, Kaleliodgu, & Gulbahar, 2017; Le Grange* & Reddy, 2017). For example, a lecturer is expected to design and give quizzes that will automatically provide feedback to students about a concept of a module being studied. This suggests that quick online feedback will provide satisfaction to those groups of students (societal need) through the use of informal reflection (Jesup et al., 2017; Reddy & le Grange, 2017).

The study by Salmon (2004) outlines that stage 4 allows e-learners to take control of their own knowledge construction in various styles. This study further reveal that, e-moderators should be able to make complex e-tivities available to e-learners so that they can socialise in order to construct their own knowledge, and e-moderators should ensure that e-learners do take part in those activities effectively by tracking their participation in the system. For instance, lecturers may use the Moodle platform to provide a scenario that needs students to think, and research constructively before sharing the solution on the discussion forum. Further to this, stage 5 is advocating for informal reflection for development of e-moderators and e-learners in order to become committed and creative (Salmon & Hawkrigde, 2009). Moreover, informal reflection drives their social teaching and learning by looking back at their actions in other stages in order to improve their practices at this stage, and both e-moderators and e-learners produce and deal with more emotional aspects of writing their social experiences during teaching and learning (Salmon, 2013; Sator & Bullock, 2017). For instance, lecturers should make evaluation forms for students, lectures, and module so that learners may use informal reflection in evaluating their practices during the teaching and learning process.

2.10.3.4 Personal e-IwR: TPACK

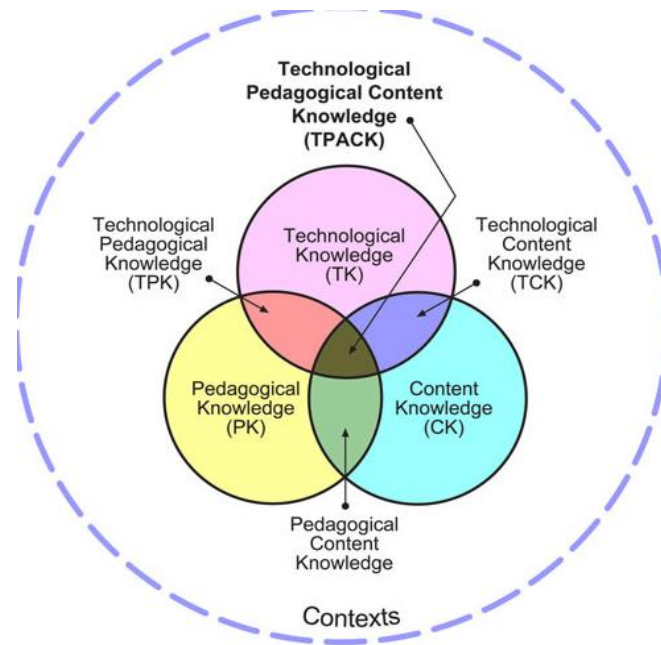


Figure 2.7: The TPACK Framework and its Knowledge Components (<http://tpack.org>, 2012, reproduced by permission of the publisher)

Moreover, Bernstein (1999) as well as Khoza (2016b) further alluded that teaching and learning theories (personal e-IwR) in the integration of technology with curriculum play a major role. As a result, Govender and Khoza (2017, p. 77) conducted a study on educational technology, and it was outlined from the study that, “There are three basic components of knowledge essential for teaching, namely, content knowledge (CK), pedagogical knowledge (PK) and technological knowledge (TK)”. This then suggests that lecturers/practitioners should possess a personal e-IwR that may address any reflections among the three, namely, personal reflection, formal reflection, and informal reflection. For this reason, Mishra and Koehler (2006) developed a learning theory called Technological, Pedagogical And Content Knowledge (TPACK) as depicted in Figure 2.7 above, which aims to capacitate practitioners, like lecturers, with these three basic knowledges (CK, TK, PK) so that they can pedagogically use any emerging educational technology for effective teaching and learning in all disciplines (education, health, engineering, and others). This suggests that lecturers should have a personal reflection of what capabilities educational

technology can offer and how it can be used during the teaching and learning context (Amory, 2014; Anderson et al., 2015). For instance, when lecturers offer a certain content of a certain module, they must be able to select the relevant pedagogical methods together with the technology, with which they will facilitate the presentation of the lesson. The proper selection will depend on the ability of a lecturer to possess the CK, TK, and PK (Mishra & Koehler, 2006; Piguillem Poch et al., 2012).

2.10.3.4.1 Content Knowledge (CK) – knowledge of subject matter

Moreover, CK is knowledge about the content of a subject or a module that is to be learned or taught, such as the content of undergraduate's Physical Science modules that is to be covered per semester (Mishra & Koehler, 2006). Note that "Knowledge of content is of critical importance for teachers." (Koehler & Mishra, 2009, p. 63). This suggests that teachers need to be informed by formal reflection, which addresses the subject, or a module need in order to master the subject or module content. As a result, nature of content knowledge varies greatly among content areas or disciplines, and it is of paramount importance that lecturers clearly or deeply understand the discipline/subject that they teach (Khoza, 2016a). For instance, lecturers teaching Physical Science module should be able to master mechanics or physics (area of science dealing with motion and forces producing motion) and chemistry (area of science dealing with substances). Thus, Van den Akker* et al. (2009) outline that CK assists lecturers to have knowledge of other curriculum concepts (resources, accessibility, time, platforms, activities, roles, goals, assessment) toward teaching of a particular content of a module. According to Shulman (1986), it is clear that if lecturers have inadequate CK, this can be quite prohibitive to students and they can develop incorrect conceptions about the module taught. In other words, teaching a module or subject without strong or enough CK may not save the purpose of addressing the subject need. For this reason, Mpungose* (2016, p. 260) strongly advocates that "teachers without content-related knowledge, experience uncertainty about topics". This suggests that a formal reflection plays a major role in addressing the module need, because lecturers are expected to question themselves and read or research more about the module content offered (Mishra & Koehler, 2006; Van Manen, 1991). As a result, the move or discussion of CK indicates that it is driven by formal reflection since it is concerned about the understanding of a module content.

2.10.3.4.2 Pedagogical Knowledge (PK) – knowledge of teaching methods

Moreover, both Bates* (2016), as well as Mishra and Koehler (2006), are of the view that PK is a critical knowledge about the approaches/practices/methods of teaching and learning such as behaviouralism, constructivism, cognitivism, and others. This is a broad form of knowledge that relates to student learning, classroom management, instructional preparation and enactment, as well as student assessment, that a lecturer should personally possess in order to deliver a lesson or a lecture (Hoadley & Jansen, 2013; Khoza, 2015). This suggests that lecturers with broad PK comprehend how students construct knowledge and receive skills in various ways. This implies that a PK requires teachers to have an understanding approach that addresses cognitive domain, affirmative domain, and psychomotor domain (Behari-Leak, 2017; Bloom, 1956), and be able know how to use them during teaching and learning processes (Mpungose*, 2016). PK requires lecturers personally master approaches or methods, and this may lead them to undergo personal reflection in order to address their personal needs of understanding approaches before teaching and learning begins (Boud et al., 2013; Wareing, 2017). This suggests that there is a need for lecturers to own the pedagogy in order to become confident and be able to use TK during the teaching and learning process.

2.10.3.4.3 Technological Knowledge (TK) – knowledge of technology tools

Shulman (1986) Acknowledges that teachers who have knowledge of their subject content and of general pedagogical approaches is not adequate in the process of teaching and learning. Further to this, teaches cannot be regarded as good teachers if an only if, there is no interplay between content and approach component through the use of technology. Thus, TK is defined as “knowledge about the different range of tools and technologies, from traditional technologies such as pencil, paper, chalk and chalkboard, to digital technologies such as the internet, computer simulations, interactive whiteboards, discussion forums, and soft-ware programmes” (Govender & Khoza, 2017, p. 77). That is the reason why Persky (1990) is in support of Mishra and Koehler (2006)’s emphasis, that lecturers should use effective ways of integrating TIE (SwR and HwR) with curriculum in order to maintain smooth social, collaborative, and cooperative teaching and learning. This suggests that lecturers may undergo informal reflection in order to have a deeper, more essential understanding and mastery of TIE for teaching and learning (Amory, 2014; Wamba, 2017). For instance, lecturers

should understand how LMP technology such as Moodle, is constructively used in order to involve all learners to social construct their own ideas. Furthermore, it is clear that the use of Moodle activities, like chat and discussion forum, create a social space where student and lecturers (university community) may socially engage in a dialogue with a purpose of teaching and learning (Bates*, 2016; Jackson, 2017). Thus, lecturers should possess knowledge of using technology to teach modules and this will make students' life easier. This then seeks lecturers to engage students in a social space where they can share their experiences being influenced by informal reflection.

2.11 Curriculum signals

In summary of the above-mentioned personal e-IwR, CHAT, five-stage model, and connectivism advocate for informal reflection including formal reflection. In other words, the majority of personal e-IwR is concerned with ensuring societal needs, and module needs, during the teaching and learning process. This is because most of them were advocating for connectedness, networks, achieving learning outcomes, scaffolding in teaching and learning (stages), and social construction of knowledge during teaching and learning process. This suggests that these personal e-IwR (CHAT, five-stage model, and connectivism), only caters for the horizontal curriculum signals and vertical curriculum signals, and excludes the personal curriculum signals. However, from the literature on personal e-IwR, it is clear that only one type, personal e-IwR, covers all types of reflections (informal, formal, and personal). As a result, TPACK covers all the three types of reflection, namely, informal, personal, formal reflection. This is because TPACK has PK which addresses the personal reflection, CK which addresses the formal reflection, and TK which addresses the informal reflection. In other words, TPACK advocates for addressing all curriculum signals, from the horizontal curriculum and vertical curriculum, as well as the personal curriculum, namely: goals, accessibility, roles, activities, location, time, assessment, and content. TPACK seems to be the suitable theory for this study and it will be discussed further in Chapter Four.

2.12 Concluding statement of the chapter

The literature presented here has reflected and provided the trend in defining a reflection phenomenon as from 1933 to 2017. This chapter outlined how informal reflection, formal, and personal reflection emerge from the literature. The chapter has unpacked the concepts of technology in the field of education, which is termed as educational technology. As a result, Moodle LMP educational technology was unpacked, and the chapter indicated different types of Moodle resources namely: Hard-ware, Soft-ware, and ideological-ware resources. The chapter further indicted the types of ideological-ware resources that lead to electronic ideological-ware resources namely: personal, formal, and informal electronic ideological-ware resources. It was then outlined from this chapter that personal electronic ideological-ware resources are further characterised with teaching and learning theories, which includes Connectivism, CHAT, Five-Stage Model, as well as TPACK. This chapter reveals that TPACK covers all types of reflections (informal, formal, and personal), which suggests that all curriculum signals (reflections, resources, accessibility, content, time, goals, assessment, activities, roles, and location) with its needs (informal, formal, and personal) are catered for in this learning theory. That is why the following chapter seeks to unpack curriculum signals in the use of Moodle during the teaching and learning process.

CHAPTER THREE

Curriculum signals in the use of Moodle

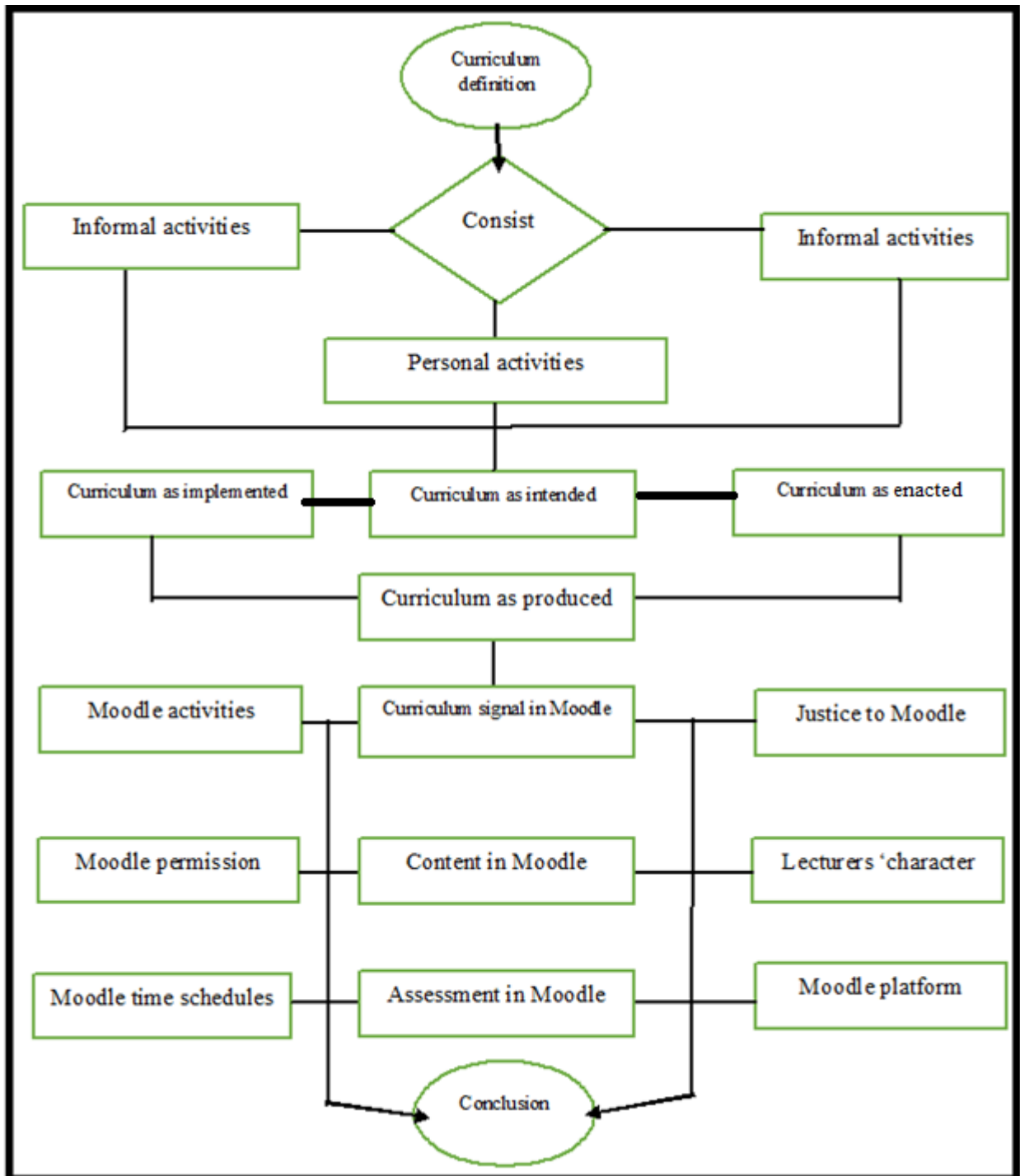


Figure 3.1: Chapter 3 flow Chat

3.1 Introduction

The previous chapter (Chapter 2) reflected on the first part of the literature. Chapter Two covered only two vital curriculum concepts namely: reflections (phenomenon) and resources (Moodle); and they were fully unpacked to provide the background literature of this study. The literature from the chapter on reflection phenomenon explored three propositions which include formal reflection, informal reflection, as well as personal reflection. These propositions were used to frame the discussion of resources on the basis of Hard-ware, Soft-ware, and Ideological-ware Moodle resources. Moreover, the chapter provided clarity on lecturers' reflections on the use of Moodle when teaching science modules at HEIs. On the contrary reflecting on the use of Moodle resources without understanding curriculum signals is useless and this leads to the curriculum vulnerability during the teaching and learning process (Berkvens et al., 2014; Van den Akker- et al., 2012). Firstly, this chapter intends to define etymological definition of curriculum before discussing curriculum signals, by unpacking types of curriculum activities (formal, informal, and personal) which leads the discussion to the levels of curriculum (intended, implemented, enacted, and produced). It is the intention of this chapter to unpack the discourse of curriculum teaching believes which includes Tylerian approach, Stenhousian approach, and Freireian approach. Curriculum development approach like instrumental approach, communicative approach, pragmatic approach are intended to be unpacked.

Moreover, various studies on curriculum assert that all curriculum signals should be incorporated by lecturers in order to inform and improve the teaching and learning process in HEIs (Berkvens et al., 2014; Bernstein, 1999; Khoza & Mpungose, 2017; Spiller & Ferguson, 2011; Van den Akker- et al., 2012). Further to this Mpungose (2017) reveals that reflecting on curriculum signals can provide input on the current discourse of curriculum decolonisation (especially in African universities). Therefore, this chapter (Chapter Three) takes a step further to articulate and elaborate on the discourse of curriculum signal on Moodle which includes: Moodle permission, Justice to Moodle, Content in Moodle, Moodle activities, Lecturers' character, Moodle platform, Time scheduled for Moodle, and Assessment in Moodle.

3.2 Let them reflect on etymological definition of curriculum

In most instances, it is normally a surprisingly complex activity to develop a clear and concrete definition of the term curriculum in the field of education and curriculum studies as there are many definitions, by different authors, from the literature (Hoadley & Jansen, 2009). As a result, see the study done in 1970s by an American curriculum theorist Pinar (1978) in reconceptualising the curriculum. The main objective of the study was to enhance a clear understanding of the curriculum before teaching and learning takes place. The study reveals that the etymological definition of the word curriculum is '*currere*' which implies 'to run the course' (Pinar, 1974, 1976, 1978). In other words, "the Latin noun curriculum refers to both a 'course' and a 'vehicle' (Van den Akker* et al., 2009). Furthermore, in the field of education, curriculum is taken as the running of a course for teaching and learning. Note that, the other study conducted by Eisner (1979, p. 66) also outlined that curriculum is "a Latin word carried directly over into English, and its first Latin meaning was "a running," "a race," "a course," with secondary meanings of a "race-course," "a career"". Moreover, it is outlined from the study conducted by Le Grange- and Reddy (2017) in curriculum studies at a South African university that the notion of *currere* was introduced in order to make the transition of defining curriculum as noun (a course), as articulated by Aoki (2004), into defining curriculum as a verb (to run the course). As a result, curriculum is not taken as an object or a matter (anything that occupies space and has a mass) but is now taken a something that we do and as an action verb (Pinar, Reynolds, Slattery, & Taubman, 1995). This suggests that curriculum as an action verb seeks lecturers to reflect on their teaching and learning practise based on their past action (formal reflection), present action (informal reflection), and future actions (personal reflection), in order to address all needs (societal need, module need, and personal need) of the teaching and learning process (Dewey*, 1938; Van Manen, 1991). Thus, lecturers will be able to have an understanding that curriculum involves the question of what should be taught and how it should be taught in a lecture hall (Egan, 1978).

Furthermore, in 1960s, the study conducted by Taba and Spalding (1962) came with a well-known, a very short and concise definition of curriculum. This definition is still recognised, and used in the field of education and curriculum studies. This definition is defines curriculum as plan for learning. This concurs with a definition from the study conducted by Hoadley and Jansen (2013,

p. 29) which outlined that curriculum as a plan “presents teachers and learners with a plan of the ideal course of learning”. As a result, Tyler (2013b) defined curriculum as plan, intended objectives or a programme of study to be attained, and this was well articulated from a formal reflection, in his work on curriculum studies published in 1949 in a book titled “Basic principles of curriculum and instruction”. Further to this, Ayers (1992) conducted a study at schools in Chicago, USA, with an aim to find out if teachers understand the meaning behind the term curriculum. Observation was used to generate data. The study revealed that students were passive and even fell asleep while the teacher was actively delivering the set or planned curriculum. Teachers became clerks or technicians, only delivering what is instructed or planned. While this practice may be good from the formal reflections that drill students with facts, it is limited if it is interpreted from the informal reflections where experiences of students are valued. As a result, this practice may not be in line with the use of Moodle which was introduced for informal reflections (Khoza & Mpungose, 2017). However, the conclusion of this was similar to other assertion from various studies (Barr & Tagg, 1995; Biggs, 1996; Myers, 2016; Richardson, 2011) because it was concluded that, “Curriculum is the product of someone else's thought, knowledge, experience, and imagination. It becomes the package developed somewhere out there. The teacher takes the package and hands it on to the students” (Ayers, 1992, p. 259). It is evident from the study that most teachers do not understand the word curriculum, and this may lead to the vulnerability of curriculum where concepts of curriculum (accessibility, content, time, goals, assessment, activities, roles, and location) may not be balanced (Khoza-, 2015d; Van den Akker* et al., 2009). This suggests that there is a need for a study that advocates for the process of reflection (formal, informal, and personal) to be conducted in the field of curriculum studies in particular the use of technology.

Furthermore, curriculum is taken as a vehicle for change that presents knowledge, freedom, and future opportunities (Bourdieu & Passeron, 1990; Freire, 2000). This suggests that curriculum is about content that brings knowledge and also involves lived experiences in order to shape future practise (Pinar, 2012). As a result, Marsh (2009), outlines that curriculum should provide a direction for students in order to shape their future. Moreover, the above-stated definitions from different authors requires lecturers undergo a formal reflection that enhances understanding of a

planned curriculum. Further to this informal reflection may influence the delivery of such curriculum, and personal reflection may address the methods towards the achieving set goals of the such curriculum through the use of Moodle (learning management system).

The literature in the 21st century still outlines that there are many trending definitions of the word curriculum (Apple, 2004; Ayers, 2011; Freire, 2000; Kelly, 2009; Randolph, 2008; Van den Akker* et al., 2009). For instance, look at the study conducted by Marsh (2009, pp. 5-8) which indicates various definitions of the word curriculum as follows: 1. “Curriculum is the permanent subjects that embody essential knowledge”; 2. “Curriculum are those subjects that can be most useful for contemporary living”; 3. “Curriculum is a planned learning for which the school is responsible”; 4. “Curriculum is the totality of learning experiences so that students can attain general skills and knowledge at a variety of learning site”; 5. “Curriculum is what student construct from working with computer and its various networks”; and 6. “Curriculum is the questioning of authority and the searching of complex views of human situations”.

Moreover, the first definition seems to be driven by a formal reflection which address the subject or the module needs because curriculum is taken as permanent or prescribed subjects with a specific content that is selected to make the curriculum of that particular module or subject such as Mathematics, Physical Science, Life Sciences, and others (Hoadley & Jansen, 2013; Marsh, 2009). Those selected subjects consist of unique and formal knowledge of a particular discipline in such a way that teaching and learning processes are intended to fulfil that formal knowledge (Le Grange', 2014). This then suggests that the change of module knowledge or content may lead to the change of curriculum itself. Moving further to the second definition which indicates that curriculum should address the societal needs, so that teaching and learning process should be informed by informal reflection (Mpungose*, 2016). Thus, this definition takes curriculum as subjects that are selected in order to address societal needs (Khoza', 2016a). For instance, if there is a shortage of numeracy and literacy skills within the society, subject like Mathematics and English will be selected to form part of the curriculum in order to address those societal needs. In other words, this definition of curriculum seeks lecturers to be driven by informal reflection during

teaching and learning process so that the societal needs can be addressed (Kehdinga, 2014; Kelly, 2009).

Furthermore, the third definition of taking curriculum as a planned learning seem to take the direction of a formal reflection because it addresses the subject need (Marsh, 2009). As a result, this definition requires the school to plan at a MESO level such that the learning and teaching process at a school should have the module outline indicating the whole content to be covered per term or per semester (Oliva & Gordon II, 2012; Van den Akker- et al., 2012). Thus, the module outline should clearly display all expected goals to be achieved of the module, and teachers are expected to prepare the lecturer in order to manage time to cover the specified content of that day (Bloom, 1956). In other words, the planned learning should even involve all planned assessment activities and their respective due dates where students will be expected to submit their tasks. Moreover, the fourth definition is informed by informal reflection because it caters for societal need. According to Marsh (2009), the focus in this definition is on providing skills and relevant competencies that will assist students to compete with the world outside the school environment. In other words, teaching and learning should fulfil the need of students from the society with some skills such as life skills, communication skills, and civic participation skills (Marsh, 2009; Maxwell, 2013). This suggests that universities should provide a conducive teaching and learning environment where students may be encouraged to socialise and share their own experiences in order to construct their own ideas (Limongelli, Lombardi, Marani, Sciarrone, & Temperini, 2016).

In addition to the above, the fifth definition of curriculum advocates that the content learnt by students from LMPs (Moodle) is also termed to be a curriculum (Marsh, 2009). Note that, Moodle resources are driven by social constructivist learning (informal reflection) where students should socialise in order to construct their own learning from their experiences. In other words, the module content drives students to socialise during discussions initiated by the lecturers from the Moodle environment (Amory-, 2015). This suggests that, this definition is driven by both informal and formal reflections where societal needs and module needs are catered for. Thus, this definition enhances both informal e-IwR (synchronous e-learning) and formal e-IwR (asynchronous e-learning) so that teaching and learning can occur at any time and any place (Waghid- & Davids,

2016; Wamba, 2017). Moving further to the last definition, this is the only definition among the five that advocates for personal reflections where lecturers should question their own personal authority and thinking towards their practise during teaching and learning (Marsh, 2009; Miheso-O'Connor Khakasa & Berger, 2016). In other words, this curriculum definition is advocating for a personal curriculum that will address the lecturers' personal needs during the teaching and learning process (Khoza*, 2016b). As a result, this study seek to allude for a development of a personal curriculum which may be addressed by personal reflection during teaching and learning process. In other words, when lecturers question their authority (personal reflection) in their own modules, they may simply understand teaching and learning ideologies or methods for any particular module such as the Physical Science module. Moreover, According to Mgqwashu' (2017) and Pillay (2015), it is noted that if lecturers are taken as drivers of their modules from the formal reflection perspective, they should possess module's teaching methods; on the contrary, from the personal reflection perspective, there is no curriculum that addresses their needs and this may lead to vulnerability of the curriculum. In most cases that is why teachers are referred to as technicians, employed only to implement and enact the curriculum, because their personal being (personal reflection) and development is not the main concern in curriculum (Msibi, 2012; Samuel, 2009). Thus, Ayers (1992) and Schubert (1996), outline that HEIs system and policies are influenced by the formal reflection because lecturers are taken as Clerks because they only teach modules according to the directives from the planned curriculum. As a result, this study argues for the existence of a personal reflection that will address lecturers' personal needs. Therefore, in the context of this study curriculum may be taken as all personal, formal, and informal actions done by both student and lecturers/teachers during the teaching and learning process.

In addition to the above, defining curriculum as all the formal activities done during teaching and learning stipulates the voice of this study and it brings input into the body of literature in defining the word curriculum. That is why Hunkins and Ornstein (1998) outlines that the existence of variety in the definition of curriculum is not a crisis but it is an indication of various voices in the field of curriculum, and this brings diverse definitions of the term curriculum from curricularist (Le Grange* & Reddy, 2017). Thus, Tyler (2013b), and Taba and Spalding (1962), idea of defining curriculum as a plan of all actions or all strategies in the form of a written document with stated

goals to be achieved, symbolises that curriculum consist of prescribed formal activities to be followed in order to fulfil the formal module/subject need. In other words, formal activities of curriculum consist of planned, linear, and sequenced activities of content to be covered in a particular module/subject, and those activities have a start and an end point (Le Grange* & Reddy, 2017). That is why Pratt (1994a, p. 32) defines “curriculum as an organised set of formal education or training intentions. This then suggests that, this is a basic definition of all other definitions of curriculum since it is advocating for curriculum as a formal plan for all formal teaching and learning activities in education. In other words it all starts with planning before any other steps follows, for instance there may be no teaching and learning without a formal plan in place (Behari-Leak, 2017). Note that, curriculum as a formal activity should be driven by a formal reflection which may enhance both student and lecturers to reflect based on planned content activities in order to address the module need (Peabody & Noyes, 2017).

Moreover, when curriculum is defined as an informal activity it involves both student and lecturers teaching and learning experiences (Downes, 2010; Van den Akker_, 2004). See studies by Dewey* (1938) as well as Caswell and Campbell (1937) on experiences and curriculum. These studies outline that curriculum involves all the experiences students’ and lecturers’ bring into the teaching and learning space. In other words, all informal contextual issues based on socio-economic, political, historical, and cultural backgrounds are brought in by both students and lecturers which constitutes the informal activities of the curriculum (Hoadley & Jansen, 2013). This is evident when Eisner (1985, p. 36) defines curriculum as “a program the school offers to its students”, and it consists of a “preplanned series of educational hurdles and entire range of experiences that a child has within the school”. In other words, curriculum as informal activity seeks the school to cater for different kinds of experiences of students and lecturers so that teaching and learning may occur while their needs are acknowledged as well, and this indicates that experiences are attached to the curriculum (Pinar', 2010; Pinar, 2012). This then suggests that curriculum as an informal activity is informed by informal reflections where societal needs (student, academics, parents, administrators, and others) become the priority in order to enhance the informal activity of the curriculum by including the different societal experiences during the teaching and learning process.

Furthermore, defining curriculum as a personal activity advocates for a personal development of lecturers or teachers through the process of personal reflection (Jesup et al., 2017). As a result, Hunkins and Ornstein (1998) define curriculum as a “field of study, comprising its own foundations and domains of knowledge, as well as its own research and theory, and its specialist to interpret this knowledge”. In other words, this definition seeks a personal activity of personal development for lecturers through engaging themselves in studies, research and others, and this requires a personal reflection which may address lecturers’ personal needs in education in order to master curriculum (Khoza*, 2016b; Mpungose-, 2016a). This then suggests that curriculum, as a personal activity, requires that lecturers read more so that they may have theoretical and scholarly knowledge of their modules or subjects, and this may bring confidence and expertise to implement curriculum.

Moreover, the definition of curriculum as personal activity (personal development), curriculum as informal activity (individual experiences), and curriculum as formal activity (module/subject) indicates that curriculum may be threefold. This is evident in the study done by Wragg (2002) which developed the notion of cubic curriculum, which explained that curriculum occurs in three major dimensions, namely: the subject being taught, cross-curricular issues, and the methods of teaching and learning. In other words, the first dimension of a subject being taught suggests the curriculum as a formal activity according to this study, where attention is brought to all planned activities done in a particular module like Mathematics and Physical Science which are informed by formal reflections in order to address a module need (Schubert, 1996; Zembylas, 2017). Secondly, the cross-curricular issue, as the second dimension, advocates curriculum as an informal activity where societal issues (politics, economy, culture, and others) have an impact on all curriculum activities, and this needs to consider informal reflection (Zeichner- & Liston, 1996). The third, and the last dimension, seems to be driven by personal reflection since it emphasises the teaching and learning methods that are required to be mastered by lecturers. This then defines curriculum as a personal activity where each and every individual should be developed in terms of ideological-ware, such as, teacher-centredness or learner-centredness (personal reflection), problem-based (informal reflection), and content-centredness (formal reflection) (Heleta, 2016;

Khoza-, 2016b). Moreover, the definition of curriculum is further defined in different positions such as curriculum-as-intended, curriculum-as-implemented, curriculum-as-achieved (Hoadley & Jansen, 2013; Khoza', 2016a; Mpungose-, 2016a).

3.3 Curriculum-as-intended

The study conducted by Doll Jr (2015) and Doll (1992) revealed that every learning institution has the planned, formally acknowledged curriculum, and this curriculum is termed to be the curriculum as intended. For this reason, Kelly (2009) claims that the curriculum as intended is all about what is documented as the syllabus, prospectus, and so on. Further to this, both Heleta (2016) as well as Hoadley and Jansen (2013), speak the same language of taking the curriculum-as-intended, as the plan of teaching where written document contains all prescribed content or activities to be covered at a particular time. This written document is found and used in all levels of curriculum which includes SUPRA level (international curriculum), MACRO level (national curriculum), MESO Level (institution curriculum), MICRO level (teacher curriculum), and NANO level (learner curriculum) (Van den Akker- et al., 2012). This suggests that curriculum-as-intended consists of the lists of all content to be covered, organisation and sequencing of this content, and activities, as well as the list of ways or methods to be used during teaching and learning in all curriculum levels (Hoadley & Jansen, 2013; Wragg, 2002). In other words, curriculum-as-intended is an official and formal document of content to be covered which is informed by formal reflections in order to address the module need, and that is why it can be termed as curriculum-as-plan, prescribed curriculum, or curriculum-as-intended (Greeley & Rose, 2006; Hagay, Baram-Tsabari, & Peleg, 2013). This then suggests that documents like textbooks, module outline or course pack, lesson plan, and all other curriculum policy documents are taken as curriculum-as-intended since they all consist of formal content and activities to be covered during teaching and learning in order to address the module need. The importance of curriculum-as-intended is evident in the study conducted by Fraser (2006) at Macquarie University, Australia. The purpose of the study was to explore the academics' reflections on the forces shaping the University's formal curriculum. The study interviewed twenty-five lecturers for data generation. The study revealed that through partnerships and critical conversations between academics and curriculum developers there would be clear directions on the formal curriculum (curriculum-as-intended) content and sequencing. The

study concluded that, with an understanding between academics and curriculum developers, curriculum-as-intended will have relevant content of each module per discipline. This suggests that a well-planned formal curriculum is as a result of good partnerships between all university stakeholders, and this even enhances an understanding of module content by learners.

Moreover, studies conducted by Hoadley and Jansen (2013), as well as Naylor, Baik, and James (2013), outline the importance of curriculum-as-intended at a HEIs in that it gives direction to both lecturers and students because it clearly stipulates how and what is to be taught. These authors reveal that curriculum-as-intended provides module content, module objectives, and module assessment tasks in order to give guide lines to both students and lecturers. This then requires lecturers and students to reflect formally so that they will be confident about a module (Meierdirk, 2016). Be that as it may, there are some limitations of curriculum-as-intended as outlined in the study conducted (Hoadley & Jansen, 2013). Findings from this study concurs with the findings from the study conducted by Khoza* (2016b), and this study revealed that, lecturers were supposed to teach what is prescribed and intended by the university but, lecturers were teaching according to what they line not according to the prescribed curriculum. These studies reveal that this situation results in different consequences or results. For instance, when student are taught the same content by different lecturers (team teaching), there are high chances of students receiving different content that will lead in attainment of different marks, and this is limiting the intended curriculum. This then suggests that there is a huge difference between what is planned or intended (prescribed syllabus), and what is taught and learned in class or in a lecturer hall (actual implementation). As a result, formal reflection seems be the relevant tool to curb this kind of limitation because when both lecturers and students reflect daily on each module content taught and learnt, the rate of improving practise and understanding of module content may yield successful consequences on curriculum-as-intended (Le Grange* & Reddy, 2017).

In addition to the above, the curriculum-as-intended, according to the context of this study, seems to take the direction of formal reflection which addresses the module need. As a result, this then indicates that curriculum-as-intended may be termed to be a formal curriculum. According to Kelly (2009) formal curriculum is referred to as all planned activities that are done in a learning

institution such as sports, teaching and learning activities, educational excursions and others. That is why Kerr (1968, p. 16) is of the view that formal curriculum is about “all learning which is planned and guided by the school, whether it is carried on in groups or individually, inside or outside the school”. This then indicates that a formal curriculum is informed by formal reflections which give direction to lecturers and students about all activities pertaining to a particular module. Further to this, Hoadley and Jansen (2013), as well as Van den Akker- et al. (2012), aver that the formal curriculum is influenced by the instrumental approach when planning or designing all formal activities which are informed by formal reflections.

3.3.1 Instrumental approach in the development of curriculum-as-intended

Moreover, according to Van den Akker- et al. (2012), instrumental approach advocates for a systematic design process which is formal and based on clear and measurable goals (aim and objectives) in order to address the module content. This is why Kelly (2009) believes that during the planning stages, content taught and objectives achieved are the main signals or aspects reflected on. Further to this, the intensive study done by Tyler (2013b) on curriculum design stipulates facts during the planning process. This study asserts that planning in formal curriculum should include four essential aspects, namely: objectives to be achieved, content to be taught and learnt, teaching and learning methods or procedures used, and evaluations (reflections) done by both students and lecturers. Moreover, “the aims of a module gives the broad purpose or general teaching intentions of the module, whilst the objectives gives more specific information about what the teaching of the module hopes to achieve”. This then suggests that the successful planning of a formal curriculum is attested to a clear and concise formulated aims and objectives, and they must be measurable for all authentic formal activities (Khoza-, 2015d). In other words, aims and objectives act as points of reference that guide the planning process for teaching and learning formal activities. For instance, when a lecturer is planning a formal teaching activity based on atomic structure in the Physical Science module, the aim of the lecturer might be to introduce students to the basic principles or laws of atomic structure and the objective might be to understand how to state principles of atomic structure. This indicates that aims and objectives are the main pillars of a formal curriculum and they form the nucleus of the instrumental approach towards planning all formal activities driven by formal reflection (Jesup et al., 2017; Khoza, 2013b). This then suggests

that instrumental approach is not worried about how (the process) teaching and learning should emerge but rather what matters most is the end product which is about working towards achieving particular goals, and this is defined as the product approach (Le Grange* & Reddy, 2017; Tyler, 2013a).

Furthermore, see the interpretive case study of twenty university students doing Bachelor of Education Honours specialising in Curriculum Studies done by Khoza* (2016b) at a South African University. The main purpose of the study was to explore the postgraduate students' reflections on understanding of curriculum goals in teaching their subjects. The study revealed that there are three main goals to be understood by students during the planning of formal curriculum activities, namely aims, objectives, and outcomes. The study concluded that students were not aware of the goals that underpin their planning of activities of the formal curriculum. This study then suggests the third element on goals, which is learning outcomes (what is to be achieved by learners at the end of the formal activity), and learning outcomes are not emphasised in the instrumental approach. This then indicates that planning is not all about aims and objectives but it is also about learning outcomes to be achieved by learner. Be that as it may, Tyler (2013b) strictly outlines that curriculum should be driven by rationale and goal in order to address the module or subject content.

In addition to the above, Tyler (2013b) study further asserts that the attainment of module content also becomes the most vital factor in the process of planning formal activities for a formal curriculum. The study outlines that the school or the university should plan and decide on formal educational experiences (content) which will lead to the achievement of goals, and this will influence meaningful teaching and learning process. As a result, lecturers value "curriculum content as central, so that the acquisition of that content by pupil becomes the central purpose of the curriculum" (Tyler, 2013b, p. 21). Further to this, Van den Akker- et al. (2012) further support the rationale, product, and goal oriented approach by asserting facts on the third aspect of planning, namely the organisation or teaching methods. The study outlines that learning institution and lecturers should be concern about the ways in which teaching and learning process are going to be organised in order to achieve goals. Tyler (2013b) further avers that organisation has to do with teaching methods and formal activities that may be included during teaching and learning process.

For instance, if lecturers are driven by instrumental approach in planning any formal activities, they should know their modules' organisation, relevant and suitable delivery methods that can be used towards achievement of stated goals. For this reason, Kelly (2009) asserts that "the organisation becomes the matter solely for effectiveness of delivery". See the study conducted by Ensor (2016) on the recontextualising of pedagogic practise of beginning secondary mathematics teachers doing a preservice mathematics teacher education course in the university, it is argued that the recontextualising of pedagogic practise of teachers is dependent and is regulated by three important factors: access to the principles and procedures, educational biography, and school organisation. The study concluded that there is a gap between a secondary mathematics inexperienced teacher education course and secondary school mathematics teaching practise, and this is because of different contextual issues such as teaching resources, teaching location, and socio-economic factors that have an impact on the teaching and learning process. This study suggests and lays down the importance of organisation and teaching methods when planning formal curriculum activities, and the manner in which teaching methods or guiding principles play a major role towards planning of formal activities.

In addition to the above, studies by Tyler (2013b) and Hoadley and Jansen (2013) further outline that the last element on planning formal activities of a formal curriculum which is informed by formal reflections, is assessment and evaluation. These studies reveal that this element requires learning institution like universities including lecturers to be clear as to how to assess learners in order to achieve goals, be able to find ways to reflect, evaluate their teaching and learning practise. Assessment and evaluation focuses on "the degree of attainment achieved by pupil" (Kelly, 2009, p. 21). This then suggests that planning of any formal activity should involve assessment and evaluation strategies which are guided by formal reflections. For instance, it is the responsibility of a lecturer to plan possible assessment activities like assignments and tests, and the lecturers should give evaluation forms to be evaluated by students at the end of each teaching process. This suggests that for students and lecturers to engage in assessment and evaluation, they should undergo formal reflection (Finlay, 2008; Waghid, 2010).

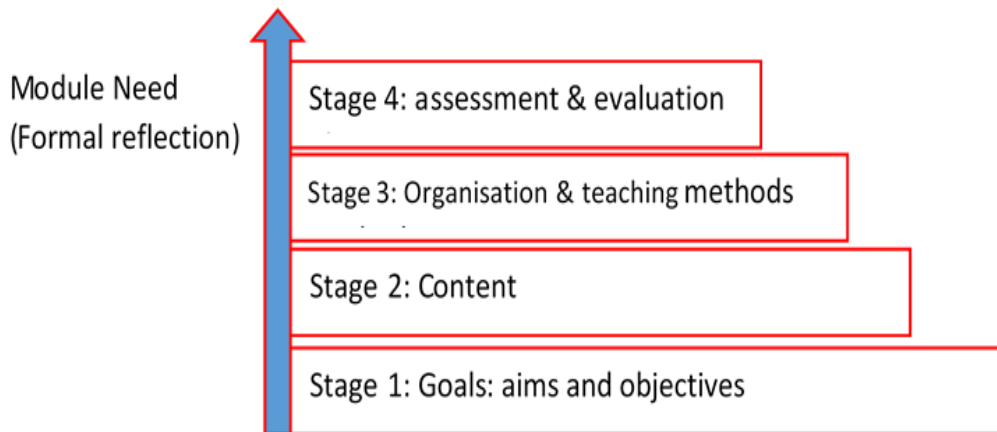


Figure 3.2: Tyler's product approach to curriculum development (Source: Pinnar: 2010, p. 267)

Furthermore, the above discussion displays the thorough usage of instrumental approach when designing formal activities of a formal curriculum. That is the reason why Tyler (2013b) asserts that instrumental approach is influenced by product, technical, and product approach to curriculum planning and development. In summary of the above discussion, Tyler (2013b) formulated four basic questions in different stages (refer to Figure 3.2) in order to enhance a clear understanding of the planning process namely, Stage 1: Why is my educational aims and objectives (purpose); Stage 2: What will I teach in order to achieve my purpose (content); Stage 3: How will I organise my teaching (organisation); and Stage 4: How will I determine if these purposes are being achieved (assessment and evaluation). Thus, in product approach “the purpose of the curriculum take pride of place, content selected not for its own sake but for its presumed efficacy enabling us to achieve those purpose, organisation is similarly designed with these objectives in mind, and evaluation is framed so as to assess how far those objectives have been achieved” (Kelly, 2009, p. 21). This suggests that, instrumental approach is influenced by formal reflection where teachers are taken as transmitters of prescribed content from the formal written content, in such a way that, the knowledge and skills are discovered after an intense research by module experts before they are laid down as objectives in the formal documents (Hoadley & Jansen, 2013; Schubert, 1996; Waghid, 2005). In other words, curriculum-as-planned is informed by formal reflection which plays a major role in addressing the needs of the module in terms of goals, content, organisation,

as well as assessment and evaluation so that it can be easily implemented by lecturers during the use of Moodle.

3.4 Curriculum-as-implemented

The understanding of the concept of curriculum-as-implemented is drawn from authors who have done a great deal of studies in curriculum. These studies in the field of curriculum include (Bravmann, Green, Joseph, Mikel, & Windschitl, 2000; Eisner, 2002; Hoover, 1987; Karseth, 2006; Schubert, 1996). These studies refer to curriculum-as-implemented as the integration, arrangement, and monitoring of planned or instructional content directly as it is from the intended/planned curriculum to students in the classroom/lecture hall environment without any alterations. These findings are similar to the findings from the study conducted by Bharuthram (2012) at a university of the Western Cape, South Africa. The main aim of the study was to outline the importance of the implementation of curriculum particularly on reading skills in higher education. The study revealed that it is important to teach students reading strategies during the implementation of the curriculum in order to improve their reading skills, thereby improving their academic excellence. The study concluded that most of the students lacked reading skills, which was due to the manner in which the university curriculum is implemented by lecturers. Findings from this study suggest that the lack of students' reading skills is as a result of the teaching/implementation of what is supposed to be taught (planned/prescribed content and activities) as according to the module outline without bringing in any experiences/creativity to enhance reading skills (Ngwenya, 2010; Pretorius, 2002). For this reason, Magrini (2015) further states that curriculum-as-implemented is only done according to the way it was planned by developers in the intended curriculum stage in order to ensure consistency. This indicates that lecturer may not be able to deviate from what is planned. As a result this enhances the formal, static, sequential and consistent teaching process which does not bring in creativity or skills. In other words formal curriculum is influenced by formal reflection in order to cater for a module content need (Schiro, 2013; Van den Akker- et al., 2012). This then further indicates that curriculum-as-implemented is influenced by instrumental approach which take the direction of the vertical curriculum which advocates for formal steps and facts as well as a sequential manner towards curriculum implementation.

3.4.1 Instrumental approach (vertical curriculum) in the development of Curriculum-as-implemented

In addition to the above, Hoadley and Jansen (2009), and Bernstein (1999), outline that when curriculum-as-implemented is influenced by ideology of vertical, performance, or collection curriculum, the formal reflections will be driven or influenced by the following key aspects namely: students, lecturers, teaching methods, knowledge, assessment, and the learning environment. These aspects are interrogated in the study conducted by Ensor (2004) on higher education curriculum restructuring discourse. The study revealed two contesting discourses on curriculum implementation policies in reshaping higher education curricular, namely: disciplinary discourse (mode 1) and credit exchange accumulation discourse (mode 2). It is revealed from the study that mode 1 is advocating for vertical curriculum attributes because the valued knowledge is from a direct discipline (module need), the content body of knowledge is also taken from research work, the world view on implementation is driven by traditional, vertical or sequential teaching and learning, perspectives of teaching and learning is guided by teacher-centred. On the contrary mode 2 (horizontal curriculum) discourse is opposing mode 1 discourse. The findings from this study suggests that lecturers should formally reflect of these aspects (students, lecturers, teaching methods, knowledge, assessment, and the learning environment) when implementing the curriculum in order to ensure the module need is met.

Furthermore, studies outline that in the implementation vertical curriculum, a lecturer has control over the selection of the module content to be taught as according to the module outline (planned curriculum) (Bernstein, 1999; Ensor, 2001; Khoza*, 2016b; Schubert, 1996; Van den Akker- et al., 2012). Studies aver that the lecturer decides which content to be taught in a particular module, and the lecturer only does the direct teaching or lecturing by transmitting knowledge from the module outline as it is to the students. These studies further highlights that the pedagogy, or teaching and learning methodology, in curriculum-as-implemented puts more focus on the module to be taught, that is the main concern or focus during curriculum implementation, which is on sequential implementation of the module content to be covered. For instance, when implementing the content on electricity in the Physical Science module, the main focus might be to cover the concepts on parallel and series connection as well as it calculations. As a result, a lecturer may feel

satisfied or that they have done justice in class if all concepts highlighted in a physical module outline are covered or taught as is, irrespective of whether learners have understood it or not.

Moving further, it is outlined from the studies done by Ensor (2004) and Bernstein (1999) that university modules follow the mode 1 type of curriculum implementation where modules are demarcated from each other according to their own disciplines. For example, modules such as Professional Studies module, Educational Studies module, and others, offered in the curriculum studies discipline may address the discipline (curriculum studies), and modules like History, Geography, and others offered in Social Sciences discipline may address the discipline. Moreover, Bernstein (1999) and Schubert (1996) studies further emphasise that curriculum-as-implemented advocates for a school knowledge of each discipline. Studies further assert that school knowledge is embedded into a particular module in a discipline vertically, formally, and sequentially, in order to constitute researched facts and relevant language of the module offered, such as Physical Science, Mathematics, Geography, and others (Hoadley & Jansen, 2013; Laurillard, 2013). School knowledge is implemented systematically, sequentially, and hierarchically following the prescribed content which address the module need, and school knowledge is written down in black and white which enhances vertical continuity from one module to another (Bernstein, 1999; Le Grange* & Reddy, 2017). This suggests that curriculum-as-implemented is influenced by formal reflection based on written facts of each module offered in a discipline. In other words, knowledge in each discipline is based on evidence taken from research of each discipline (Kelly, 2009). Thus, curriculum-as-implemented depends on the set or planned university curriculum stating all content that is to be taught or learned (Le Grange', 2014; Noblit & Pink, 2016).

In addition to the above, the aspect of assessment in curriculum-as-implemented is outlined in various studies which outline that assessment in the curriculum-as-implemented is informed by formal reflection because it has to form a constructive alignment that should be transpired in all levels of module implementation at a university, namely, teaching activities, intended curriculum as well as assessment tasks (Biggs', 2011; Boud et al., 2013; Cornish & Jenkins, 2012; Hunkins & Ornstein, 1998). These studies further aver that intended or planned content leads to the teaching activities and assessment task that will be administered during the implementation process. This

then suggests that all formal assessment which takes place during the implantation period takes the formal written content prescribed in the module outline or course pack. For instance, assessment tasks given to students, might be in line with what is taught and stipulated in the module outline and be aligned with all other previously done teaching and learning activities in order to ensure constructive alignment (content, activities and assessment).

Furthermore, to the above, studies conducted by Bloom (1956), Hoadley and Jansen (2013), as well as Anderson-, Krathwohl, and Bloom (2001), on assessment in the implementation of the curriculum, outline that there are stipulated criteria in place to determine the failure or the pass of a particular assessment. For instance in the South African university context, if an assessment mark is below 50%, the criteria reflects the fail; 50%-59% is a third class pass, 60%-69% is second-class pass in lower division, 70%-74% it is second class pass in upper division, 75%-100% it is first class pass. This then suggests that assessment criteria follows certain vertical and formal steps in order to achieve the higher criteria, and in curriculum-as-implemented lecturers' may only judge whether students have failed or passed an assessment task. As a result, lecturers' are then expected to be driven by a formal reflection in teaching the content of curriculum-as-implemented before they administer assessment tasks in order enhance stipulated assessment criteria (Reddy & le Grange, 2017). In other words, lecturers are implementing the module content in order to attain the assessment criteria, and this indicates that lecturers are teaching the content while their focus is on assessment. This why Bloom (1956) introduced different classifications that should be ensured when conducting assessment during teaching and learning

Moreover, Anderson- et al. (2001), Bloom (1956), Kennedy, Hyland, and Ryan (2006), as well as Hoadley and Jansen (2013), further aver that teaching and learning in curriculum-as-implemented is addressed by a formal reflection that is guided by an instrumental development approach because implementation of curriculum is systematic and hierarchical following certain prescribed content in order to address the module need. These studies further articulate that curriculum-as-implemented gives great privilege to the cognitive domain (knowing component of learning), affective domain (emotional component of learning), and psycho-motor domain (skills component of learning). Note that curriculum-as-implemented focuses more on cognitive domain as depicted

in Figure 3.3 below which will be discussed further in Section 3.8 of this chapter (Bloom, 1956; Kennedy et al., 2006). Be that as it may, note that assessment in curriculum-as-implemented are made up of sequential steps which are influenced by formal reflection, ranging from lower order to higher order level of thinking namely: 1. Remembering (knowledge); 2. Understanding (comprehension); 3. Applying (application); 4. Analysing (analysis); 5. Evaluating (evaluation); and 6. Creating (synthesis) (Anderson- et al., 2001; Bloom, 1956)

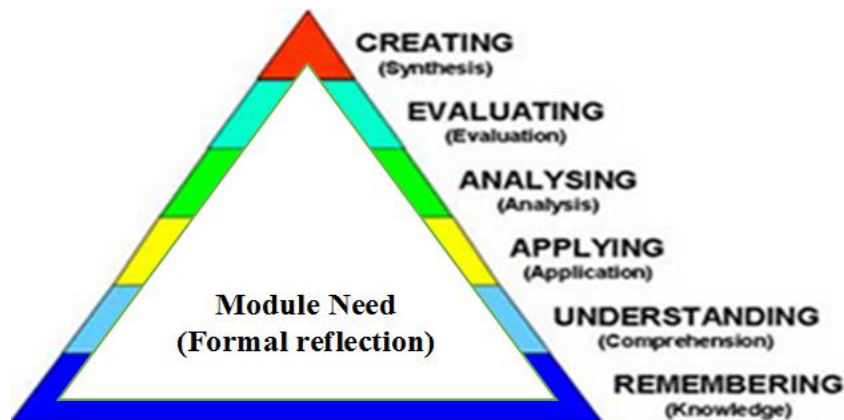


Figure 3.3: Classification of levels in curriculum-as-implemented. Source: Anderson- et al. (2001, p. 81)

Moreover, Policies in higher education also provide some formal reflection of assessment in higher education. Take for instance in the South African context, there are policies which provide assessment criteria of each qualification offered at a HEIs (Education, 2002). These policies provide formal level descriptors as according the National Qualification Framework (NQF) levels, namely: 1. NQF level 1: General knowledge; 2. NQF level 2: Basic operational knowledge; 3. NQF level 3: Basic understanding of key concepts; 4. NQF level 4: Demonstrate fundamental knowledge; 5. NQF level 5: Demonstrate an informed understanding; 6. NQF level 6: Demonstrate the main knowledge areas; 7. NQF level 7: Demonstrate integrated knowledge; 8. NQF level 8: Demonstrate knowledge of and engagement; 9. NQF level 9: Demonstrate special knowledge; and 10. NQF level 10: Demonstrate expertise and critical knowledge. The meaning of these levels is therefore (Education, 2002) outlined in NQF policy, which indicates that each qualification offered is assessed according to each NQF level. For instance, there is Higher Certificate (NQF level 5), advanced certificate and Diploma (NQF level 6), advanced certificate (NQF level 5), Bachelor's

Degree certificate (NQF level 7), Bachelor Honours Degree certificate and Postgraduate Diploma (NQF level 8), Master's Degree (NQF level 9) and Doctoral Degree (NQF level 10). This then suggests a formal reflection of qualification attained by students after assessment has been administered in curriculum-as-implemented and this shows a step-by-step process of achieving a qualification which is influenced by a formal and vertical curriculum. Note that the last aspect to be considered in curriculum-as-implemented is the teaching and learning environment (Earl & Giles, 2011; Hoadley & Jansen, 2013).

Furthermore, the teaching and learning process only occurs in a clearly marked environment such as the classroom, lecturer hall, laboratory, an online platform (Hoadley & Jansen, 2013). Note the case study of twenty-two postgraduate university students who specialised in Curriculum Studies conducted by (Khoza*, 2016b). The main purpose of the study was to explore students' reflection on the teaching and learning environment. The study revealed that student teachers were confused as to where teaching and learning should occur because their policy document (intended curriculum) was silent on that note. This then suggests that if an intended curriculum does not specify venues where teaching and learning may occur, it is the duty of teachers and lecturers to select venues or learning environments for themselves where the curriculum may be implemented. As a result, according to Boud et al. (2013), formal reflection on curriculum-as-implemented may assist lecturers to identify the relevant learning environment in order to implement the formal curriculum. For instance, lecturers may decide to go to the laboratory when the lecture is about Physical Science experiments or they may decide to use the local area network (LAN), if a lecture requires computers. This is done in order to address the module need via formal reflection which is a pillar in curriculum-as-implemented (Boud* et al., 1985; Schiro, 2013). This then suggests that curriculum-as-implemented constitutes the formal layer of the curriculum which goes hand-in-hand with the process approach to curriculum development as articulated by teachers in the field of curriculum (Ayers, 2011; Van den Akker- et al., 2012)

Moreover, a study conducted by Hoadley and Jansen (2013) concurs with the views by Stenhouse (1975) on curriculum-as-implemented because these studies outline that lecturer's reflections are influenced by the process approach which is sometimes referred to as the critical, contextualised,

or action-reflection approach. These studies further point out that curriculum is not about the design of curriculum (intended curriculum) by experts who select the content of the module, but it is about the development (curriculum-as-implemented) of curriculum where lecturers or teachers are taken not only as transmitters of the content but also taken as mediators in implementing the curriculum, and as participants in curriculum development. In other words, lecturers' reflection in curriculum-as-implemented may advocate for formal teaching and learning through mediating between what is planned and what is implemented in class (Kolb, 2014; Le Grange* & Reddy, 2017). This then suggests that curriculum-as-implemented is a guide (implemented) not a prescription (planned) to lecturers about what is supposed to be taught in class according to different contextual issues (lack of resources, environment, and others), and this gives lecturers a chance to try and see what works and what does not work for them during curriculum implementation (Ensor, 2016). For this reason, Hoadley and Jansen (2013) outline that a good curriculum should include both the content and the processes of implementing that particular content. This suggests that curriculum-as-implemented focuses on how student should learn the formal curriculum and be understood in order to enhance formal reflection. This then leads to understanding of the enacted curriculum (Govender & Khoza, 2017; Laurillard, 2013).

3.5 Curriculum-as-enacted

The literature indicates that curriculum-as-enacted is often ignored in the field of Curriculum Studies and sometimes its definition contradicts with the one of curriculum-as-implemented (Du Preez & Simmonds, 2014; Ensor, 2016). However, Fullan (2014), as well as Hoadley and Jansen (2013), draws a line between curriculum-as-implemented and curriculum-as-enacted by outlining that the concept of curriculum-as-enacted is vital because it provides a true sense of teaching and learning, clarifies that not all students can learn the same way, and that teachers or lecturers become interpreters of the planned curriculum; whereas in curriculum-as-implemented teachers or lecturers become transmitters of the planned curriculum and it is assumed that all student should achieve the intended goals (all student learn the same way). Thus, "curriculum enacted is a more useful way of describing the on-going process of implementation because it emphasizes the educational experience that student and teachers jointly undergo as they determine what the curriculum will be like in each classroom" (Marsh, 2009, p. 93). This then puts forward the motion

that curriculum-as-implemented is concerned with teaching and learning only what is stipulated in the planned curriculum, whereas curriculum-as-enacted is more concerned with bringing in social experiences based on the contextual issues that affect teaching and learning and it is dynamic (lecturer must bring in creativity in line with experiences of both learners and teachers in order to deliver the content in a particular context).

As a result, Kelly (2009), as well as Caswell- and Campbell (1935) defines curriculum-as-enacted as the curriculum in practise, the lived or experienced curriculum, an actual curriculum since it involves teaching and learning in the context of school or class, it is about how lecturers and students practice curriculum by bringing in their social reflection on their experiences. This is because curriculum-as-enacted tries to ease the tension between the curriculum-as-planned and curriculum-as-implemented. This is because what is planned in the intended curriculum may not be what may be implemented, but in most cases it is what occurs in practice or enacted. As a result it involves the real actual teaching and learning which includes the actual lecturers' and students' experiences at a spade level (Hunkins & Ornstein, 1998; Le Grange* & Reddy, 2017). This then suggests that what is planned (module need influenced by formal reflection) and what is implemented (module need influenced by formal reflection) is given a meaning by what is enacted (societal need influenced by informal reflection). In other words, the definition of curriculum-as-enacted in the context of this study may be referred to as all informal teaching and learning activities or experiences emerging from the planned curriculum that are done in class by both students and lecturers in order to address the societal need. Thus, curriculum-as-enacted is what is actually practiced based on the daily choices, selection, and decisions lecturers make about content and learning experiences in order to meet the needs of students (Hiebert, 1997; Lester, 2007).

Furthermore, See the study conducted by Le Grange* and Reddy (2017) reflecting on the tension between the curriculum as planned and curriculum-as-enacted. The study outlined that teachers find themselves in the tension space of planned and enacted (unplanned), where teachers are intrigued, experiencing difficulties and uncertainty if what is taught is what is supposed to be enacted the way it was planned. The study reveals that this assertion enhances lecturers to use their own experiences in enacting the curriculum in order to bring uniqueness, vibrancy, and life to the

teaching and learning process. This therefore shifts the curriculum towards something that is lived, experienced, and actual practise according to the informal reflection which then caters for everybody's (lecturers and students-society) needs in the process of learning and teaching, rather than taking curriculum as static and dehumanising (planned/implemented curriculum) (Aoki, 2004; Chisholm, 2005). As a result, according to Pinar and Irwin (2005), curriculum is well interpreted when lecturers and students are reflecting on their own experiences, and bring in those experiences into curriculum enactment. That is the reason why Aoki (2004) and Apple (2004) share the same view that the rationale of curriculum-as-enacted is on the basis of human experiences within the classroom or lecture hall context. This advocates for experiential world view of lecturers with students who resides and dwell in the existences of the planned curriculum to use their experience to unpack the content of the module.

In addition to the above, reflections help teachers to understand and “have control over the content and processes of their own work” (Zeichner & Liston, 1987, p. 26). Thus, informal reflection that influences curriculum-as-enacted is well articulated when Pinar et al. (1995) introduced the four phases that underpins curriculum-as-enacted through autobiographical educational experience (Figure 3.4), namely: Regressive phase, Progressive phase, Analytical phase, and Synthetic phase. Further to this, Wang (2016) highlights that this phases enables a transformative, dynamic, flexible, and reflective teacher during the enactment of curriculum. Moreover, various studies outline that regressive phase focuses more on the past experiences of both lecturers and students where both will take into account the past lived experience that had an impact during curriculum enactment, and this may include socio-economic factors, environmental factors, cultural factors, political factors and others that is brought in teaching and learning process (Pinar, 1975; Pinar et al., 1995; Schubert, 2009). Studies further aver that the progressive phase focuses on the future such that, “one looks forwards to what is not yet present; one meditatively imagines possible futures and also how the future inhabits the present” (Pinar, 2004, p. 36). Moreover, Pinar (1975), outlines that analytical is with a focus on the present teaching and learning activities or experience in order to shape ones' future from the past. In other words, both students and lecturers reflects on how the present curriculum enacted is influenced by the past life experiences. The last phases according studies is synthetically and this is as a result of integrating the previous three phases in

order to bring the awareness of all informal activities done in curriculum-as-enacted so that both student and lecturers may have an understanding and make meaning of the curriculum as planned (Pinar & Irwin, 2005; Schubert, 2009). This then suggests that, curriculum-as-enacted interprets the curriculum by following the process or phase's approach in curriculum development which brings in the experiences of the society (students and lecturers) through personal reflections in order to create meaning of the planned or intended curriculum (Boud et al., 2013; Stenhouse, 1975)

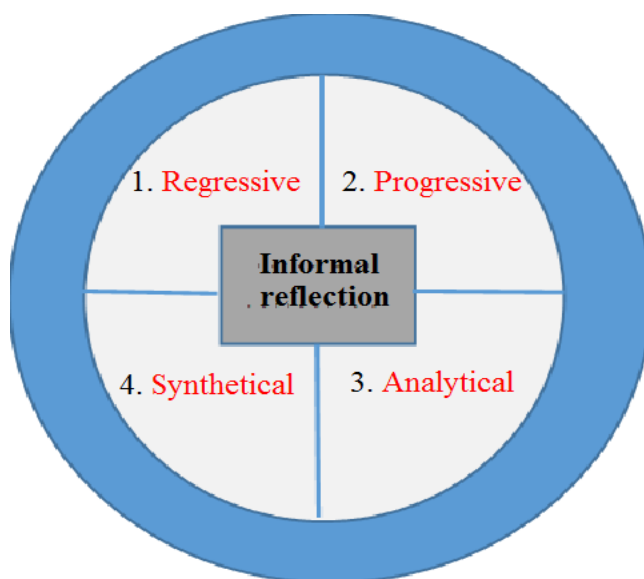


Figure 3.4 : The four phase of curriculum enactment (*currere*), source: Pinar et al. (1995, p. 36)

In addition to the above, studies conducted by Stenhouse (1975); (Stenhouse, 1979, 1983) further aver process approach in the development of curriculum-as-enacted which advocates for teaching and learning processes in order to bring understanding about the concept taught rather than teaching the content activities with an aim of achieving goals (aims, objectives, and outcomes). For this reason, Hoadley and Jansen (2013, p. 62) assert that “curriculum should be an intelligent guide or proposal rather than a plan with pre-specified objectives. This guide will be tested and validated according to each other’s particular context”. This then indicates that the process approach requires informal reflection of students and teachers to be included in the curriculum as planned, and those experiences must be introduced in order to make meaning about the concepts studied or taught (Ensor, 2016; Peabody & Noyes, 2017). For instance, when a lecturer is actually teaching the Physical Science module and unpacking reversible reaction (water to gas and vice

versa) in a chemical change concept, a lecturer may not only write a reaction $\text{H}_2\text{O}(\text{s}) = \text{H}_2\text{O}(\text{l})$ in teaching the concept, but a lecturer must bring relevant informal experiences like demonstrating the reaction by boiling water in a beaker while bringing the cover so that water may evaporate and condense. This may be easily understood by students because this is what they normally see in their daily experiences when cooking in their respective homes.

In addition to the above, Stenhouse (1979), and Knight (2001), in the process approach, is concerned with procedures and processes that will inform the content from the curriculum-as-planned which will then give more details on goals to be achieved in a lesson. As a result, reflecting on activities into this approach plays a big role because activities allow students to make informed options about the sequence on how to do a particular task. As a result students become active, and this enhances different thinking capabilities of students, students get opportunity to revise and rehearse given activity, it gives student and opportunity to share experiences with others (Hoadley & Jansen, 2013; Le Grange* & Reddy, 2017). This suggests that process approach gives more freedom to students to explore ideas that brings about learning and knowing during curriculum enactment, and this allows students to master key concept during teaching and learning. Moreover these assertions concur with what is outlined in a study conducted by Knight (2001) at the University of Lancaster, University in United Kingdom (UK). The main purpose of the study was to explore lecturers' reflection on the use of process approach of curriculum development as an alternative from Outcomes-led rational curriculum approach. The study revealed that a process approach to curriculum highlights the areas in which students will be able to construct knowledge and meaning, It also give direction to where students should put more attention, but it does not specify exactly the result of the learning processes (goals to be achieved). The study concluded that lecturers were not aware of the key role that is played by process approach in actively engaging students during teaching and learning (curriculum enactment). This then suggests that not all lecturers from the universities are aware that teaching module (implementing curriculum) with an aim of achieving goals disadvantage the active participation of student in understanding of the module concepts. This leads to the notion of grading students without relevant skills that may assist a student in a working environment (Waghid, 2002; Zembylas, 2017). As a result, it is then "fair to say that a good curriculum would plan for learning to take place through communities of practice in which

group work and peer evaluation are normal, interpersonal contact is common and networks of engagement are extensive” (Knight, 2001, p. 377). This then indicates that the process approach is influenced by horizontal, competence, or integrated curriculum (Bernstein, 1999).

In addition to the above, reflection on horizontal curriculum by Mpungose* (2016) concurs with the study conducted by Hoadley and Jansen (2013), on curriculum because it is outlined that horizontal curriculum is influenced by informal reflection based on the following factors, namely: Lecturer, Pedagogy, Knowledge, Assessment, and Learning Site. Further to this, Bernstein (1999) avers that the role of a lecturer in horizontal curriculum is indirect during the enactment of the curriculum. As such, the lecturer must act as a facilitator in satisfying or addressing students’ needs, and thus the control on teaching and learning activities is negotiated among the student and a lecturer by including their experiences in order to bring an awareness of all concepts enacted (Khoza*, 2016b). For instance a lecturer is not expected to impose and direct how activities should be done, but the lecturer should help students to use and share their own societal experiences in order to master a particular concept in a module (Vygotsky, 1978). This then indicates that teaching and learning does not follow what is prescribed from the planned or intended curriculum but it brings in experience in the process of teaching and learning in order to enhance understanding of the content. Thus the lecturers’ role tends to be more hidden from learners, and this indicates that the teacher becomes the interpreter of the curriculum rather than the transmitter (Bernstein, 1999; Graham-Jolly, 2002). For example, in this context, when lecturers’ offer a lecture, the focus should be on the individual students’ experiences that they bring in with them to the lecture rather than the goals to be achieved.

Moreover, Ngubane-Mokiwa and Khoza (2016), as well as Bernstein (1999), share the same view on the pedagogy in horizontal curriculum; Specifically, that all activities enhance built-in skills which may be relearned by students through the process of engagement. In other words, when enacting the curriculum, the focus is for students to actively engage with activities in order to build awareness on concepts studied by involving their everyday experience. This is supported by Hoadley and Jansen (2013), as well as Le Grange- and Reddy (2017), when revealing that students have extensive control over the manner in which their learning takes place (selection), when their

learning occurs (sequence), and how quickly their learning happens (pace), irrespective of their background. This then suggests that students have control over learning concepts according to what is stipulated in the module outlines and they are the ones who determine the pace to finish the content.

Furthermore, horizontal curriculum knowledge is located in various activities of a module such as given projects, assignments, and portfolios rather than in a module. This brings the link between everyday knowledge and students' experiences so that all activities may draw from modules from different disciplines through the overarching of themes and concepts (Berkvens et al., 2014; Bharuthram, 2012). For instance a lecturer may use mathematics equations (algebraic equation) from the Mathematics Module in order to solve problems based on laws of motion in the Physical Science module. This is because the focus is on what they are competent on (what they already know) from their prior existing knowledge, and in the horizontal curriculum, all students are taken competent in such a way that they can use their own unique reflections in order to reach the outcomes (Bernstein, 1999; Biggs, 1996). Thus, the manner in which the outcomes are reached will determine if the outcomes are attainable and also lay down room for a lecturer to assist students where necessary.

In addition to the above, the assessment and evaluation is based on what students know (presences) rather than what they do not know (absences), and lecturers share the process of evaluation with students (Bernstein, 1999; Fullan, 2014). Thus, Khoza- (2013c) further indicates that assessment in curriculum-as-enacted is about checking if learning outcomes have been achieved by learners, and learners do not fail since they are all allowed to achieve different outcomes at their own different ability and pace. This shows that all assessment activities are based on everyday knowledge, and everyday knowledge is informed by informal reflection since it is based on societal opinions that yield in unplanned teaching and learning process (process approach) (Le Grange* & Reddy, 2017; Stenhouse, 1975). In other words, activities are from various sources such as internet, television, parents, and others. This suggests that knowledge is not only from the implemented or planned curriculum but is also from the experiences that is brought by both students and teachers from the surroundings (society) in order to address the

societal need. Note that, everyday knowledge is influenced by informal reflection because it involves oral conversation and practical activities according to a particular context which address a certain societal need (Graham-Jolly, 2002; Loughran, 2002). In other words, teaching and learning activities in curriculum-as-enacted are based on the local context which is unsystematic, and this suggests that there is no one stated sequence to be followed by all students in order to accomplish any activities. As a result, curriculum-as-enacted is informed by communicative approach to curriculum development (Van den Akker* et al., 2009).

3.5.1 Communicative approach in the development of curriculum-as-enacted

In addition to the above, various studies aver that curriculum-as-enacted is basically dependent on principles of communicative approach to curriculum development because in this approach both students and teachers use informal reflection in order to negotiate the development process of a lesson activity (Fullan, 2014; Hoadley & Jansen, 2013; Schön, 1983; Schubert, 2009; Van den Akker- et al., 2012; Van den Akker* et al., 2009; Waghid, 2010). That is why Van den Akker* et al. (2009) emphasise that commutative approach is a social process where all stakeholders (students and lecturers) involved in teaching and learning actively participate in finding a solution for matters or activities. In other words, curriculum-as-enacted uses informal reflection to actively engage with module content activities in order to achieve goals using their own relevant strategy. The above-mentioned studies, further outline that the best curriculum development (teaching and learning) is the one in which both students and lecturers become involved in all teaching and learning activities, this then therefore advocates for deliberation and negotiation as the core aspects in curriculum-as-enacted.

Furthermore, see the study conducted by Puntaney (2016) in one of the USA, HEIs. The main purpose of the study was to explore deliberation and negotiation on curriculum development of intercultural master's-level students preparing for international careers. Nine professors and two students from across disciplines were participants in this study. The study revealed that the deliberation and negotiation aspects in curriculum development assisted them to develop a curriculum that will cater to their societal needs in terms of race, colour, socioeconomic background, and others. The study concluded that conversations and considerations among the

participants during the planning process did play a big role in the curriculum that emerged (intercultural competence curriculum). The findings from this study suggests that the aspect of deliberation and negotiation in curriculum development seeks to identify, understand, and meet the needs of students and lecturers (stakeholders) involved via the use of informal reflection. For this reason, Van den Akker- et al. (2012, p. 17) outline that in the development of curriculum-as-enacted lesson activities, "...users and other parties involved were given ample opportunity to contribute" in order to find the solution.

Furthermore, note that informal reflection plays a significant role in the development of activities in curriculum-as-enacted because it creates relationship between lecturers and students. That is the reason why Van den Akker- et al. (2012, p. 29) further reveals that "...building relationships with stakeholders and soliciting the input of developers and other parties involved are crucial". This then then suggests importance of relational strategies in the development of curriculum-as-enacted. In other words, communicative approach holds the subjective perception and views of all stakeholders during the development of the activities. For instance, when the lecturer is giving a lecture in the Physical Science module based on how to draw electric circuits. The lecturer should not come and demonstrate this activity but a lecturer must seek subjective perception from students on how they perceive the drawing of electric circuit instead of depositing the knowledge to students as an empty vessels (Rylands, Simbag, Matthews, Coady, & Belward, 2013; Vygotsky, 1978).

Moreover, the role of communicative approach is evident when developing curriculum-as-enacted activities because it seek for informal reflection to take place everywhere and at anytime without any demarcation (Khoza, 2015). For this reason, Hoadley and Jansen (2013) and Van den Akker* et al. (2009), emphasise that teaching and learning in curriculum-as-enacted can occur anywhere, like at home, at work, even at school. This assertion concurs with Nkohla (2017) and Mpungose* (2016) who assert that lecturers' use different platforms according to the experiences of learners in order for them to have a space to voice out their informal reflection (opinions) about the matter being studied. For instance, lecturers must provide learning platforms like Moodle (discussion forum, to students, so that there will be engagement of the content matter being discussed,

irrespective of where they are (location). Even though communicative approach is time consuming but what matters most is that it is learner-centred and it is informed by informal reflection in order to cater for societal needs (stakeholders). This approach is dynamic and flexible in order to provide social change in the learning institution (Ayers, 2011; Bernstein, 1999; Van den Akker* et al., 2009). This discourse then brings confusion to lecturers on whether to implement the curriculum (teach only what is prescribe) or to enacted the curriculum (bring in experience in teaching what is prescribed) after it has been planned at a MACRO level (national) or MESO level (institution level). Thus, according to this study, the decision taken by lecturer whether to enacted or implement the curriculum if informed by personal reflection (personal need) which therefore result to the produced curriculum, refer to the Figure 3.5 below

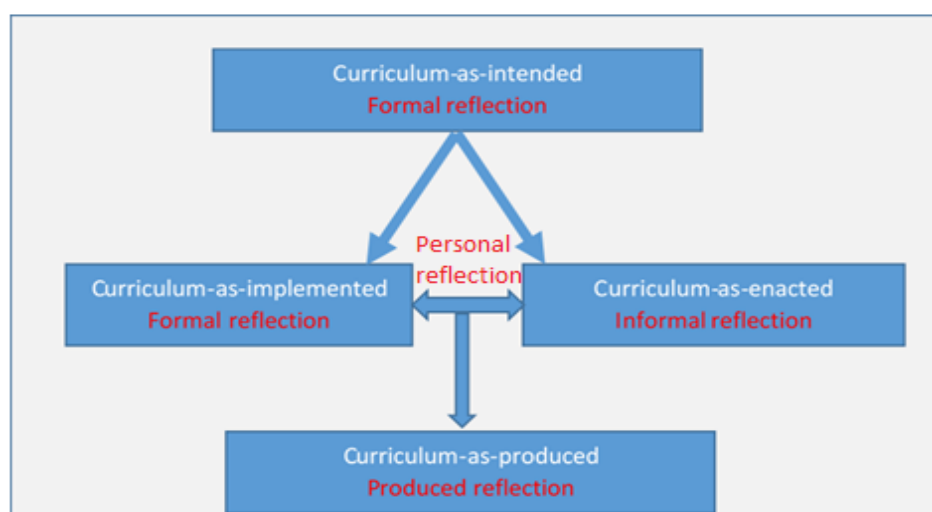


Figure 3.5: Curriculum presentation informed by reflections

3.6 Curriculum-as-produced

Studies conducted by Khoza- (2015d) and Nkohla (2017) in the 21st century concur with studies conducted by Eisner (1979) in the 19th century regarding the concept that curriculum-as-produced is driven by an artistic approach to curriculum development. The studies revealed that, in most cases, teaching and learning is successfully done by lecturers who do not have a much clearer comprehension than others of curriculum goals, but who do bring in a sense of creativity in all

activities during teaching and learning. Eisner (2002) further avers that these kinds of lecturers become more cognisant of bringing in their personal creativity from their personal reflection in order to master some concepts of the curriculum-as-produced which may include: goals (aims objectives and learning outcomes), module content, learning environment (location), teaching methods (learner or teacher-centred), assessment, and others. In other words, artistic approach enhances the creativity after a personal reflection of the developer (lecturer) to choose whether to implement the curriculum, to enact the curriculum, or to use both in order to produce the new curriculum which will address the personal need, since no one is innocent among the two (Mpungose*, 2016; Van den Akker- et al., 2012). Moreover, in the context of this study, the produced-curriculum are as a result of the produced creativity after personal reflection on curriculum concepts stated above. This then gives powers to this study to declare that the curriculum-as-produced is informed by produced reflection rather than personal reflection, refer to Figure 3.5 above.

In addition to the above, produced reflection informs curriculum-as-produced, which is guided by the pragmatic approach, because of this assertion, development of lesson activities in curriculum-as-produced is guided by lecturers' personal viewpoint, expertise, and perception, which are subjective (Eisner, 1979; Schön, 1983). As a result, Van den Akker* et al. (2009) emphasise that the pragmatic approach towards the development of curriculum-as-produced enhances the lecturer to meet their personal need after undergoing the produced reflection. Thus, no goal-orientated or prescribed sequence or permanent set of procedures are to be followed by lecturers; only the lecturers creativity and bringing in of personal experience is required to drive the process of teaching and learning. This then suggests that curriculum-as-produced gives powers and freedom to lecturers to possess relevant skills and abilities to select what is educationally relevant in teaching and learning activities of the module content in a particular context (Singh & Singh, 2012; Van Manen, 1991). Moving further, according to various studies, produced reflections play a huge role in enhancing lecturers to have trust in themselves and imagine possible creativity in executing module content or activities successfully (Dewey*, 1938; Heleta, 2016; Schön, 1983; Zeichner- & Liston, 1996). Studies further reveal that the constant and daily reflection of lecturers on their practise on the produced curriculum will improve their teaching skills. This may assist them to

have different ways to overcome obstacles during teaching and learning, and to increase their awareness and adaptability on *pros and cons* of both curriculum-as-implemented and curriculum-as-enacted. Thus, the produced curriculum seems to create a connecting curriculum between the two other curricular as depicted below in Figure 3.6.

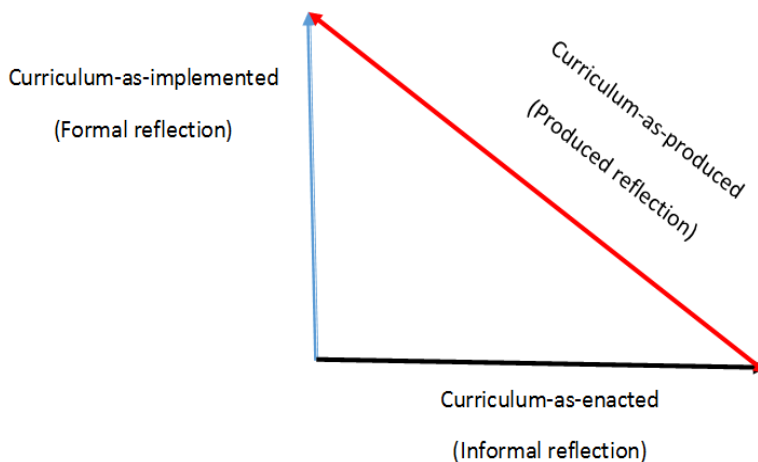


Figure 3.6: Curriculum-as-produced, curriculum-as-enacted and curriculum-as-implemented with reflections

3.6.1 Pragmatic approach in the development of curriculum-as-produced

Berkvens et al. (2014), Khoza (2015), and Nkohla (2017), refer to pragmatic approach as a type of curriculum development approach that meets user’s needs by embracing practical consequences or usability of curriculum, and this includes aspect of accepting realities from real life experiences in order to bring truth during teaching and learning. In other words, pragmatic approach is influenced by the produced reflection in order to bring practical observation and experiences into the curriculum which addresses the personal needs of lecturers, and this may promote links between curriculum-as-implemented and curriculum-as-enacted because pragmatic approach strives for personal development and personal consciousness in order to meet personal needs (Khoza, 2015; Mpungose-, 2016a; Myers, 2016).

Moreover, as the study conducted by Bovill, Cook-Sather, and Felten (2011) at a University of Glasgow in UK shows, the importance of a pragmatic approach in curriculum development can be useful. The aim of the study was to understand university students' reflections on the involvement in using the pragmatic approach in curriculum development. The study revealed that, curriculum developers must create typical structures and relationships where all stakeholders, like students, may freely voice out their inputs towards teaching and learning activities, student become active if they are valued, and encouraged to participate in all academic activities. The study therefore concluded that, involving students in the development of their own educational experiences can enhance students' ownership of their own personal learning. This is in line with what various studies indicate (Berkvens et al., 2014; Hax, 1996; Van den Akker- et al., 2012; Viterbi, Wolf, Zehavi, & Padovani, 1989). Specifically, pragmatic approach is significant in curriculum-as-produced because it is clear from the findings that lecturers (academic staff) must always use creativity to provide the room to include student to the development of any activity of a module so that students will feel as part and parcel during teaching and learning process. As a result, the produced reflection may then play a major role as lecturers can easily decide which role (instructor or interpreter) they will play that will suite their own personal needs during teaching and learning (Biggs-, 2014; Boud et al., 2013). This then indicates that curriculum-as-produced is also influenced by Freire (1985) critical pedagogy in education and curriculum.

Moreover, studies by Van den Berg, Bakker, and Ten Cate (2013), as well as Freire (2000) assert that critical pedagogy is influenced by produced reflection in order to meet the personal need. This is because it is outlined that producing the curriculum from either implemented or enacted seeks both student and lecturers to become the change agents in order to address their own personal needs. Thus, students and lecturers have to “problematise and challenge the oppressive experience in their direct environment” (Le Grange* & Reddy, 2017, p. 103). This then suggests that all activities in the produced curriculum must be committed to emancipation and empowerment of both lecturers' and students' own personal needs (Dewey*, 1938). Moving further, Freire (2000) and Jansen (2013), aver that critical pedagogy requires lecturers to produce activities and teach them irrespective of class difference and racial classification or inequalities. For instance, teaching

and learning activities of the Physical Science module should not be demarcated according to whether students are black, white, coloured, etc. As a result, produced reflection has to cater for the different personal background experiences of each participant (lecturers and students) during teaching and learning (Karseth, 2006; Pedro, 2005).

In addition to the above, Freire (2000), Fraser (2006), and Le Grange* and Reddy (2017), assert that curriculum-as-produced should avoid the banking notion of teaching and learning, where students are taken as empty containers to be filled with knowledge. Instead, they should engage in the knowledge and meaning-making process via produced reflection and action. That is why Sherborne (2014), and Gosper and Ifenthaler (2014), assert that the meaning-making process is entrusted in social interaction with others (social constructivism) grounded on the personal needs. This then suggests that it is vital for lecturers to rely on their produced reflection in order to master the discourse in different presentation of curriculum developments, and to curb the tension between curriculum-as-implemented and curriculum-as-enacted by reflecting on the curriculum-as-produced. This then guides and leads lecturers to understand Technological, Pedagogical and Content knowledge signals (TPACK) as depicted in Table 3.1 in Section 3.7 below.

3.7 Moodle curriculum Signals.

Khoza* (2016b), Van den Akker- et al. (2012), and Mishra and Koehler (2006), aver that the signals listed in the table 3.1 below play a significant role in understanding curriculum during the teaching process while using the Moodle LMPs. These signals are further discussed from Section 3.7.1 to 3.7.8 as detailed in a table 3.1 below.

Table 3.1 Moodle curriculum signals.

	Signal	Questions	Propositions	Reflections
1	Moodle permission	Who and how are they permitted to use Moodle	Financial permission	Produced reflection
			Physical permission	Formal reflections
			Cultural permission	Informal reflection
2	Justice to Moodle	How do you ensure justice when using Moodle for teaching	Aims	Produced reflection
			Objectives	Formal reflections
			Learning Outcomes	Informal reflection
3	Content in Moodle	What content are you teaching using Moodle?	Teaching methods	Produced reflection
			Physics	Formal reflections
			Chemistry	Informal reflection
4	Moodle activities and content	What are Moodle teaching activities used?	Personal activities	Produced reflection
			Formal activities	Formal reflections
			Informal activities	Informal reflection
5	Lecturers 'character	How do you perceive your role when using Moodle?	Instructor	Produced reflection
			assessor	Formal reflections
			Facilitator	Informal reflection
6	Moodle platform	Where do you use Moodle for teaching?	Personal platform	Produced reflection
			Formal platform	Formal reflections
			Informal platform	Informal reflection
7	Time scheduled for Moodle	When do you use Moodle for teaching?	Spare time	Produced reflection
			During Work	Formal reflections
			After work	Informal reflection
8	Assessment in Moodle	How do you assess teaching using Moodle?	Assessment for learning	Produced reflection
			Assessment of learning	Formal reflections
			Assessment as learning	Informal reflection

3.7.1 Granting permission in the use of Moodle

According Farace and Schöpfel (2010), knowledge construction starts with a clear and well accepted definition of particular concepts or terms reflecting on a certain matter. As a result, according to the Oxford dictionary (2014) term permission is defined as manner, opportunity, or characteristics that make it possible to look, approach, enter, benefit, or work with something. In the context of education, and of this study, permission is about providing an opportunity to all people (students and lecturers) and a chance to have access to education (teaching and learning), irrespective of their political and socio-economic background (Berkvens et al., 2014). Permission in higher education is characterised with contact to a traditional teaching, use of educational technology, and full-time and campus-based interaction with higher education institution for teaching purposes (Letseka & Pitsoe, 2014). Further to this, Farmer (2017a) avers that permission is all about those factors that enable one to participate in HEIs for the purposes of teaching and learning in order to get a qualification. The assertions from the three authors to the latter suggest that permission is all about answering the question of ‘with whom is teaching done and how teaching is accessed’, and in the context of this study permission seeks to bring clarity on a matter of who is permitted to access the teaching of Physical Science Modules when using Moodle. In others words, permission in this study is concerned with what is considered by lecturers to access Moodle for teaching and learning with students.

In addition to the above, the study conducted by Berkvens et al. (2014) in Netherlands Institute for Curriculum Development (SLO) places more emphasis on the issues of permission (accessibility). The main focus of the study was to understand reflections in ensuring permission to the quality education in developing countries such as South Africa and others. The study revealed that for the past fifteen years, the main aim of education has been on permission (enrolment) to basic and higher education with a focus to equity as second millennium goal for The United Nations Educational, Scientific and Cultural Organisation (UNESCO). Be that as it may, the study then pointed out that the focus from 2015 to date is on providing quality (relevant teaching and learning) education for all. The study concluded that the concepts of quality in the post 2015 agenda begins with reflections on curriculum TPACKs signal called permission (accessibility) to education in order to prepare responsible and accountable citizens. The study then recommended three of the

most important aspects (propositions/sub signal) on which permission to education is dependent, namely: Physical permission (informal reflection), financial permission (informal reflection), and cultural permission (produced reflection). This then suggests that permission to the teaching and learning by lecturers when using Moodle may be determined by the produced reflection (personal need), formal reflection (module need), and informal reflection (society need) in order to interrogate these three above-mentioned aspects or sub-signals of permission.

Before the discussion of three aspect of permission signal it is important to note that in a South African context permission to education is still a priority especially in higher education. See the studies (Hoadley & Jansen, 2013; Jansen, Featherman, Hall, & Krislov, 2010; Lee Grange-, 2016; Mqgwashu', 2017; Msibi & Mchunu, 2013) conducted a research student access in higher education. These studies outline that in the period of transition from the apartheid era to democratic era (1994) most of the adopted educational policies in basic education but mostly in higher education were concerned about addressing the issue of permission to higher education by those who were disadvantaged as a result of Physical permission, financial permission, and cultural permission aspects. These studies further assert that, because of this transition, the democratic government was then compelled to provide opportunities for equal permission to a quality education for all in order to address personal and social needs of South African citizens. Thus, the demographics of granting permission to those who were denied a permit to education shows an increasing trend. For instance, the South African government has put structures in place like, financial aids schemes (financial permission), in order to increase access to higher education especially to those disadvantaged students, and this resulted to the increase of number of student in HEIs (physical permission) (Mbembe, 2015; Prinsloo, 2016).

The above articulation is in line with what is attested by Jansen (2001) whose study reflects on the historical background of South African education. The study further highlighted that the solution to the Black-White conflicts in education was well addressed by the Chapter 2 of constitution of South Africa, which stipulates that everyone has a human right and the responsibility to be permitted to access education as the basic right of every citizen living in the country. That is the reason why Ngubane-Mokiwa and Khoza (2016), Govender and Khoza (2017), and Wamba

(2017), emphasise that lecturers and student must be provided with personal, informal, and formal space in order to undergo the process of reflection which will ease or catalyse the aspect of physical permission, cultural permission and financial permission. Permission to enter tertiary institutions is still a challenge in developing countries due to the lack of financial access which draws a line between rural and urban students (Berkvens et al., 2014; Biggs-, 2014). That is the reason why the following section will further articulate on the financial access aspect of the permission signal which is informed by informal reflection.

3.7.1.1 Financial permission

Financial permission is referred to as the state of affordability to access any programme or course in education, and it also addresses the question of whether academics have enough financial resources or facilities in order to access and be permitted to use Moodle for teaching and learning (Bevc & Uršič, 2008; Doolan, Puzić, & Baranović, 2017; Mora, 1997). In other words, financial permission relates to the cost that will cover the expenses that are required by lecturers in order to use Moodle, and this remains the duty of the university community or management to provide financial assistance to lecturers in order to access Moodle. This then indicates that financial permission is informed by informal reflection (societal need), and this lays the responsibility on the university management to provide funds for services during the use of Moodle (Maxwell, 2013). Moreover, according to Richardson (2011) and Watt and Paterson (2000), the distribution of financial resources in many developing countries around the world is limited and does not satisfy societal needs (lecturers and students); this sometimes leads to the high rate of student protests and silent boycott by lecturers which then disturbs the teaching and learning process. Further to this, globally, Universities are experiencing rapid globalisation, pressures to ensure transgressive teaching and learning processes while lecturers and students are demanding various changes that will address their societal needs (Chung & Ackerman, 2015; Dhunpath, Amin, & Msibi, 2016; Lee Grange-, 2016). Further to this articulation, according to Downes (2010) as well as Lee Grange- (2016) the world's economy undergoes economic recession which has an impact on the financial stability of various universities. This situation then forces universities to adopt Moodle LMP as a teaching and learning resource in order to be used by both lecturers and students to access teaching

and learning of offered modules (Fish, 2016; Naicker, 2016). This then suggests that changes in education are influenced by what the university community demands via the informal reflection. This then compels the university structures to provide some means of financial support to lecturers that teaching and learning may be smooth. In other words, informal reflection assists lecturers to consider costs for devices required to use Moodle, such as the all in one printer (photocopier, scanner, and printer) and other services like a Wi-Fi connection to the internet.

In addition to the above, in the context of this study, financial permission simply relates to financial costs lecturers will spend in using Moodle for teaching and learning. See the study conducted by Landry and Neubauer (2016); the purpose of the study was to explore reflection of lecturers' in the field of access to higher education in USA. The study outlined that decline of funding to HEIs by both private and public sector creates chaos in the education system. The study therefore concluded that obstacles to financial access at HEIs results in lecturers producing less capable graduates who may not be able to compete in the global workforce. This then indicates that the lack of funds from the university to support lecturers in order to have to access to Moodle for teaching and learning may cause chaos which may lead to produce incapable students that will not compete internationally. In other words, informal reflection seeks lecturers request funds from the university community in order to have enough funds so they may buy laptops, data projectors, and others, and install soft-ware like Moodle, Presentation and others, and have enough funds to attend Moodle workshops or seminars on how to use Moodle for teaching and learning in order to address societal needs (Jackson, 2017; Singh' & Kaurt, 2016). Further to this, the university has an obligation to cater for lecturers by providing funds to train the university community on the use of educational technology (Moodle), and this may then lead lecturers to move from the world of digital immigrants to the world of digital natives (Amory-, 2015; Govender & Khoza, 2017).

3.7.1.2 Physical permission

Physical permission is informed by formal reflection since it seeks to address the physical ability of lecturers to access teaching and learning using Moodle. It includes the means of transport and actual hands-on and onsite access to Moodle hard-ware (Nnaka, 2014; Van Manen, 1991). In other words, physical permission addresses the ways in which lecturers access Moodle in order to engage

students during teaching and learning. Further to this, formal reflection seek to understand means of transport required by lecturers to reach the university to use Moodle and also attend seminars on how to use Moodle. This also involves ways or steps used to access Moodle hard-ware, security passwords as well as the issue of eligibility of lecturers to use Moodle (Jackson, 2017; Pitman, Koshy, & Phillimore, 2015). For instance physical permission checks if all lecturers have a permit to access Moodle according to their ranks, whether the lecturer is permanent staff or contract staff. That is the reason why Mpungose* (2016) refers to physical permission as any physical facility that permits lecturers to undergo the process teaching. This suggests that formal reflection seeks lecturers to be well versed by formally reflecting on the, portable, physical gadget that influences their teaching and learning using Moodle; this may include physical gadgets like desktop computers, laptops, printers, network routers, Wi-Fi routers, data projectors, policy documents, Moodle manuals, and others.

In addition to the above, see the case study of seven lecturers conducted by Sarfo, Winneba, and Yidana (2016), in Ghana. The purpose of the study was to understand university lecturers reflections on the design and development of Moodle-based modules at the University of Education, Kumasi campus. The study revealed that teachers were given laptops in order to use Moodle but students did not have enough computers or laptops to use Moodle, and it was revealed from the study that lecturers had to be given training and incentives as a motivational package to adopt and use Moodle successfully. The study concluded that lecturers were lacking technology competence, and lacked relevant or adequate technological facilities. The assertion from this study indicates that physical permission in the use of Moodle is greatly influenced by formal reflection where lecturers are supposed to have formal knowledge and skills of using Moodle from various sources like training programmes, and research work (articles); and have adequate facilities like laptops, lecture halls, lecturers' offices, and others. However, the study did not reflect on what mode of transport was used by lecturers when coming to use Moodle to design and develop modules. On the contrary, the importance of transport physical permission in the use of Moodle is taken as priority before others, because it ensures the availability of a lecturer in the space of teaching and learning in higher education (Bates*, 2016; Eaves, 2011),

In addition to the above, physical permission is also about the health and well-being of the lecturers, whether the lecturer is physically and mentally fit enough to use Moodle resources (Ramona, 2017). This articulation correlates with the report presented by UNESCO (2005) on guidelines to equal access to education, which outlines that half a billion people are denied access to education due to the fact that they are disabled on the basis of mental ability, physical ability, sensory impairment, and others. This then suggests that formal reflection in physical permission addresses the issue of whether lecturers' physical wellbeing does allow them to use Moodle properly for teaching and learning. For instance, lecturers who are on sick leave may not access Moodle, and when lecturers have a particular disabilities, like blindness, it may hinder physical permission to use Moodle (Ngubane-Mokiwa & Khoza, 2016).

In addition to the above, formal reflection relates to physical permission because it seeks all action be driven by facts and knowledge from formal documents like policies that guides lecturers' action during teaching and learning (Myers, 2016; Van Driel, Verloop, & de Vos, 1998). Teaching and learning using Moodle requires lecturers reflect formally on four main areas in higher education, namely: research output (publication); academic promotions; academic development; and policy implementation (Vithal, 2016; Vithal & Jansen, 2012). These assertions are in line with what is outlined from the study conducted by Van den Berg et al. (2013) and Cranton (2011). These studies outlined that higher education teaching requires lecturers' formal reflection on their qualification which determines their level of competence during teaching and learning using Moodle. This then indicates that lecturers' academic qualification become the formal assistance or motivator in their teaching and learning using Moodle. For instance, if a lecturer is a Doctor holding a PhD, and he has been allocated duties to coordinate a module, even if he is not well versed with skills of using Moodle, he will try to do better and learn how to use Moodle in order to give credit to his qualification or title (PhD). As a result, lecturers need to work towards improving their qualification so that they can use Moodle according to what policies are regulating. This may enhance them to publish and supervise student on issues pertaining Moodle (Waghid- & Davids, 2016; Waghid, 2010).

3.7.1.3 Cultural permission

The study conducted by Harland, Raja Hussain, and Bakar (2014) explored ten Malaysian University lecturers on the acceptance of the scholarship of teaching and learning (SoTL). The study revealed that SoTL introduced new ways of teaching and learning, like the use of educational technology such as Moodle, but some lecturers and student were resistant. As a result, reluctant lecturers were drawn back to do traditional practise of teaching and learning (lecture method). The study therefore concluded that for a realistic and practical SoTL, the importance of cultural and social background should be reflected during teaching and learning for academic development. This articulation then suggests that cultural permission in teaching and learning when using Moodle is all about bringing in the personal background of each lecturer influenced by produced reflection. This advocates inclusion or bringing in of cultural experiences such as religion and language in order to construct ideas during teaching and learning (Vithal, 2016; Vygotsky, 1978). That is the reason why Khoza* (2016b) and Amory- (2015) assert that cultural permission has to do with issues informed by produced reflection which are personal beliefs, political, and socio-economic issues, that are incorporated during teaching using any educational technology (Moodle). For instance, produced reflection may seek lecturers to interactively use all official languages adopted by a university, such as to IsiZulu and English. Moreover, according to Mpungose* (2016), cultural permission relates to issues of gender or sex and race-related matters as well as linguistic issues which are all informed by produced reflection during teaching and learning. Further to this, language is critical to higher education transformation as it impacts on cultural permission to the teaching using educational technology and success in such a way that, “The challenge facing higher education is to ensure the simultaneous development of a multilingual environment in which all our languages are developed as academic/scientific languages, while at the same time ensuring that the existing languages of instruction do not serve as a barrier to access and success.” (DHE, 2002, p. 5). This then seeks lecturers’ to reflect personally on the use of relevant language which will cater for social needs of students and other stakeholders in teaching and learning using Moodle (Khoza, 2015c; Yuan, Powell, & CETIS, 2013).

Furthermore, Ramona (2017) and Khoza- (2015d), assert that cultural permission allows lecturers to bring in their cultural backgrounds in teaching and learning. Studies further aver that lecturers must be aware that Moodle is for social teaching and learning informed by informal reflection which indicates that lecturers must not feel uncomfortable or infringed during teaching and learning process. For instance, when a lecturer is from cultural beliefs of Muslim and he is using discussion forum to discuss the benefits and the limitation of Muslim religion, a lecturer must not feel offended or as if his religion is infringed when students are criticizing this religion. On the contrary, permission to Moodle teaching and learning, and education can never be debated alone without mentioning goals that are to be achieved.

3.7.2 Ensuring justice in the use of Moodle

According to Brown Jr (1999) and Chittleborough (2014), justice in education relates to visions of fairness which is driven by goals. This suggests that in order to ensure justice in any educational programme goals to be achieved need to be clear, and be able to cover personal needs, module needs, and societal need. That is the reason why Mpungose- (2016a, p. 42) asserts that “goals are an important aspect of the planning of teaching and learning practice” in order to enhance justice and fairness in the educational programme. In addition to that, Berkvens et al. (2014) further outlines that most lecturers lack an understanding of the curriculum goals, and this challenge is becoming a worldwide problem that needs to be addressed in order to promote justice and fairness (goal-orientated), relevance (resembles to what is prescribed), practicality (worth enacted or implemented), and sustainability (future-looking). Moreover, Marsh (2009) declares that learning within an institution is typically goal-oriented, students are at school because they want to achieve certain goals, similarly, even lecturers also want to achieve their goals in order to assist their students to achieve their goals. This then suggests that curriculum is planned, implemented, or enacted for a particular rationale or intention, and reflections assist lecturers to teach intentional activities to achieve stipulated goals (Hunkins & Ornstein, 1998; Mpungose*, 2016). In other words, misunderstanding of goals by lecturers may lead to the nonfulfillment of teaching and learning intentions, and this may result to the misunderstanding of their module needs. Further to this, Khoza- (2013c) and Kennedy et al. (2006) define the term goal as the desired results that a plan is willing to achieve. Moreover, Nkohla (2017) further articulates that goal is a phenomenon that “justify the means of doing something.” This then indicates that produced reflection may be

the basic route taken by lecturers, when they want to achieve justice by using Moodle for teaching and learning the Physical Science module. Similarly, Dewey* (1938) asserts that curriculum is a journey with intentions or goals to help lecturers to fulfil or attain the needs of students. As a result, various studies further aver that in the lonely journey, there are guiding focal points or goals (as depicted in Figure 3.7) which are divided into aims (long-term goals for teachers) informed by produced reflection for a personal need, objectives (short-term goals for teachers) informed by produced reflection for a personal need, objectives (short-term goals for teachers) informed by formal reflection for a nodule need, and outcomes (goals for students) informed by informal reflection for a societal need (Berkvens et al., 2014; Bloom, 1956; Donnelly & Fitzmaurice, 2005; Kennedy et al., 2006; Khoza-, 2013c).

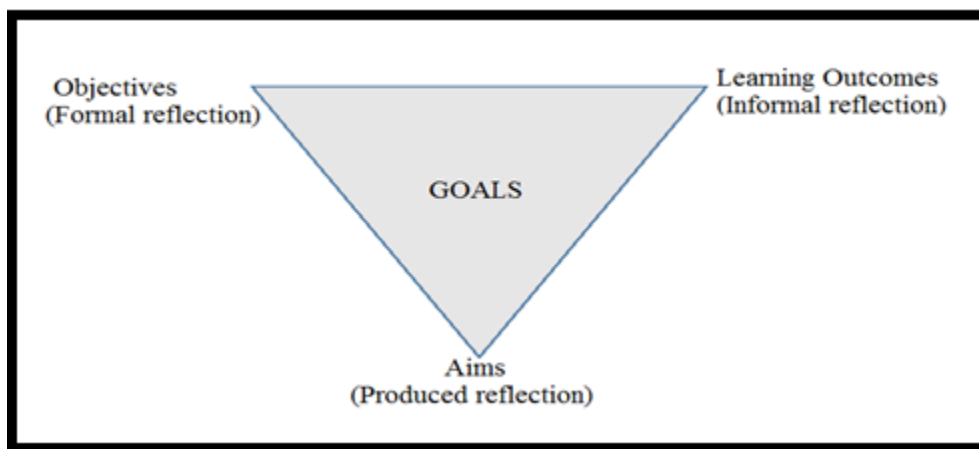


Figure 3.7: Goals with their respective reflections

3.7.2.1 Aims (long-term goals for teachers)

Hunkins and Ornstein (1998, p. 273) refer to aims as “general statements that provides the shape and the direction to the more specific actions designed to achieve some future product or behaviour. Aims are starting points that suggests an ideal or inspirational vision of the good. Aims depict the general vision of the curriculum”. This studies (Fink, 2013; Kennedy et al., 2006; Mpungose*, 2016; Ngubane-Mokiwa & Khoza, 2016; Scott, Yeld, & Hendry, 2007) further advocate for the idea that aims are informed by produced reflection which caters for the personal needs of lecturers, and aims are taken as a long term purpose based on lecturers’ needs. This concurs with what is outlined from Mpungose- (2016a, p. 42) study that aims are referred to as “broad general statement of teaching intentions written from the teachers’ point of view ”.

Moreover, aims come up with answers to address the question of “what destination do you have in mind for learners as far as a particular curriculum or subject is concerned” (Hunkins & Ornstein, 1998, p. 276). These assertions on definitions from the literature indicates that aims are concerned with ensuring justice by addressing the personal needs of lecturers (What do they want?) which is addressed by undergoing the process of produced reflections. This then gives a shape and a direction to lecturers during teaching and learning process. For instance, if a lecturer is teaching the Physical Science module using Moodle, then the lecturer might stipulate the aims of using Moodle in teaching the module so as to, *‘Introduce student to educational technology competences or To provide general understanding to social learning’*.

Furthermore, Kennedy et al. (2006) outlines that aims indicate a general vantage point and direction on the matter being studied in order to ensure justice. For instance, when the module is studied, the question seeking the aim of teaching a module by lecturers might arise, and this question might be, *‘what are the aims that shape and give direction of the module’* and the answer might be *‘To introduce a wide repertoire of teaching methods’*. Moving further, in the context of this study, this suggests that aims are trying to unpack the different kinds of questions seeking the general goals of using Moodle; for instance question such as *‘What is the purpose of using Moodle?; how to ensure justice when using Moodle and What is Moodle trying to achieve?’* might be imposed asking lecturers the aims of using Moodle on the basis of their produced reflection (personal need). In answering such questions, lecturers need to be aware of keywords used in the formulation of aims like, *introduce, provide, allow* and others, which plays a huge role in giving direction (Kennedy et al., 2006; Reddy & le Grange, 2017). Additionally, the aims of using Moodle to teach the Physical Science module (general statement) might be *‘allow the sharing of useful information, documentation and knowledge; to open an open dialogue between lecturer and students; to assist students to construct their own knowledge; to develop cooperative skills; provide a flexible teaching and learning than a traditional’* (Berkvens et al., 2014; Govender & Khoza, 2017; Martín-Blas & Serrano-Fernández, 2009).

Moreover, According to Khoza (2015), aims illustrate the key nature of using Moodle in relation to the module students are studying, and aims should be brief, with clear keywords, up to the point

and be on the side of addressing the lecturers' needs in using Moodle to teach a module. For this reason, Hunkins and Ornstein (1998, p. 278) assert that goals, like aims, are informed by produced reflections and should "address the particular times in which educators find themselves but should contain wording also appropriate for the future times". This then suggests that aims are informed by produced reflections which cater to a lecturer's personal need in order to improve and empower their teaching practice for the future.

In addition to the above, a study by Tyler (2013b) of curriculum in American institutions highlights some important goals, namely: developing of self-needs, making the individual educated, encouraging social teaching and learning, providing the required skills and understanding, equipping the individuals with the tools for teaching and learning. Note that these stipulated keywords like develop, make, encourage, provide, and equip, in the of formulation of aims are taking the direction of produced reflection in order to address the personal needs of lecturers in any particular programme such as in Moodle LMP. That is why Biggs- (2014) and Pratt (1994b) outlined that aims addresses the intellectual domain, societal-personal domain, and productive domain. The intellectual domain focuses on thinking process towards having skills and knowledge of solving problems; the societal-personal domain has to do with personal emotions and psychology adapted from home, family and others; and productive domain places the productivity of curriculum at the centre. In other words, the produced reflection by lecturers on the use of Moodle may address these three domains in order to bring a clearer understanding of the broader purpose of using Moodle. In other words, in order to do justice on aims of using Moodle, lecturers' aims should address the three world stated above (Bloom, 1956; Ion, Vespan, & Uță, 2013).

Furthermore, the importance of having clear aims in using Moodle is highlighted from the study conducted by Martín-Blas and Serrano-Fernández (2009) at the University of Madrid, in Spain (Europe). The main aim of the study was to explore lecturers' reflection on the role of new Moodle technology as a tool for teaching and learning physics. The study revealed that the aims of using Moodle is to make an online learning society to have a virtual space to share knowledge and to organize, manage and avail module resources for students. The study concluded that even though some of the lecturers were reluctant on the use of Moodle but after they were driven by aims on

the use of Moodle, which were giving shape and direction of using Moodle in their teaching of physics, they became more interested and they were able to use Moodle according to their aims. This then indicates that lecturers become more motivated after they have undergone the process of produced reflection in order to form aims which addresses their personal needs, and this suggests that aims are a nucleus, starting point, or the basic guiding principle of using any LMPs before learning outcomes and objective are declared, refer to Figure 3.6 (Govender & Khoza, 2017; Maxwell, 2013). That is why Mpungose (2017) advocates that learners can never achieve the intended outcomes if the aim is not clearly specified. In other words, lecturers have a duty to understand the aims of using Moodle and state them clearly so that students may achieve their goals as well. Thus, if there are no aims, there will be no proper teaching and learning to ensure justice in using Moodle (Govender & Khoza, 2017; Schiro, 2013). As a result, objectives are some of the goals which are specific, and that must be considered on the use of Moodle when teaching the Physical Science module.

3.7.2.2 Objectives of using Moodle

The importance of objectives is witnessed in the qualitative case study conducted by Khoza (2013a) in one of the South African universities. The purpose of the study was to “explore reflections of eight lecturers who were using Educational Technology (Moodle) in teaching their modules”. Documents were analysed, lecturers were observed and interviewed for data generation purposes. The study outlined that the formulation of clear objectives led students to use Moodle effectively during the teaching and learning of a module. The study therefore recommended that lecturers should develop themselves via formal reflection so that they are able to form their own concise objectives in order to address the module need. This then suggests that a clear formulation of objectives ensures justice in a particular programme, and enhances lecturers to be able to address the needs of that particular programme in place (formal curriculum). As a result, Kennedy et al. (2006, p. 5) concur with the findings from this study in defining objectives, in a manner that objectives of any programme are defined as “specific statement of teaching intention, i.e. it indicates one of the specific areas that the teachers intends to cover in a block of learning”. Take for instance, in a Physical Science module offered at a second year level of study, the module’s objectives might be *‘to introduce students to a theoretical and practical framework in solving*

problems based on laws of motion'. In other words, objectives are narrower and specific to the focal point of what lecturers wants to attain or cover in the use of any resource in teaching and learning the module, and this can be achieved when lecturers are able go through the process of formal reflection which may give an understanding of the module need (formal curriculum) (Singh' & Kaurt, 2016; Vithal, 2016).

In addition of the above, in the context of this, study Martín-Blas and Serrano-Fernández (2009), and Jackson (2017), assert that objectives (specific statement of intention) are formed in order to address the module need (formed on the basis of the content/subject/module), and this requires lecturers' formal reflection on the content of the module. These studies aver that the objective of using Moodle in teaching a Physical Science Module might be: '*to develop students' ability to solve problems on laws of motion' or to state the laws of motion*'. These examples indicate that objectives unlike aims, are specific statements in order to address the specific content of a module such as Mechanics in this case (Govender & Khoza, 2017; Kennedy et al., 2006).

Moreover, the significance of objectives is further asserted in the study conducted by Ramona (2017) at a South African university, and the main objective of the study was to explore students reflection on the use of electronic resources when conducting their research. Convenient and purposive samplings were used to select Masters' student as participants in this study. The study revealed that students were using the word objectives and purpose synonymously and interchangeably, and that objectives enhance the general feeling of what they may use for conducting their research and how they may benefit (the side of a researcher). The study concluded that students' understanding of objectives assisted them of required steps of how to go about doing research methodology and other nitty-gritties of doing research using electronic resources like search engines, Moodle, and others. The assertion from the study suggests that objective are as a result of formal reflection which may assist lecturer to have a formal step-by-step on how to use electronic resources like Moodle in the teaching of a module (Boud et al., 2013; Todorova, 2016). In the context of this study, this then indicates that objectives may provide a clear direction and guide lecturers on how to use Moodle in teaching the module content.

Moreover, studies reveal that objectives play a major role in the planning process of any teaching and learning programme which indicates that the use of any resources for a thorough, well-planned module depends on clear, and well-formulated objectives (Entwistle & Ramsden, 2015; Kennedy et al., 2006; Khoza & Manik, 2015; Moon, 2013). These studies further aver that objectives always create a space where lecturers will formally reflect on the module content in order to formulate the clear and specific statement about what students are intending to learn. According Reddy and le Grange (2017), as well as Vithal (2016), the clear and concise formulation of objectives can avoid the state of confusion and misunderstanding between lecturers and students in terms of the module because, students will be made aware of what is intended to be learned, and this can lead to good and higher levels of communication which will address the module need through lecturers' formal reflection. For instance, when the LMPs like Moodle is adopted by the university, and the lecturers does not have a clear objectives on its usage in teaching and learning the module, this might course the reluctance to both lecturers and student to use Moodle (Maxwell, 2013; Mpungose-, 2016a). This then suggests the need for formal reflection of lecturers which may act as a drive in developing their objectives of using Moodle before the teaching and learning process in a particular module may begin (Govender & Khoza, 2017; Mohammadyari & Singh, 2015).

According to the studies, the formulation of objectives must involve three characteristics, namely: performance (what is observable and can be done), condition (situation under which task can be done), and criteria (how well the task is done) (Boud, Cohen, & Sampson, 2014; Cohen, 1966; Falchikov, 2001; Kayes & McPherson, 2010; Khoza-, 2013c). For instance, the objective of using Moodle including this three characteristic might be, '*I will assist student to differentiate between Chat activity and discussion forum (performance) by sharing 10 percent of their social experiences (criteria) in using both Moodle activities (condition)*'. Moreover, the formulation of objectives requires formal reflection on the content of the programme or module so that the correct keywords can be used which includes the following: *determine, assist, appreciate, grasp, become clear with, and others* (Kennedy et al., 2006; Peabody & Noyes, 2017). As a result, objectives must be precise, measurable and with clear performances that the student may perform in order to reach the stipulated goals (aims) (Fink, 2013; Meierdirk, 2016). Thus, Khoza- (2013c) and Langer (2000),

over that formation of objectives must address authentic and formal activities through the process of formal reflection, and thus the objectives must be specific, measurable, attainable, relevant, and time bound (S.M.A.R.T). This then suggests that formulation of objective must be in line with formal reflection of the lecturer on the use of Moodle in teaching a module, and it must address the module need. That is the reason why Hunkins and Ornstein (1998), and Hoadley and Jansen (2013), as well as Harris, Spiller, Schoenberge-Orgad, and Cockburn-Wootten (2012), share the same sentiment that the formulation objectives should have the correct wording, be trustworthy, appropriate, and match the context in order to ensure justice by achieving goals.

Furthermore, Kennedy et al. (2006, p. 5) outlines the difference between aims and objectives is that “the aims of a module gives the broad purpose and general teaching intention of the module, whilst the objective gives more specific information about what the teaching of the module hopes to achieve”. This assertion indicates that objectives may be taken as specific sub aims of a particular program or a module. That is why Ramona (2017) indicates that objectives (short-term goal) emerge from aims (long-term goal), and they are an explicit account of what a lecturer can do to use Moodle positively. For instance, in the context of this study the aim (general) of using Moodle may be, *‘To prepare student for using an online learning platform’*; from this aim, the objective (specific) may emerge as *‘ability to understand and use Moodle activities like Chat room, Journal writing and others.’* This suggests that there is a need for lecturers to undergo formal reflection in order draw objectives from aims; that is, they need to understand facts from research about the use of Moodle before they formulate relevant objectives (Le Grange* & Reddy, 2017; Waghid- & Davids, 2016). However, see the qualitative study conducted by Khoza (2015) on student-teachers’ reflection on the teaching of their subjects. It was concluded from the study that student-teachers were only familiar with aims and objectives but they were not well versed with learning outcomes. This suggests that most lecturers turn a blind eye on learning outcomes which are informed by informal reflection in order to ensure that students’ needs are catered for (Meierdirk, 2016; Myers, 2016).

3.7.2.3 Learning outcomes

It is worth noting that globally, in order to ensure justice in all activities such as module activities in the use of LMPs in HEIs should be driven by outcome-based approach which is driven by learning outcomes (Gosling & Moon, 2001; Kneale, 2005). As a result, Kennedy et al. (2006). Thus, Learning outcomes are becoming the most useful goals during teaching and learning, especially on the use of Moodle. Note the developed and an operational definition of Learning outcomes that “Learning outcomes are statement of what a learner is expected to know, understand and/or be able to demonstrate after completion of a process of learning”. In addition to that, various studies share parallel views in defining learning outcomes (Brown, Race, & Smith, 2004; Khoza- , 2013c; Spiller, 2013; Stein et al., 2013). These studies aver that learning outcomes referred to attributes such as skills, knowledge, and values a student may be expected to achieve at the end of each programme; learning outcomes can be any expected and general competences that are expected to be attained by students. Khoza- (2013c) and Mpungose* (2016) outline that learning outcomes are driven by informal reflections because it is concerned about students’ intentions (societal needs), and they are not on the side of the lecturer (lecturer-centred) but they are on the side of the student (student-centred) when a programme or a module is offered. That is the reason why learning outcome are defined as “a statement of what the learner is expected to know, understand and/or be able to do at the end of a period of learning” (Donnelly & Fitzmaurice, 2005, p.16). Similarly, Mpungose- (2016a) and Nkohla (2017) outline that learning outcomes are what students are required to demonstrate as based on knowledge, skills, and attitudes after the programme is completed. In the context of this study, learning outcomes are what is expected of students to do (practice/skill), to know (knowledge) and to think about (attitude) in the use of Moodle LMP. In other words, learning outcomes has to do with addressing the societal needs of students when using Moodle. In other words, lecturers are expected to reflect on how students’ societal needs are addressed when using Moodle during the teaching and learning of the Physical Science modules.

Moreover, Kennedy et al. (2006), Donnelly and Fitzmaurice (2005), and Stein et al. (2013), outlines that traditionally teaching and learning of modules in HEIs, was driven by lecture-centred approach where lecturers were guided by the content of the module, and by what is prescribed or

planned to be taught and assessed. These studies further indicated demerits of this approach which includes that it focuses on lecturers' directives and what is going to be assessed based on the prescribed content. On the contrary, it does not indicate clearly as to what is expected of students to do and achieve. In other words, this approach is embedded in principles of formal and personal reflection (personal and module need) (Mpungose*, 2016; Pedro, 2005). However, the global and international trend in higher education shows the move from lecturer-approach to student-approach in order to cater for societal needs (students' needs) (Kennedy et al., 2006). For this reason, LMPs like Moodle are frequently adopted in order to cater to student's needs (Govender & Khoza, 2017). Moreover, the benefits of student-approach is to put more focus on what the student are expected to attain during the teaching and learning process, and that is the reason why the phenomenon of learning outcomes is mostly considered in HEIs; this approach is sometimes called outcome-based (Amory-, 2015; Jansen, 1997; Khoza*, 2016b). This assertion is in line with the purpose of introducing Moodle LMP in HEIs so that societal needs (student) is entrenched by lecturers who are driven by learning outcomes when using Moodle for teaching and learning of a module. According Donnelly and Fitzmaurice (2005), learning outcomes may be designed for a course, a programme, or an entire institution. Thus, in the context of this study, lecturers are reflecting on the learning outcomes on the use of Moodle resources. In other words, the study is not concerned with lecturers' input but rather with lecturers' output of the use of Moodle (Marsh, 2009).

Furthermore, Kiriakidis (2013) and Khoza- (2013c) assert that one of the benefits of using learning outcomes by lecturers when teaching is that, it is a clear statement giving a direction to student as what and how is expected of them to attain the particular goal of that programme in place. Thus, "learning outcomes can be considered as a sort of common currency that assists modules and programmes to be more transparent at both local level and at international level" (Kennedy et al., 2006, p. 6) . This suggests that learning outcomes should be measurable or observed from each student's performance (Mpungose-, 2016a; Nkohla, 2017). For this reason, Bloom (1956) introduces three domains, namely: Cognitive domain (knowing component of learning), Affective domain (emotional component of learning), and Psycho-motor domain (skills component of learning). Informal reflection places a greater focus on the cognitive domain such that lecturers are expected to use their informal reflection in order to measure and observe student performance by

following the hierarchy or classification of the cognitive domain levels according to their ascending order, namely: 1 Knowledge, 2. Comprehension, 3. Application, 4. Analysis, 5. Synthesis, and 6. Evaluation; refer to Figure 3.8 below (Bloom, 1956; Fink, 2013; Kennedy et al., 2006).

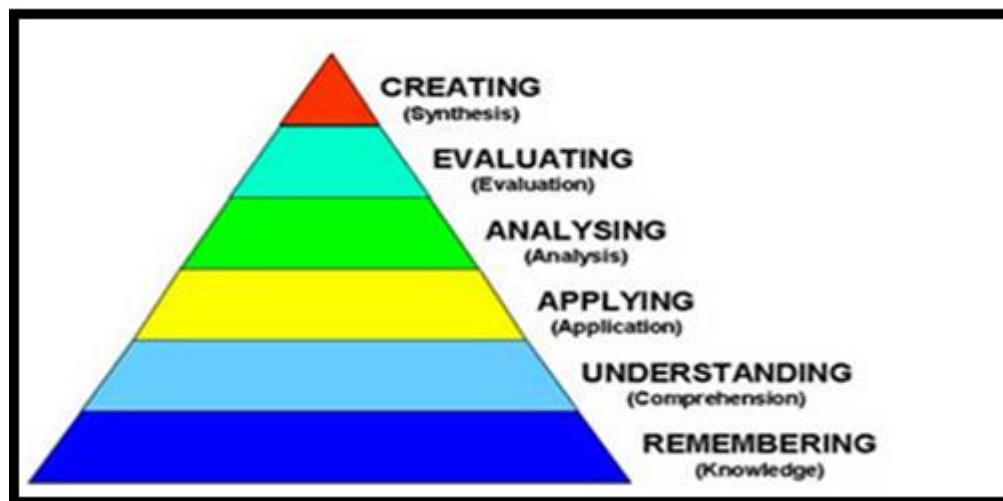


Figure 3.8 Benjamin Bloom's Cognitive levels of learning outcomes, adopted from Khoza (2016 p.)

Moreover, there are allocated key words that are to be used in each of these above-indicated levels in order to create or develop a meaningful learning outcomes and those key words ensure justice on thinking ability of each student (Fry & Ketteridge, 2000; Ion et al., 2013; Khoza-, 2013c). In other words, these levels cater for the societal needs of all learners with different cognitive capabilities. Bloom (1956), as well as Bloom, Krathwohl, and Masia (1984), assert that most needs of students are catered in level one, includes keywords like, *defines, describes, identifies, knows, labels, lists, matches*, in order to remember the concepts; key words used for level two are for understanding, such as, *gives an example, converts, understands, defends, estimates, explains*; level three is for application, such key words are used *applies, changes, compose, constructs*,

demonstrates, discovers; in level four, students are expected to *analyses, breaks down, compares, contrasts, differentiates*; level five is for evaluation, such key words may be used, *appraises, compares, concludes, contrasts, criticises, critiques, defends, describes* and others; and lastly creation which includes key words like, *categorises, combines, compiles, composes, creates, devises, designs, explains, generates, modifies*. This articulation indicates that learning outcomes of using Moodle should be influenced by informal reflection all levels in order to move from low order, middle-order, and to higher order thinking levels of the societal needs (Boud et al., 2013; Tadesse & Gillies, 2015). As a result, justice is done when aims, objectives, as well as learning outcomes, are clearly stated on the use of Moodle goals to ensure justice to any curriculum through Moodle teaching and learning activities (Le Grange* & Reddy, 2017; Waghid- & Davids, 2016). The above discussion on goals indicates the trends that without goals in place, during the use of Moodle, there will be no justice, and these suggest that goals may be referred to as justice. Thus, justice is linked to Moodle teaching activities through the process of reflection.

3.7.3 Moodle teaching activities and time

According to various studies, teaching activities of any curriculum are referred to as experiences done during teaching process that lead to a particular behaviour or competence (Berkvens et al., 2014; Biggs', 2011; Khoza, 2015d; Le Grange* & Reddy, 2017; Mpungose-, 2016a; Nkohla, 2017). These studies further outlined that teaching activities in any programme may be categorised into informal activities (problem-centred), formal activities (content-centred), and personal activities (teacher/lecturer-centred).

Moreover, informal teaching activities are informed by informal reflection in order to address the societal needs (societal needs), and the university society, especially students, becomes actively involved in these kinds of activities in order to share their own experiences so as to construct their own knowledge about the module or subject (Van den Akker- et al., 2012; Van den Berg et al., 2013). As a result, informal activities includes all activities for learning that are diagnostic in order to check the progress of processes of teaching and learning (Biggs-, 2014). For instance, when lecturers give group work activities to students, this allows students to interact amongst themselves and share their own social experiences in order to make an understanding of the particular concepts

while the lecturer checks the progress of the lesson. Moreover, in the context of this study, lecturers may use Chat activity, forum activity, and others, to allow students (university society) to share their own experiences about the content being taught.

Moving further, according to Bitzer and Botha (2011), and Boud et al. (2013), formal activities are influenced by formal reflection in order to cater to a module need. In other words, formal activities are driven by the stipulated or prescribed content in order to address the module need, and formal activities are normally done to address the content of a module in order to check that students understand a module (Fullan, 2014; Lee Grange-, 2016). This then suggests that formal teaching and learning activities are done for the purpose of unpacking the content, and this allows lecturers to give activities to students, which are content-based. For instance, lecturers can use lesson activity, wikis, and others to involve student to understand the module content.

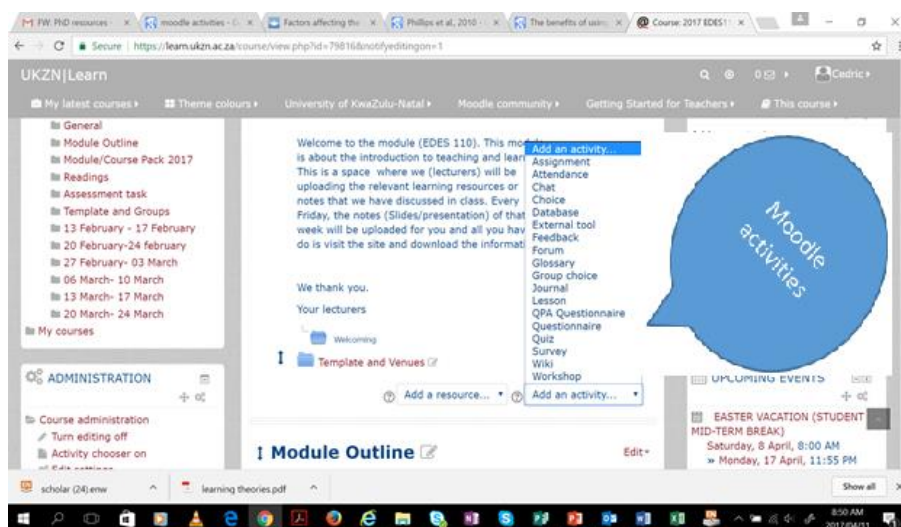
Moreover, Khoza' (2016a) and Nkohla (2017), aver that personal activities addresses the needs of the lecturers through the process of produced reflection, and these activities are termed to be continuous during the teaching process since they ensure if lecturers' aims and objectives are continuously going to be achieved. Personal activities are produced from both informal and formal activities during teaching process in order to address the personal need of each member of the university society (Berkvens et al., 2014; Van den Akker- et al., 2012). Personal activities are problem-centred in such a way that it tries to solve personal challenges through the influence of produced reflection in order to address the personal need. For instance, lecturers may always use Moodle activity (attendance) in order to manage the high rate of students' absence.

In addition to the above, activities form the core of human life as from birth to life-long, and one need to learn something from any given activities. As a result, learning is referred to as the receiving of new knowledge, skills, values, it may also involve producing different types of information (R. Phillips, McNaught, & Kennedy, 2010). In other words, learning is through the engagement in activities of a particular curriculum in order to address or develop personal problem solving skills (Van den Berg et al., 2013). According to Greeno (1980) and Wenger (2010),

teaching activities reflect certain kinds of teaching theories used by lecturers during teaching and learning process such as: Cognitivism (activities focus on the attainment of knowledge) based on formal activities, Behaviourism (activities focus on changing the behaviour aspects that are observable) based on informal activities, and Constructivism (activities focus on constructing new ideas or concepts via experience sharing). Thus, Moodle is designed using the social constructivist approach in order to support teaching and learning that is participatory and engaging which is mostly influenced by informal reflection (Bates*, 2016; Govender & Khoza, 2017). This suggests that Moodle learning and teaching activities may support the interplay between social need and the module need in order to address the personal need of each individual participating in any activity. In other words, lecturers should draw from formal reflection and informal reflection in order to enhance their produced reflection (personal) so as to master all Moodle activities.

See the qualitative case study conducted by Kumar and Sharma (2016) at Sharda University, Greater Noida, in India. The main purpose of the study was to explore the importance of various activities of cloud-based open source Moodle Learning Management platform on teaching and learning in HEIs. Lecturers and administrators were made participants in this study. The study revealed that there are various Moodle activities where lecturers and administrators do engage, including Chat, Database, Feedback, Forum, Lesson, Quiz, Glossary, Survey, Workshop, Questionnaire, Wikis, Journal, Choice, and others. The study concluded that, it is the duty of lecturers and administrators to create collaborative and convenient teaching and learning platforms with moodle activities in order to assists students as digital natives to interact among themselves for the social construction of knowledge. This suggests that Moodle teaching and learning activities create collaborative space for interaction among lecturers, students, and administrators so that teaching and learning is flexible and easily accessible throughout the process of reflection. Further to this, this study suggested various teaching and learning activities that lecturers should engage students on. See the screen grab on Figure 3.7 with highlights of some of the Moodle activities which are used in one of the South African universities. A few of these activities will be discussed in the following paragraphs with reference to their categories (formal, informal, and personal activity). Moreover, any activity in moodle consists of features that students can do with interaction with others or the lecturer, and it is outlined that there are more than

fourteen basic different types of Moodle activities that pop up when the editing is turned on and the link 'Add an activity or resource' is clicked, as depicted in Figure 3.9 below (Docs.moodle.org, 2017b).



Figurer 3.9 Moodle Activities

3.7.3.1 Lesson activity

Studies conducted on Moodle activities outline that lesson activities provide hypertext makeup language (HTML) pages which consists of various content of a module (Cole & Foster, 2007; Docs.moodle.org, 2017b; Nash, 2016; Singh-, 2014; Wild, 2011). There are two basic HTML lesson content pages stipulated in this activity, namely: question pages and content pages. Moreover, in the question page, a lecturer provides questions to students to answer in order to unpack the content, a student is provided with a quick response or feedback before proceeding to another question. On the contrary, these studies stipulate that the lesson page provides a space or

platform for lecturers to present a content of lessons such as the use of videos and other means. This suggests that lesson activity is content-driven since its main focus is to provide some means to unpack the content of a particular module. As a result, lecturers should be driven by formal reflection in order to address the module need (Boud[^], Keogh, & Walker, 2013; Wild, 2011). Studies outline that planning in the lesson activity is of paramount importance in such a way that lecturers should use formal reflection in order to master the concept of branching the lessons (branch the table of content). In other words, this gives the direction to students, and enhances them to have logic in order to understand the module content.

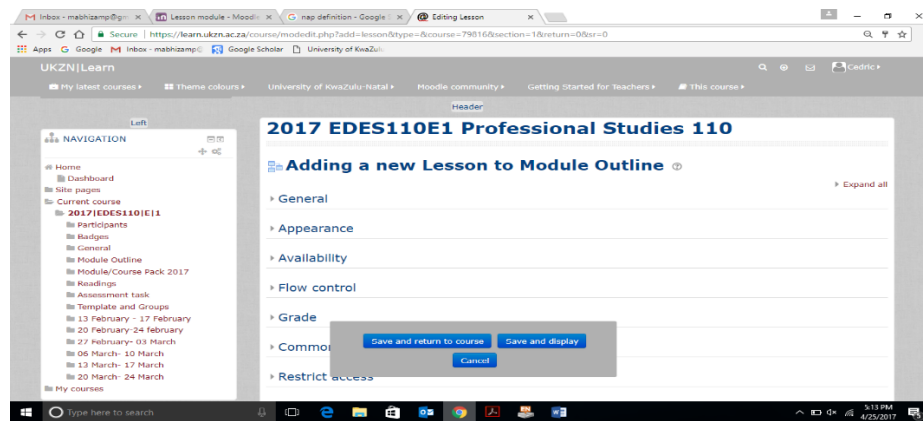


Figure 3.10: Lesson Activities

In addition of the above, studies note that setting of lesson activities as depicted in Figure 3.10 above consist of several functions that should be adhered to by lecturers. Moreover, under general function, lecturers are expected to give the name of a lesson that will be clicked by students and be linked to the lesson, including the description of a lesson (Nash, 2016; Singh-, 2014). Studies further aver that in the appearances section, a lecturer provides bars that shows link from the first page up to the last page. On the contrary, the availability function allows lecturers to set the start date and the end date of a lesson including the time limit. Moving further, flow control function provides the space for lecturers to provide opportunities for students to go through the lesson again. (Docs.moodle.org, 2017b). Grading functions provides grading specifications, while the common module setting enhances the visibility of a lesson to students in order to address the module content (Nash, 2016). These assertions about the creation of a lesson requires lecturers to address the

content of a module through the formal reflection that caters for the module need (Berkvens et al., 2014; van Rooij & Lemp, 2010).

Moreover, Singh- (2014) is in line with what is outlined in Docs.moodle.org (2017b) which indicates that building of a lesson after settings are set also requires a formal reflection in such a way that lecturers are obliged to give a structure to a lesson. For instance, lecturers are given option to add or import questions and content using different formats such as MS PowerPoint, MS word and others. Moreover, lecturers are to draw attention to the content page, including question types, to include whether multiple choice, essays, matching and others (Kaka, 2015; Wild, 2011). Most importantly, lecturers must provide options to move the lesson forward as well as the option to end the lesson. That is the reason why lesson activity is referred to as content-centred because both content page and question page address the content to be taught, and this requires the influence of formal reflection in order to address the module need (le Roux & Breier, 2016; Stocker, 2011).

3.7.3.2 Wiki activity

A wiki activity addresses the content of a certain module offered, and this indicates that it is a formal activity which is content-centred in order to address the module need (Singh-, 2014). This then encourages lecturers to use formal reflection in conducting this activity. Moreover, Kumar and Sharma (2016) as well as Laurillard (2013) refer to a wiki as a collection of web documents or pages that are authored by participants together such as a Wikipedia, encyclopaedia, and others. These web pages are created together by every student registered in a module, directly in a browser (explorer, Firefox, windows explorer and others) in order to address the content of a module. For instance, a wiki can start with one page as front page indicating the theme of a content to be discussed in such a way that every student can have a chance to make input and comments based on the content discussed.

Furthermore, studies outline that a wiki is termed to the fast method for unpacking the module content as a group, and it gives equal opportunity to all participants to edit and develop their own content (Docs.moodle.org, 2017b; Kaka, 2014). Thus, understanding of the content comes after

the interaction of many participating students (Amory, 2014). For instance, in Moodle, a lecturer can use a wiki as a resource to enhance team work where the entire class can be given an opportunity to work together to edit a web page, and create a conducive teaching and learning platform in order to unpack the module content. Further to this, Maharajh et al. (2013) and Singh- (2014), as well as Leslie (2004), aver that wikis are used for developing lecture notes, to collaboratively develop an online book, and to unpack the content on a topic provided by a lecturer. This assertion about wiki activity indicates that lecturers are expected to use formal reflection in order to engage students in working as a team in unpacking each theme of the module content (Le Grange* & Reddy, 2017; Sator & Bullock, 2017).

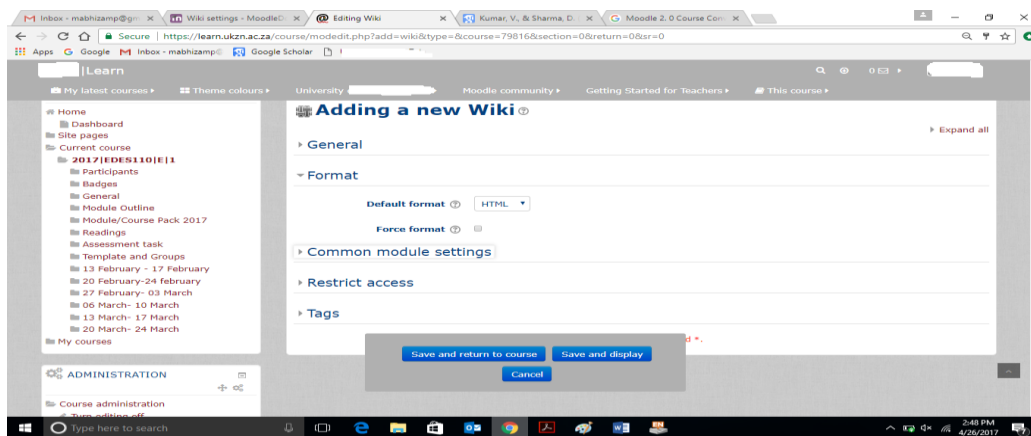


Figure 3.11: Wiki Activities settings

In addition to the above, lecturers should understand how to set up wiki activity in the Moodle environment (Docs.moodle.org, 2017b). For this reason studies assert that general, format, common module, restrict access, and other settings as depicted in Figure 3.11 are the most vital functions (Tshabalala et al., 2014; Unwin et al., 2010; Wahab et al., 2013; Wild, 2011). As a result, lecturers are required to give a general name and description of a wiki, provide a format such as HTML, and choose the visibility of a module (Stocker, 2011). Furthermore, this then enables lecturers with students to use and edit a wiki in order to address the module content. In other words, the content in this activity is taken as a drive, and this is informed by formal reflection in conducting this activity (Siemens, 2014; Singh & Singh, 2012). Singh- (2014) and Escobar-

Rodriguez and Monge-Lozano (2012) further aver that there are various formal Moodle activities which are content driven, and this requires knowing and understanding how they work during teaching and learning. For instance, lecturers should know how to set up and use a glossary, choice activity and other activities that are formal used to address the content of the module. However, informal activities also play a big role in the teaching of a module.

3.7.3.3 Forum activity

According to Loncar, Barrett, and Liu (2014), the forum is an informal activity which is problem-centred and driven by informal reflections. In other words, the forum activity gives the solution to problems faced by the society taking part in Moodle platforms, thus forum address the needs of the university society (students, teachers, administrators, and others) (Quan-Baffour & Vambe, 2016; Rabbany, Elatia, Takaffoli, & Zaïane, 2014). As a result, the forum activity provides a platform where students and teachers can exchange ideas about the module through the process of exchanging comments. (Fournier, Kop, & Durand, 2014; Singh-, 2014). Moreover, discussion in forum activity is asynchronous which means ‘not at the same time’ (Govender & Khoza, 2017). This suggests that forums allow lecturers and students to discuss with each other at any time, from anywhere provided there is a connection with an internet connection. Moreover, this gives freedom to participants to have time to respond or provide feedback about the matter being discussed at their own pace and time.

Lecturers uses informal reflection to provide the informal space for students to share experiences in order to know each other and be able to make any announcement necessary through news forum. News forum allows the discussion of the module content and also provides platform where students lecturers can give advice and direction to each other (Garud et al., 2016; Hutchison & Woodward, 2014; Singh-, 2014). In other words, Van der Merwe et al. (2015) aver that a forum activity enhances successful communication in an online environment in order to address the societal need by addressing all problems during teaching and learning. Petrovic, Jeremic, Cirovic, Radojicic, and Milenkovic (2014), and Docs.moodle.org (2017b), outline that there are five basic and different types of forum activity as displayed in the Figure 3.12 below: 1. Single simple discussion (replies are responding to a single topic posted by the lecturer); 2. Each person posts a

discussion (anyone can initiate the discussion); 3. Q and A forum (lecturers post the question and students give possible answers); 4. Standard forum displayed in a blog-like format (anyone among student and lecturers can start a new discussion at any time); 5. Standard forum for general use (same as the above but participants are able to see title, its author, the number of replies made including the date of the last post). This assertion indicates or suggests that there are three most informal types of forum, namely: simple discussion forum (discussion responding to one posted question), Q and A forum (discussion responding to the posted question) as well as standard forum (anyone can start a discussion) (Amory, 2007; Bates' & Poole, 2003). This resonates with informal reflection in such a way that both students and lecturers in the university society who Moodle are accommodated to participate in resolving any problem-based solution related to a module through involvement in a discussion (Khoza*, 2016b; Van der Merwe et al., 2015). In other words, lecturers need to be clear about how to set a forum for informal activity of a module so that societal needs are addressed.

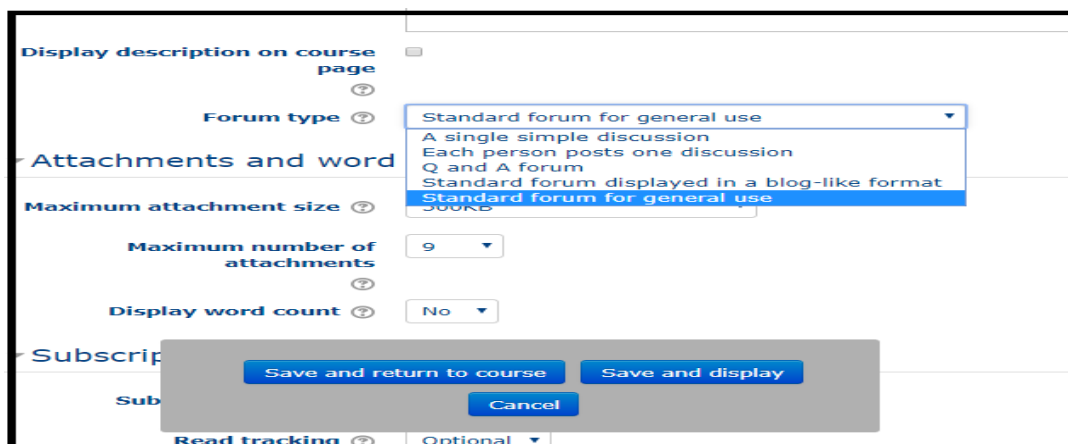


Figure 3.12: Types of forum activity

In addition to the above, the importance of lecturers' mastering the forum settings and using the forum through the process of informal reflection plays a vital role in teaching a module (Escobar-Rodriguez & Monge-Lozano, 2012; Singh-, 2014). That is why Garrison (2011) outlines that settings are to be set before the forum is used such as general settings (forum description and types), subscription and tracking (allow participants to subscribe and be able to track discussion), grade section (choose grade category), rating scale (rating the participation in the discussion

forum), and common modules settings (ensure visibility). This suggests that proper usage of forum relies on the proper settings in order to address the needs of the society (informal reflection), and this enhances lecturers to use, search, manage, and archive the forum (Docs.moodle.org, 2017b; Jackson, 2017). For instance, in cases where the student is making inappropriate comments, a lecturer has a right to delete or archive that student from the forum. As a result, “Moodle provides various channels of communication for you and your students. Forums are an asynchronous, public method for sharing ideas. Chats are a great way to have simultaneous conversations online with a group of people” (Singh-, 2014, p. 106). This suggests that forum activity is not time bound, and it can happen at any time when society members (students, lecturers and others) get connected to the net and access Moodle.

3.7.3.4 Chat activity

A Chat is one of the informal activities that address the needs of the society and it is used for simultaneous conversation in order to address a certain problem (problem-centred). The Chat activity allows students and lecturers to have a text-based, real-time synchronous discussion which helps them to share any problem in trying to find the solution (Boud^ et al., 2013; Schoenfeld, 2016; Singh-, 2014). That is why Jackson (2017) avers that Chat provides a vital and a flexible way to address the societal need and have a diverse understanding of each other and the topic being discussed. This suggests that the Chat activity cannot used at the same time (synchronous) and it is different from forum activity (asynchronous) because the Chat activity mostly plays a big role of communication especially when students and lecturers are not be able to meet face-face and are at different location. As a result, Singh- (2014, p. 84) asserts that one of the disadvantage of Chat is that some students may be tempted to add “non-useful comments or ‘beeping’ others for the sake of it”. This suggests that it is the duty of the lecturer to use informal reflection to develop guiding principles for engagement towards Chatting about a module content in order to avoid conflict among students.

In addition to the above, Sharma and Barrett (2011), and Docs.moodle.org (2017b), assert that a Chat activity is believed to be an effective learning tool because it allows lecturers to set online consultation times where students will be allocated specific times to text and ask about any

challenging issues of the module, lecturers can set a group Chat to discuss the scope before the examination period commences. That is why Downes (2010) and Singh- (2014) assert that adding a new Chat goes hand in hand with the Chat settings as displayed in the Figure 3.13 below. Thus, setting a Chat activity seeks to provide general details of the Chat like the name and description (general settings), alert the student about Chat schedule at same time or every day/week (Chat session), indicate number of days to set sessions (save past session), decide who to view the Chat (everyone can view past session), indicate the visibility of the Chat (common module settings), and other settings are provided by the administrator such access restrictions and tags (Rice & William, 2006; Selwyn, 2016; Singh-, 2014). This assertion advocates for lecturers' informal reflection in order to ensure a conducive social space where both students and lecturers share ideas and opinions about the module concepts. In other words, Chat settings are the basic step to addressing the need of the university society in this world of contradictions because it can allow university community to share their experiences in the module taught (Amory-, 2015; Quan-Baffour & Vambe, 2016). Moreover this leads to the use of the Chat activity in such a way that lecturers are then required to control and check if the Chat addresses the societal need.

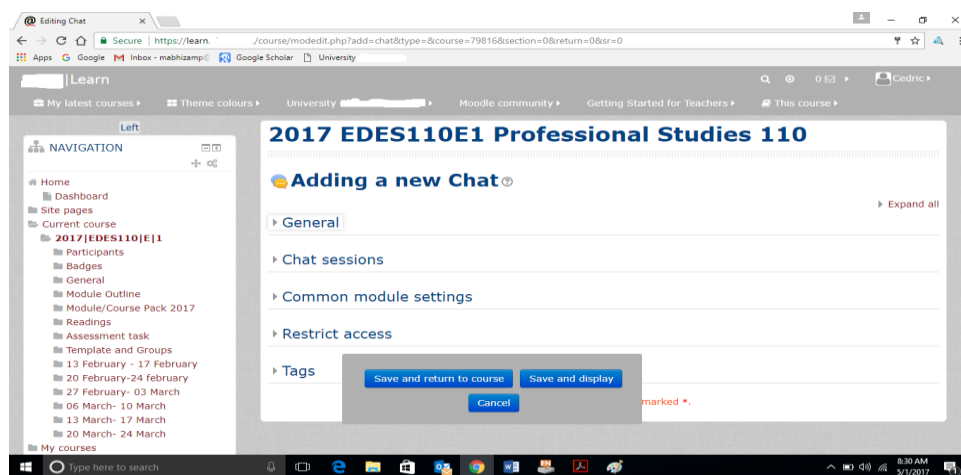


Figure 3.13: Chat settings

3.7.3.5 Messaging activity

According Singh- (2014, p. 84), messaging activity “refers both to automatic alerts from Moodle about new forum posts, assignment submission notifications etc., and also to conversations using the instant messaging feature.” This suggests that the messaging activity addresses the needs of

the society by creating an informal space of socialising by sending messages about the module aspects, and this is one of the means for sharing experience and social interaction in order to bring clarity or direction about the module (Jackson, 2017; Peabody & Noyes, 2017). In other words, lecturers seek to be driven by informal reflections when conducting this activity, and this massaging allows lecturers to send an instant message in case of emergencies (El-Bilawi & Nasser, 2017; Meierdirk, 2016). This activity is activated by the Moodle administrator, see the Figure 3.14 below which shows how this activity, called an ‘announcement’, is activated in one of the South African universities.

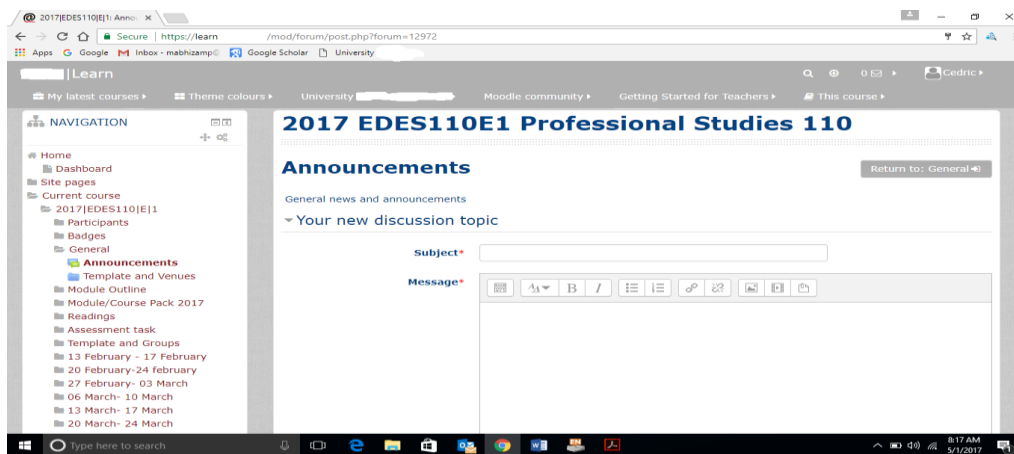


Figure 3.14 Messaging (Announcement) activity

Furthermore, Singh- (2014, p. 91) asserts that, “The message system, combined with the participants list, is a great tool for encouraging students to stay engaged with your course. On the participants list you can easily filter students based on how long they have been inactive”. This suggests that using this activity requires lecturers to be influenced by informal reflection so that students can enjoy the social space towards achieving the vision of the module (Mnih et al., 2016; Nash, 2016). This activity gives lecturers an option to broadcast the message or announcement to the whole group or to a certain specific individual, and this indicates that the message activity also provide privacy to share confidential experiences with students at their own specific time (Chung & Ackerman, 2015; Schoenfeld, 2016).

3.7.3.6 Attendance

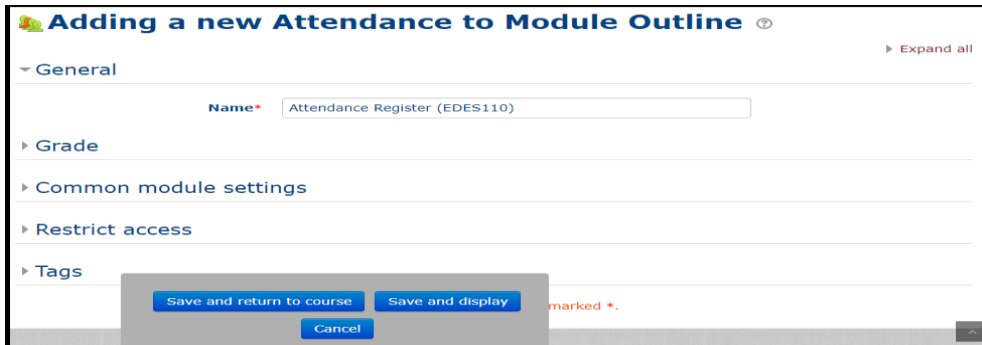


Figure 3.15: Attendance register

According to Singh- (2014), and Bozalek, Ng'ambi, et al. (2013), the attendance activity is designed to address the personal needs of lecturers via the process of reflection where lecturers are able to control and monitor the attendance of students during lecture period. However, after the attendance activity settings as depicted in Figure 3.15 above, the platform where students can view their own record for lecture attendance is enabled (Docs.moodle.org, 2017b). Moreover, this activity allows lecturers to “mark the attendance status of a student as ‘Present’, ‘Absent’, ‘Late’, or ‘Excused’” (see Figure 3.16 below) (Docs.moodle.org, 2017b, p. 29). In other words, this assertion caters for lecturers’ personal needs to ensure that learners’ presence is in order before the lecture commences and this activity is termed to be personal activity which is lecturer-centred since it addresses the needs of a lecturer during the process of teaching and learning.

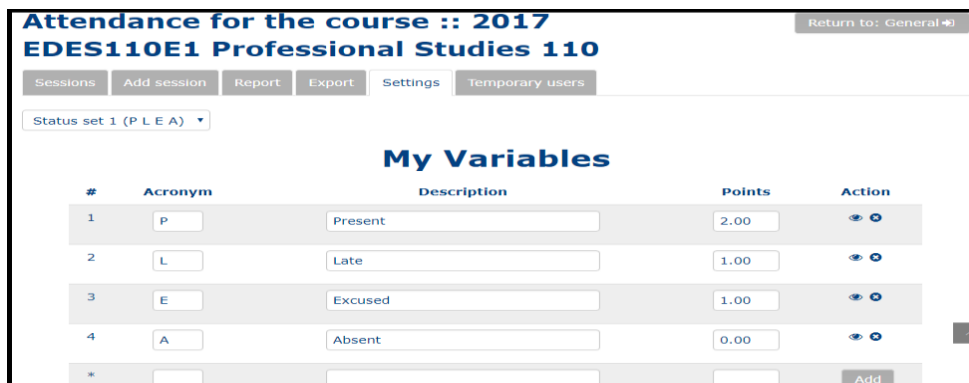


Figure 3.16: attendance status

Setting the attendance activity requires lecturers to add activity resources, give a name like ‘Lecture Attendance’ through the process of reflection in order to address their personal needs

(Petrovic et al., 2014; Van der Merwe et al., 2015). Note that, it is vital for lecturers to be aware of common settings such as 1. Setting attendance categories and grading options (modifying labels of attendance); 2. Adding (creating multiple session depending on the groups of students a module have); 3. Editing sessions (deleting), taking attendance (indicates the status and enter remarks) and 4. Making reports (creating reports on attendance) (Pearson, 1994; Siemens, 2014). All these assertions on settings are influenced by personal/produced reflection in order to address the personal need of a lecturer in such a way that lecturers remain confident that the attendance is controllable and manageable.

3.7.3.7 Journal activity

Studies assert that Journal activities personally assists lecturers to gather online evidence in the form of text from students, review it, and provide feedback including grades about the module (Maher & Elkington, 2015; Meierdirk, 2016; Nash, 2016; Ngubane-Mokiwa, 2013; Singh-, 2014). These studies further aver that Journal activities give an opportunity for lecturers to use their personal or produced reflection to analyses reflections from students in order to make decisions that improve their talent and habitual styles of teaching. According to Jackson (2017) the work submitted by students is only visible to lecturers and not to other students in order to serve the purpose of personal development. As a result, Singh- (2014) and Prensky (2001) aver that a Journal activity is lecturer-centred and it is a personal activity which is informed by produced/personal reflection. This suggests that the Journal activity is guided by what a teacher is aiming to achieve (aims and objectives), not by what students are willing to achieve (Khoza, 2015d; Nkohla, 2017). For instance, a lecturer may ask students to reflect on the most easily and friendly usable Moodle assessment activity between Assignment and Quiz Moodle activity, students' reflection assists lecturer to choose an activity that suits students.

Further to the above, Journal activity is used appropriately if lecturers give students a room to write their short and simple online reflection about the matter that is discussed, it allows online-text since it does not allow file upload (Docs.moodle.org, 2017b). Lecturer's personal reflection drives lecturers to understand how to add the new Journal activity as depicted in Figure 3.16 below. That is why Singh' and Kaurt (2016) aver that a Journal activity has general settings, whereby lecturers

provide the general name and brief description for the Journal (Figure 3.17). Further to this, the lecturer should ensure that the Journal is visible to students so that they will participate (common module settings) (Singh* & Mabasa, 2015). In other words, a lecturers' personal reflection must address their needs when they establish the settings of the Journal (Stocker, 2011; Tshabalala et al., 2014).

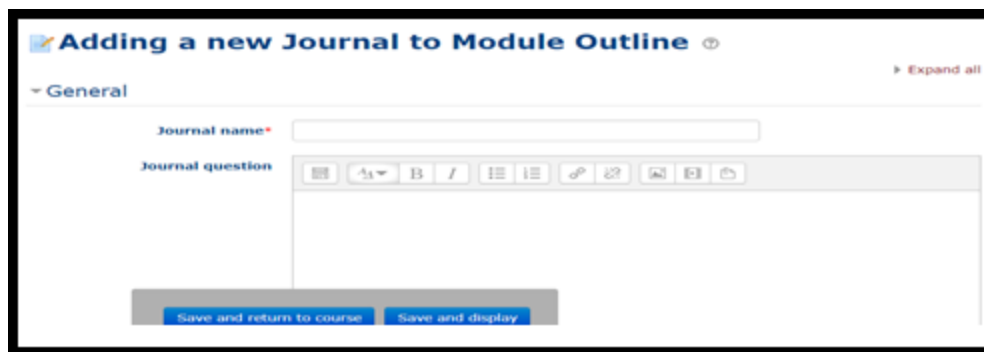


Figure 3. 17: adding Journal activity

3.7.4 Assessing a module using Moodle

The study conducted by Reddy and le Grange (2017, p. 159) on assessment and curriculum in higher education, asserts that the etymological definition of assessment comes “from the Latin verb called *assidere*, which means to sit beside”. This means that assessment is something lecturers do with students and for students including themselves. In other words assessment addresses the student’s needs (informal reflection) by unpacking the module content (formal reflection) by lecturers (personal reflection) (Singh* & Mabasa, 2015; Wamba, 2017). Furthermore, Khoza' (2016a), Hoadley and Jansen (2013), Van den Akker- et al. (2012), as well as Berkvens et al. (2014), assert that assessment plays a major role during the teaching and learning process; this process involves the achievement of goals (aims, objectives, and learning outcomes). As a result, for lecturers to ensure that goals are achieved, it has to be an assessment in place, which will measure and evaluate the progress towards the achievement of those stipulated curriculum goals or signals (Kennedy*, Hyland, & Ryan, 2006; Nkohla, 2017). That is why the study conducted by Black and Wiliam (2009) on assessment in higher education outlines that measurement is a process of gathering evidence during the teaching and learning process in order to quantifying the degree to which someone or something possesses a given characteristic, level,

or feature. Measurement produces quantitative data such as scores and numerical ratings like percentage for grading purposes. However, Fernández- et al. (2013), and Purvis et al. (2011), aver that evaluation is a process of judging the worth or value of something during the teaching and learning process and it is not done for grading purposes but rather for the purpose of monitoring of the learning process so as to check if learning goals are attained.

In addition to the above, studies aver that definition of assessment consists of both evaluation and measurement phenomenon; assessment includes both quantitative (measurement) and qualitative data (evaluation) from a variety of sources; and assessment can be thought of as the bridge between teaching and learning in order to provide feedback to the participants such as students, parents, lecturers, and universities (Biggs', 2011; Black & Wiliam, 2009; Kennedy', 2006; Moon-, 2002; Ramsden, 2003; Spiller & Ferguson, 2011; Stein et al., 2013). This suggests that, in education, assessment is mostly influenced by informal reflection (evaluation) and formal reflection (measurement). In other words, assessment requires lecturers reflect on a wide variety of methods or tools that can be used to evaluate and measure, the progress of the process of teaching and learning in order to cater for the needs of students and the needs of a module, including the needs of the lecturers. Black and Wiliam (2009), and Biggs' (2011), assert that the primary objective of assessment is to improve students' learning and teachers' teaching process. Furthermore, assessment is done in order to monitor the student's progress (diagnosis of student's problems and provide feedback), grading (assessment done on the basis of marks allocated), selection (selection for courses, subjects, jobs and others), and certification (giving certificates or degrees).

Moreover, studies are of the same view that any assessment should follow some guiding principles that will ensure trustworthiness to all stakeholders, including learners, lecturers, parents, and HEIs (Combrinck, 2003; Killen, 2003; Le Grange' & Reddy, 1998; Le Grange* & Reddy, 2017; Marsh, 2009; Siebörger, 2004; Vandeyar & Killen, 2003). These studies affirm that validity, reliability, and fairness are some of the guiding principles of assessment. Reliability is referred to as the principle that has got to do with consistency in the assessment (Black & Wiliam, 2006). This suggests that this principle is concerned with the accuracy with which assessment task or tool is used to meet the needs of society. In other words, this principle is influenced by informal reflection

because it addresses societal needs. For instance, if assessment is administered in two different social lecture halls, assessors marking the task will come to the same measurement. On the contrary, validity “refers to the extent that a measurement measures what it is supposed to not something else-the measurement must be true” (Naude & Davin, 2017, p. 15). In other words, any assessment task is valid if it serves the specific purpose or a goal based on the content taught in class, and this assertion indicates that validity is influenced by formal reflections since it is done to serve a particular goal during the teaching and learning process. Further to these principles, fairness when conducting assessment must prevail, “fairness relates to whether different learners are given equitable opportunities to demonstrate what they know and can do” (Reddy & le Grange, 2017, p. 166).

Furthermore, Reddy and le Grange (2017), Vandeyar and Killen (2003), Naude and Davin (2017), and Killen (2003), outline that lecturers should be guided by produced/personal reflection, and formal reflection in order to administer these principles (reliability, validity, and fairness) when conducting assessment. Studies further outline that lecturers should use their reflection to check if assessment is administered on the same basis of all learners. The marking process follows same criterion or memorandum and all learners are to be treated equally, stick to the purpose of assessment, results are to be confidential, assessment must be goal oriented and others in order to abide by the principles of assessment. Be that as it may, Mpungose* (2016) concurs with Kennedy' (2006) that assessment may be categorised as assessment for learning (personal reflection), assessment of learning (formal reflection), as well as assessment as learning (informal reflection) as depicted in Figure 3.18

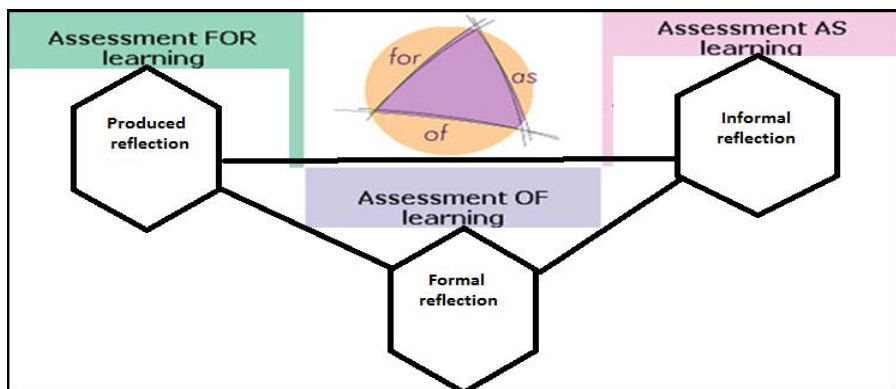


Figure 3.18: Forms of assessment with their own respective reflections

A. Assessment for learning

Furthermore, studies conducted on assessment assert that assessment for learning is also called formative assessment because it is influenced by produced/personal reflection (Black & Wiliam, 2009; Broadfoot* & Black, 2004; Carless, Joughin, & Liu, 2006; Dreyer', 2008; Harris et al., 2012; Naude & Davin, 2017). Thus, assessment for learning is conducted by lecturers for their own personal needs and development in order to check if the progress of teaching and learning is according to what is planned. These studies further reveal that assessment for learning includes all activities done prior and during teaching by lecturers to students, and this helps lecturers to personally reflect and be informed about areas of development in order to take control of the process of teaching. This then suggests that, lecturers use habitual actions when conducting this kind of assessment such as asking probing questions, class observation, and other related actions (Khoza, 2015). Furthermore, Chappuis and Stiggins (2002, p. 91) assert that, “teachers who assess for learning use day-to-day classroom assessment activities to involve students directly and deeply in their own learning”. Black and Wiliam (2009), and Reddy and le Grange (2017), further make addition to this assertion by outlining that assessment for learning is not done for grading, and this gives an opportunity to lecturers to plan assessment activities that involve students, so that lecturers may easily and quickly provide feedback where necessary.

Furthermore, assessment for learning is seen as an opposite of assessment of learning since it is mostly conducted during teaching in order to inform and influence the teaching process, and the aim of this assessment is to promote good teaching (Reddy & le Grange, 2017). Note that assessment for learning is done for developmental purposes because it is utilised by lecturers to shape their teaching by first identifying what student already know and do in order to identify aspect that requires more attention. This suggests that assessment for learning particularly seek lecturer to be influenced by produced reflection in order to address their personal needs through day-to-day activities that are conducted during teaching and learning. For instance, a lecturer teaching Physical Science may probe questions on Newton’s laws of motion, while observing a student’s ability to state these laws and a lecturer may provide motivating comments to those who

are struggling. As a result, Heritage (2007), sees assessment for learning as not seen as completion in teaching but a tool to improve teaching, it is a tool required for lecturers to improve teaching in order to support the student to move forward. In other words, this assessment seeks personal development of lecturers through the process of personal reflection during teaching and learning, so that lecturers are able to evaluate students' progress in order to provide feedback for the next instructional teaching as depicted in Figure 3.19 below. Biggs' (2011), and Black and Wiliam (2006), aver that assessment for learning have daily activities that leads to assessment of learning.

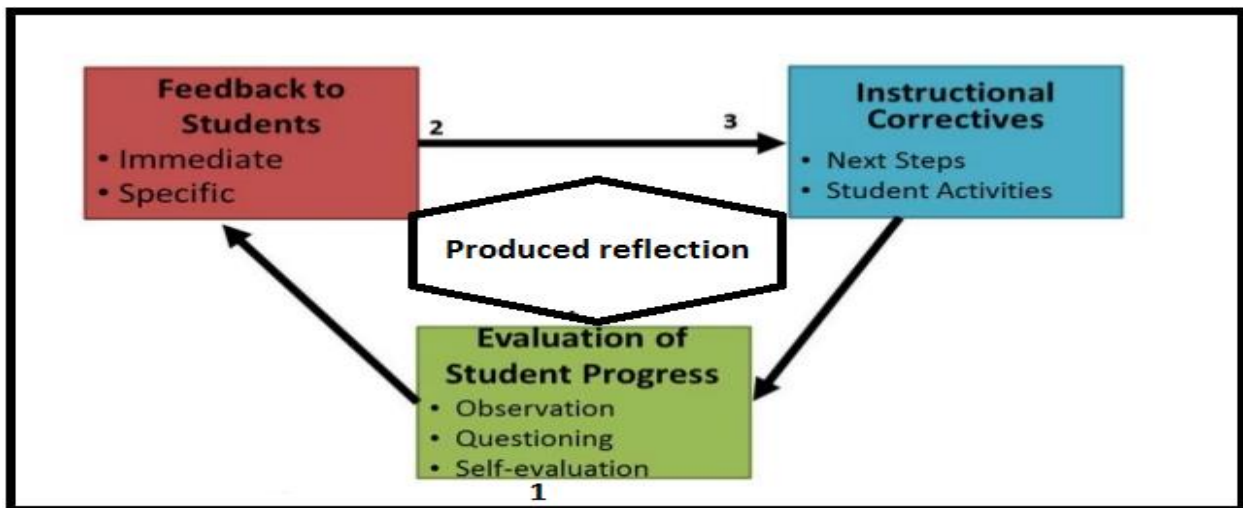


Figure 3.19: Delivering of assessment for learning through personal reflection adopted from (McMillan', 2007)

B. Assessment of assessment

On the contrary to the above assertion, assessment of learning is influenced by formal reflection in order to address the module need, and it is sometimes termed to be summative assessment because it “tries to summarise the student learning at some point in time and it has been described as end of course assessment” (Kennedy* et al., 2006, p. 21). As a result, Reddy and le Grange (2017, p. 167) state that assessment as learning is referred to as the assessment “that takes place at the end of the learning experience for a purpose that is outside the learning experience”. This suggests that assessment of learning is focusing on assessing students performances after a certain specific teaching of the module content, and this requires the influence of formal reflection by lecturers delivering this assessment. As a result, Myers (2016), as well as Black and Wiliam

(2009), are of the view that assessment of learning consists of the formal task drawn from the content taught in order to address the module need. Thus, “summative assessments act as a summary of formative assessment so that learners can achieve learning outcomes” (Mpungose-, 2016a, p. 64). In other words, these assertions indicate the need for formal reflection by lecturers in order to master and be able to cover the module content to achieve the goals (objectives and learning outcomes).

In addition to the above, see the study conducted by Knight (2002) at an open university of UK on assessment. The study revealed that valued learning is about summative assessment (assessment of learning) because it enhances effective feedback. The study concluded that there should be an alignment between the formal assessment task and the module content in order to achieve teaching goals (objectives). In other words, lecturers are driven by formal reflection to use assessment tasks like final projects, control or standardised tests, examinations, end of the course evaluations, and others. As a result, Chappuis and Stiggins (2002), as well as Reddy and le Grange (2017), reveal that assessment of learning plays a larger role than any other assessments because formal assessment task is done for grading, making judgement, and to measure the effectiveness of the module. Moreover, one of the benefits in assessment of learning is that it assists lecturers to reflect on the content of the module in order to identify the areas of weakness so that they will improve during lesson preparation (Huba & Freed, 2000). On the contrary, Ferguson (2011) asserts that the limitation of assessments of learning is to influence lecturers to teach and to test without providing details of the module content. This suggests that lecturers’ formal reflection may assists lecturers to avoid such kind of limitation which often becomes the normativity during teaching and learning process.

C. Assessment as learning

According to Khoza- (2013c), Kennedy* et al. (2006), Black and Wiliam (2009), as well as Reddy and le Grange (2017), assessment as learning also termed to be informal, peer assessment because it is influenced by informal reflection in order to address the societal needs of stakeholders in

particular students. These studies further highlight that assessment as learning takes place when students are given work by lecturers which requires them to informally reflect in order to predict the progress of the teaching and learning process. As a result, Reddy and le Grange (2017) aver that assessment as learning involves informal activities where students assess the work of another student or group of students by following a particular criteria or memorandum. Similarly, assessment as learning may occur when lecture gives rubric or memorandum to students in which they must assess themselves (Berkvens et al., 2014). These assertions reveal that assessment as learning is made up of informal activities such as short tests and class work that encourage lecturers to give students the opportunity to solve module content by using their own discretion or opinions. As a results, this requires lecturers to be influenced by informal reflection in order to allow students to socialise during the process of assessment, and this creates a room for students to actively engage in order to meet or address their needs (Biggs', 2011; Huba & Freed, 2000).

Khoza (2015) and Mpungose* (2016) view is in line with the idea asserted by Kennedy* et al. (2006) that assessment as learning activities are recorded, and it may contribute to the final mark. That is why Kennedy' (2006) asserts that this assessment is made of attributes from both assessment of and for learning. This suggests that the feedback is based on what other students are saying (opinions), and this has to do with students needs which then seeks lecturers to use an informal reflection when conducting formative assessment. Assessment as learning means that which “takes place at intervals throughout the period of learning” (Hoadley & Jansen, 2013, p. 200). This suggests that assessment as learning contributes towards the formal recorded task for assessment of learning.

Moreover, see the quantitative study conducted by (Sánchez-Santamaría, Ramos, & Sánchez-Antolín, 2012) at a university of Castilla-La Mancha in Spain. The main purpose of the study was to explore the students' reflections of pedagogical usage of Moodle at a university. The study used the survey design, with random sampling used to select participants from a population of 178 students in the education department. And *ad hoc* Questionnaire was use to collect data. The study revealed that Moodle provides more feasible means of teaching and assessment at a university. Therefore, from the findings, the study concluded that Moodle activities are relevant to the

assessment activities of the modules done at a university and it was noted that lecturers are still having limitations related to Moodle training and technical issues. This assertion suggests that there are various Moodle tools relevant to teaching and learning especially when conducting assessment (Fernández, Gil, Palacios, & Devece, 2011). For instance, lecturers may use their personal, formal, and informal reflections to master how to use an assignment activity, Quiz activity, workshop activity and others to conduct assessment. In other words lecturers reflections determines whether a particular assessment Moodle activity address assessment of, as, or for learning during the teaching and learning process (Black & Wiliam, 2009; Norris, Sporre, & Svendsen, 2013). That is the reason why the following paragraphs will discuss a few Moodle activities that have an impact on assessment during teaching and learning.

3.7.4.1 Assessing using assignments activity

Various studies assert that an assignment activity is informed by formal reflection and it is therefore termed to fall under formal assessment activity which is content-driven and undertaken for the purpose of grading (assessment of learning) (Escobar-Rodriguez & Monge-Lozano, 2012; Kumar & Sharma, 2016; Siemens, 2014). These studies further outline that an assignment activity provides a platform into which a lecturer can create an assignment with the purpose of generating evidence of whether the module content is understood by students, review it for grading, and finally provide feedback. On the contrary, this activity gives a chance for students to submit work to lecturers in any kind of file format such as word document files, spread sheet files, presentations files, web page files, photographic files, audio files, and video clip files. This suggests that lecturers need to be driven by formal reflection in this Moodle assessment of learning activity in order to address the module need, and this assists lecturers to assess if students have understood the concepts studied in order to achieve goals through grading, certification, and others.

Moreover, Singh- (2014) as well as Singh' and Kaurt (2016) articulate that for lecturers to use assignment activity as assessment of learning, they need to login into the system and turn on the editing function, then select the Assignment from the Activity chooser. These studies further outline that assignment activity has and availability options where lecturers have to be guided by formal reflection in order to choose the 'allow submission', 'Due date' and cut-off dates including

submission types as depicted in Figure 3.20 below. In other words, a lecturer is given a formal responsibility to set a date before which no students can submit an assignment, actual date during which a student is expected to submit an assignment, as well as a date for accepting late submitted assignments. In other words, Timing also plays a major role in conducting assignment activity (assessment of learning) such that, the matter of when the activity is done is of paramount importance. Moreover, the Submission types function allows lecturers to give option to students whether to submit an assignment by typing text directly into Moodle (Online text) or by uploading a file (File submission) (Docs.moodle.org, 2017b). This indicates that there are two, most important, kinds of assignments. On the other hand Singh- (2014) asserts that submission comments (allows student to submit comments) and offline activity (assignment will be done offline) will only be available if administrators have activated it. According to Docs.moodle.org (2017b) lecturers are allowed to give feedback after the assignment is submitted as follows: ‘feedback comments’ allows lecturers to leave a comments and a grade about each work submitted by the student; ‘Offline grading sheet’ downloads a grading list that enable a lecturer to enter and make feedback; ‘feedback files’ allow lecturers to upload files with feedback; and ‘comment online’ allows lecturers to give feedback directly on the submitted work on Moodle. This then leads to simple grade points with a maximum of 100 marks or percent. These assertions confirm that the assignment activity as assessment of learning (summative assessment) is done for grading purposes and that it is a formal assessment Moodle activity. This then encourages lecturers to be driven by formal reflection in order to address the module need.

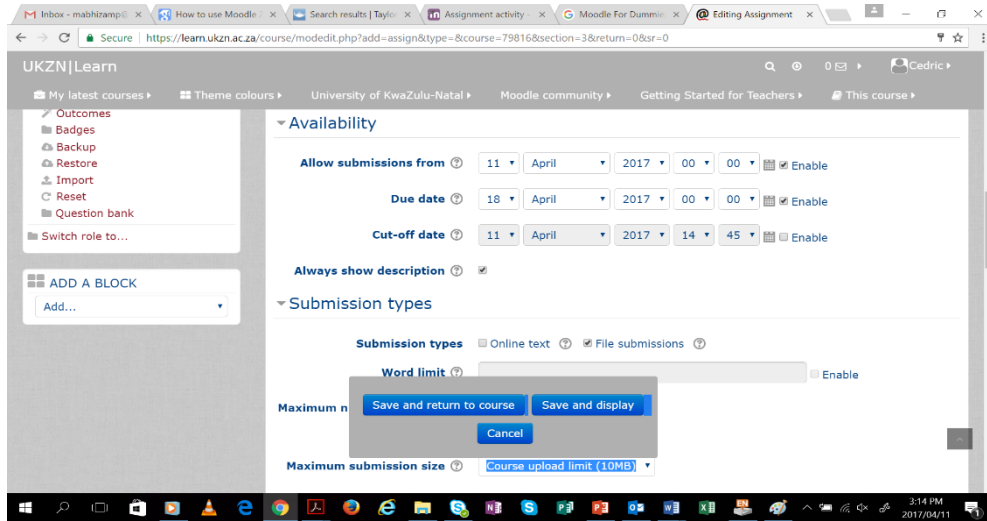


Figure 3.20: Assignment: availability

3.7.4.2 Assessing using Workshop activity

The Workshop is almost the same as the assignment activity discussed above which is why it is recommended that lecturers should familiarise themselves with the assignment activity before coming to engage in the workshop activity (Katsamani, Retalis, & Boloudakis, 2012). According to Singh- (2014), workshop is a peer/self-assessment activity, it is an informal assessment (assessment as learning), and lecturers are required to use informal reflection to administer this activity in order to address the societal needs (students and others). In other words, workshop activity is done among students as a society in order to check if the learning outcomes are achieved in a particular teaching and learning programme (Damnjanovic, Jednak, & Mijatovic, 2015; Engeström, 2014). Workshop activity has the four most important phases, namely Setup phase (initial phase where lecturers are allowed to make settings), Submission phase (submission start and end dates are specified), Assessment phase (allows peer assessment to occur), Grading/Evaluation phase (providing feedback), and Closed phase (workshop grades or results are displayed in the Gradebook) as depicted in Figure 3.20 below (Anderson et al., 2015; Chung & Ackerman, 2015; Prensky, 2001).

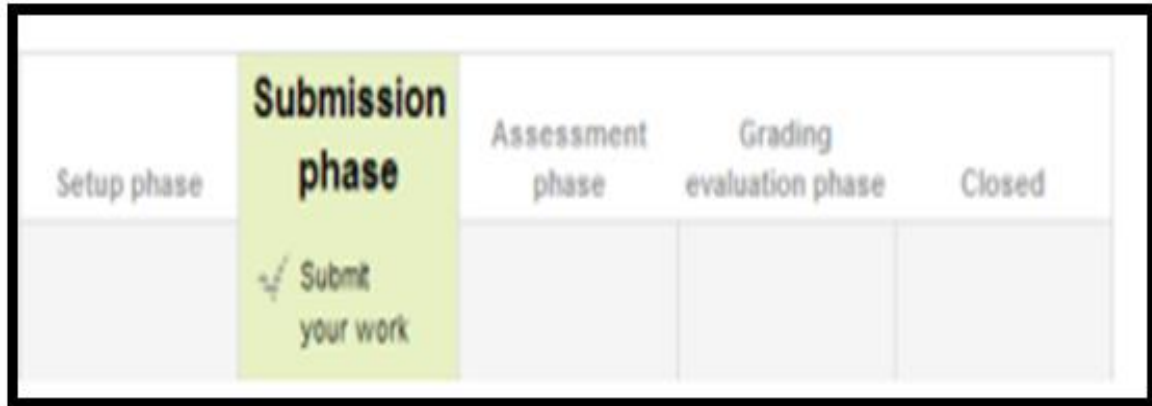


Figure 3.21 Workshop phases

In addition to the above, various studies assert that using workshop activities allow lecturers to perform various functions such as general, grading, submission, assessment, feedback, examples, availability and others as displayed in the Figure 3.22 below (Chung & Ackerman, 2015; Clark & Mayer, 2016; Katsamani et al., 2012; Quan-Baffour & Vambe, 2016). Studies outline that lecturers should be driven by an informal reflection in administering these activities in order to put clear guidelines in place for students to assess each other. Thus, under general function, lecturers are expected to give a name and the general description of the workshop whereas under grading function they are expected to choose the assessment form students will use and also the strategy for grading submissions (accumulative grading, comments, number of errors, rubric). Studies further outline that at the submission function, lecturers are bound to indicate the number, size of a file to be submitted, and issues of late submission should be clearly stated. Further to this, lecturers are expected to provide instructions for assessment while on the feedback, function must specify the types of feedback to be provided. At the examples function, examples of formative/informal assessment (assessment as learning) are done before they should be provided to students.

In addition to the above, Norris et al. (2013) reveals that workshop, as an informal activity, coordinates the submission of assignments in order to be peer reviewed to address the societal need, as assessment is done following a rubric or a memorandum indicating skills designed by a lecturer including comments which resonates the principles of the competence curriculum

(Petrovic et al., 2014; Piguillem Poch et al., 2012). This suggests that lecturers' use informal reflection to address the student needs by involving them in assessing each other's work.

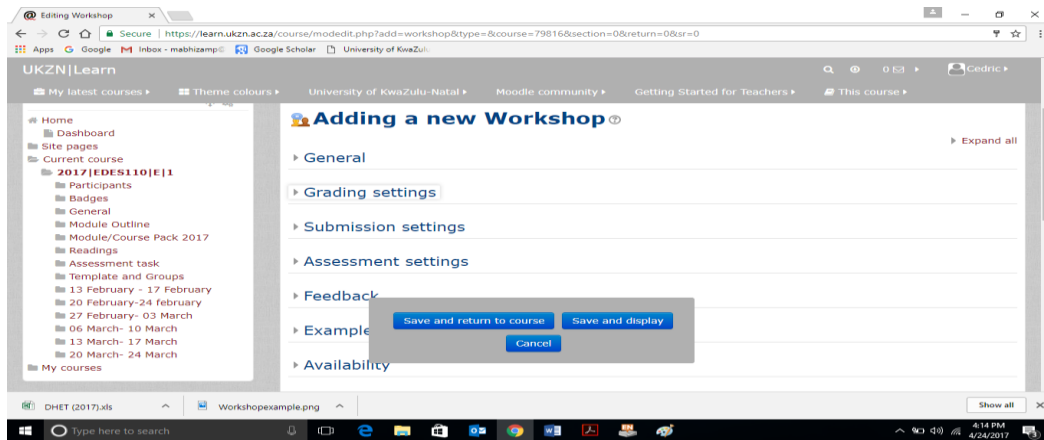


Figure 3.22: Workshop functions

3.7.4.3 Assessing using Quiz activity

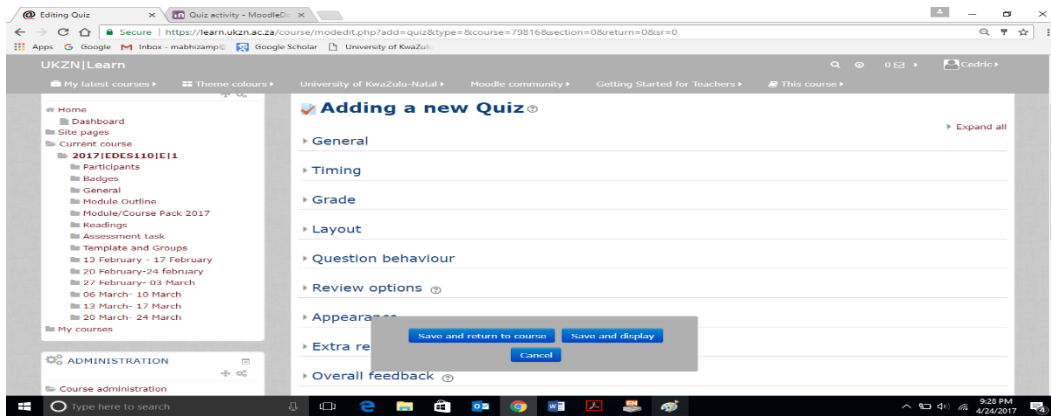


Figure 3.23: Quiz activity

The Quiz as depicted in Figure 3.23 above, is one of the formal assessment Moodle activities which is formative (done with a purpose to check the progress of teaching and for personal development), and it encourages lecturers to be influenced by formal reflection. Thus, a Quiz activity is termed to be an activity that serves the purposes of assessment for learning (Pedro, 2005; Sánchez-Santamaría et al., 2012; Singh-, 2014). Interestingly, by designing or developing Quizzes consisting of different types of questions, such as multiple choice, true-false, short answer questions, and essay, it has reduced the duty load and made lecturers' work easier. This suggests

that the Quiz activity is done with the purpose of supporting more assessment for learning than assessment of learning. In other words, lecturers need to be driven by produced reflection in order to meet their personal needs of development (Rodgers, 2002; Schoenfeld, 2016).

Furthermore, Norris et al. (2013) assert that the Quiz activity is one of the most vital activities that is conducted in order to check the progress of teaching and learning in a particular module, it enables lecturers to use personal reflection to provide reliable feedback to students. This suggests that the Quiz activity gives lecturers a chance to reflect on their practice in order to improve their teaching and learning methods or strategies. For instance if a lecturer was using questioning teaching methods and students are not performing well after writing a Quiz, a lecturer is then expected to use another teaching method like demonstration or group work. As a result, the Quiz activity is very flexible because lecturers are permitted to use different types of questions in order to accommodate different levels of that module and Quizzes provide multiple attempts of doing that Quiz (Khoza, 2015c; Novak, 2010). Further to this, Jackson (2017) agrees with Hollowell (2011) in explaining that a Quiz is used as a short test in a module and as a tool to ensure that there is a practice of the past exam papers and self-assessment. This develops lecturers to identify areas that need special attention in order to make relevant intervention. In other words, Quiz as an assessment for learning activity, influences lecturers to provide good teaching and learning that is flexible.

Further to this, studies outline that when lecturers are adding a Quiz, personal reflection must guide them to provide general details of a Quiz which include the name and description (Docs.moodle.org, 2017b; Fernández et al., 2011; Govender & Khoza, 2017; Kashora et al., 2016; Singh-, 2014). In the timing section, lecturers are expected to specify the date in which the Quiz will start and end, time limits (including the grace period). Grade section ensures grade category, attempts and method are selected for grading to unfold. Further to this, the layout section of a Quiz, order and method, and new page option, allows a Quiz to stretch over several pages. The behaviour of the question is set in such a way that it may sometimes provide feedback immediately. This Quiz activity includes other sections like review report, extra-restriction on attempts, overall feedback reaction, and common module setting. All functions in this activity address the

assessment for learning through providing lecturers' personal reflection in order to transform and improve the standard of teaching and learning. This suggests that all Quiz functions are lecturer-centred and this encourages lecturers to use personal reflection in order to master this activity in addressing their personal needs (lecturers). Singh- (2014) further asserts that there are various assessment for learning activities which address the personal needs of lecturer such as Choice. This is an assessment Moodle activity that can be used to assess and stimulate thinking about a topic in place as it gives direction to the lecturer and allows them to move towards achieving goals.

3.7.5 Moodle platform/environment and time

Platform is sometimes termed to be a location or environment which is defined space proved where teaching-learning can take place (Khoza, 2013b). Thus, studies outline that the teaching process should occur within a conducive platform that encourages and supports informal, formal, and personal activities. That is the reason why Berkvens et al. (2014, p. 18) advocates that teaching and learning process should be “carried out in inspiring environments that provide adequate teaching and learning materials”, and this requires lecturers reflections to be in place. See the studies conducted by Looney, Cumming, van Der Kleij, and Harris (2017) as well as Mockler (2011) on teacher identity. These studies reveal that teacher identify is mainly understood through main three platforms namely: personal platform, professional platform and public platform. Studies further draw the line between the three platform such that the personal platform is influenced by personal experience which is based on the historical background, the professional platform by the policy systems in place, whereas the public platform in influenced by social opinions (politics). These assertions suggests that Moodle teaching and learning platforms can based on a personal platform (blended environment) and guided by personal reflection, formal platform (face-to-face environment) as guided by formal reflection, as well as the informal platform (online environment) as guided by informal reflection (Khoza-, 2016b; Mpungose*, 2016). Note that all these suggested platforms are used within a certain period of time (Berkvens et al., 2014).

3.7.5.1 Formal platform and time

Interestingly, the studies done by Ramsden (2003), Nkohla (2017), and Khoza (2013b), specifically reflected on the issues of teaching and learning platforms. These studies outline that the formal Moodle platform is driven by formal reflection where teaching and learning is believed to take place in a demarcated area of teaching and learning, as stipulated from the university policies. For instance Moodle can be used in the formal lecture hall, formal lecturers' offices and libraries, research commons, and others. According to Sharma and Barrett (2011), Ngubane-Mokiwa and Khoza (2016), and Bates* (2016), formal platforms are referred to a face-to-face platforms where teaching and learning takes place and it occurs where there is a physical presence of the lecturer in a specific venue. This suggests that the formal platform enhances face-to-face communication for teaching a module, real time contact to access resources from Moodle LMP, real time of teaching is within a specified period of time, and feedback is provided visually with immediate effect (Behari-Leak, 2017; Berkvens et al., 2014).

In addition to the above, the use of a demarcated and formal platform is also affirmed by Bernstein (1999) and Van den Akker- et al. (2012) in the performance curriculum, indicating that the formal platform must be motivating and user friendly in order to address the module need. For instance, the lecture hall must be in a good condition in such a way that users are able to access an internet connection; and it is well ventilated and has air condition systems in place. On the contrary, Rabbany et al. (2014) aver that the use of formal teaching and learning platforms for Moodle usage is always time bound. This suggests that the use of formal platforms is according to the university formal time table that lecturers do follow in order to use the particular platform. In other words, formal platforms are used within a specified time stipulated from the university police that is in line with DHE policies (Le Grange* & Reddy, 2017; Looney et al., 2017).

3.7.5.2 Informal platform and time

Furthermore, informal platforms address the needs of all stakeholders, including students, taking part in the use of Moodle when teaching the module. This platform is influenced by informal reflection where lecturers are expected to use Moodle platforms based on what the public or society (opinions) is saying (Czerniewicz & Brown, 2014; Khoza-, 2016b). Moreover, Amory-

(2015), Khoza and Manik (2015), and Prensky (2001), refer to the informal platform as the online platform where teaching and learning take place through the use of internet using the LMP like Moodle. This suggests that a lecturer need not to be present in the lecturer hall for teaching and learning to take place, as long as both students are connected to the internet (online) teaching and learning may prevail (Nash, 2016; Quan-Baffour & Vambe, 2016). In other words, informal platforms accommodates all the community/society members taking part in the module because they can access the module at any time anywhere provided they are all connected. As a result lecturers' informal reflection addresses the needs of the society during the teaching and learning process (Mpungose*, 2016).

Furthermore, according Salmon (2013), and Sharma and Barrett (2011), lecturers, university management, and Moodle administrators, including students, are influential in selecting the use of an informal platform (online) to be used for teaching and learning using Moodle in order to meet the needs of the students (society). According Bernstein (1999), and Hoadley and Jansen (2013), this assertion follows the model of the competence curriculum where teaching and learning platforms are not demarcated or time bound. This suggests that the use of Moodle for teaching and learning in the informal platform can take place anywhere and at any time provided it serves the purpose of using Moodle for teaching and learning process. According some studies, university premises, lecturers' homes, restaurants and others, can be used as informal platforms for teaching and learning using Moodle, at any informal time (out of working ours) like after work, before work, or during lunch time (Jackson, 2017; le Roux & Breier, 2016; Mockler, 2011; Myers, 2016; Singh' & Kaurt, 2016). For instance, a lecturer may use a messaging activity to send an announcement to students based on a module while sitting at home (informal time) provided there is an internet connection.

3.7.5.3 Personal platform and time

Moreover, personal platform is drawn from the two mentioned above platforms (formal and informal), and is influenced by personal reflection where the use of the platform is basically grounded on pervious personal experience or previous historical background (Govender & Khoza, 2017; Schoenfeld, 2016). Further to this, Mowlabocus (2016) views about the personal platform

is in line with the those for Garud et al. (2016) when outlining that the personal platform is sometimes defined as a blended platform because it combines both the online platform and the face-to-face platform in order to serve the needs of the lecturer. In other words, teaching and learning requires a bit of physical interaction and a bit of virtual/online learning, and it is up to the lecturers to utilise any platform in order to meet their needs (Dreyer-, 2015; Salleh et al., 2015).

In addition to the above, the use of personal platform for teaching and learning when using Moodle address the personal needs (Khoza & Manik, 2015; Looney et al., 2017). This can also applicable when lecturers are opting to use informal platforms like restaurant which may be influenced by their personal historical background (Bates' & Poole, 2003; Biggs', 2011). This then suggests that lecturers are not forced to use any of this platform (informal or formal) but that lecturers choose the platform based on their needs in such a way that lecturers may opt to use Moodle while they are at home, in the conference, in the office and others provided it suits their needs. Note that; time is always personally decided as to when to use the Moodle platform based on the personal needs (Apple, 2004; Bijker, 2010). In other words, lecturers can use Moodle at any time they wish to irrespective of whether they are at school or not.

3.7.6 Lecturers' character when teaching the content using Moodle

The work done by the studies on the lecturers' character in the teaching and learning process in higher education, outlines that HEIs are considered to be institution for learning and teaching and for doing research (Biggs', 2011; Herrington, 2006; Kolb, 2014; Laurillard, 2013; Prosser & Trigwell, 1999; Ramrathan, 2017; Ramsden, 2003). These studies outline that transformative teaching is influenced by the character of a lecturer in place. As a result, the work of Ramsden (2003) outlines that good teaching is all about bringing change and gives light to students about the content studied, but this is dependent on the nature and character of lecturers as they play a role during the teaching and learning process. Thus, "the professional authority of academic as teacher should rest on the body of knowledge. This comprises of how the subject he/she professes is best learned and taught" (Ramsden, 2003, p. 9). This then suggests that the character of the lecturers to teach a module depends on the body of content knowledge from a particular discipline (curriculum). As a result, Spiller (2011) refer to the content as what lecturers are aiming to teach

as pertaining to skills (informal content), knowledge (formal content), behaviours, and attitudes (personal content).

In addition to the above, Nkohla (2017), Khoza* (2016b), and Myers (2016) are of the same view that the character of a lecturer in teaching content of the module is referred to as an ability or authority or powers invested to the lecturer to outline the goals for/of teaching. It involve students in teaching, the use of correct method of teaching, creating conducive teaching environment, selecting the content to be covered. This affirmation is evident when you look at an online survey study conducted by Burkill, Dyer, and Stone (2008) in some of the universities in the UK. The main aim of the article was to explore lecturers' reflection on the understanding of their character during the teaching and learning process. Web-based questionnaires were used to collect data from one hundred and six lecturers' from different universities. The study revealed that lecturers used different kinds of teaching methods in their lectures, including seminars, group tutorials, lecturing, demonstrations, team teaching, running cohorts, supervisions, and one-to-one consultations. The study therefore concluded that the character of educators is influenced by the teaching method or approaches they use during teaching and learning of their lecturers. This then suggests that lecturers' character in teaching the content of a module depends on different kind of reflections (informal, formal, and personal). This kinds of reflections is alluded to enhances lecturers to use the correct teaching methods or approaches (Boud^ et al., 2013; Khoza*, 2016b).

3.7.6.1 Lecture as the instructor

Interestingly, Berkvens et al. (2014), Van den Akker- et al. (2012), and Richardson (2011) further aver that lecturers' character in teaching the content is termed to be instructors when they are driven by lecturer-centred approach, facilitators when they are driven by student-centred approach, and assessors when they are driven by content-centred approach. As a result, Hoadley and Jansen (2013) as well as Scott et al. (2007) outline that lecturers as instructors are influenced by personal reflection in order to address their personal needs. Lecturers as facilitators are influenced by informal reflection in order to address the students' needs (societal needs). Lecturers as assessor are influenced by formal reflection to teach the relevant content in order to address the module need. For instance, when a lecturer is giving a lecture and explaining concepts from a presentation

or slides without engaging students by asking questions or encouraging them to actively participate, that lecturer is defined as an instructor because they are only giving instructions without engaging students. This example, simply suggests that if lecturers are taken as facilitators they do engage students during teaching and learning of the module content, but if lecturers are taken as assessors, they only teach the content that is going to be assessed (Hoadley & Jansen, 2013; Spiller, 2013).

3.7.6.2 Lecturer as facilitator (chemistry)

Moving further, Khoza (2015d) outlines that lecturers as facilitators in teaching the module content simply indicate that their teaching is driven by learning outcomes in order to address the students' needs (societal needs), and they are influenced by informal reflection in order to actively engage students in all teaching activities. Lecturers' informal reflection assists them to use constructivist approach which requires students active participation in order to meet their needs during the teaching and learning process (Dewey*, 1938; Spiller & Ferguson, 2011; Vygotsky, 1978). That is why Spiller and Ferguson (2011) asserts that the facilitators' teaching and learning process is orientated towards social constructivism, because learners share their own experiences in order to construct their own ideas or opinions about the content taught. This is in line with Hoadley and Jansen (2013, p. 68) assertion that a lecturer, as a facilitator, is always "drawing on the learners' knowledge in order to create focuses of interest and to help them to understand sounds. At almost every step, the learners participate actively in a dialogue with the facilitator and with each other". This assertion suggests that facilitators' informal reflections during teaching address the student needs by giving students a chance to have control over the sequence and the pace of learning, and this accommodates different kinds of thinking levels of students (Khoza*, 2016b; Laurillard, 2013). Thus, "all learners can learn, but will do so in different ways and different speeds". In other words, lecturers, as facilitators, should accommodate the different needs of all students during the teaching and learning process. For instance, a lecturer using Moodle to facilitate teaching and learning, must try to engage students to participate in all activities, but there must be ways to accommodate those who have barriers to learning (such as mental or physical disabilities).

In addition to the above, the work done by Fry', Ketteridge, and Marshall (2008) on teaching and learning in higher education, indicates that teaching in sciences (Physical Science and Chemistry) involves teaching methods like lecture, small group learning, and problem-based learning. The study suggested that, small group learning (known as tutorial and problem-based learning) are used in the teaching and learning process of chemistry. This is because students are allowed to actively participate and share their ideas when doing both theory and practical work. Thus, lecturers act as facilitators when addressing the chemistry content (science module) because lecturers use their informal reflection to make demonstration on how certain aspects are unpacked. According to (Giancoli, 2005), some of the chemistry content that can be covered is matter, equilibrium, kinetic theory, laws, and elements and compounds. For instance, a lecturer needs to demonstrate to students (tutorials) how Acid-Base Neutralisation reaction occurs by hydrochloric acid and how it reacts with sodium hydroxide so that they form water and sodium chloride (table salt). This suggests that after facilitation of reaction (chemistry content), students can share their experience and use their pace, sequence to do their own reaction in order to meet their own needs. The lecturer acts as a facilitator via the influence of informal reflection in order to meet students' needs (Antunes, Pacheco, & Giovanela, 2012; Eilks & Byers, 2009).

Interestingly, there are still recent studies done on the character of teachers in teaching chemistry. See the mixed method study conducted by Al-Amoush, Usak, Erdogan, Markic, and Eilks (2013) in Turkey. The main aim of the study was to explore teachers' reflections on their character during teaching and learning of Chemistry (science content), both qualitative and quantitative data analysis were used to offer information about teachers, and reflections on their characters (traditional, lecturer-centred, and student-centred). The study revealed that teachers in Turkey still used the traditional method because they used a teacher-centred teaching style of instructing and transmitting knowledge to students when teaching chemistry. The study therefore concluded that, teaching of chemistry is made effective if teachers' character are facilitators then students become hands-on and actively involved. This then suggests that lecturers' reflection should influence them to be facilitators in the teaching of the science module content (chemistry) in order to address the societal needs or the needs of students (Roberts & Bybee, 2014; Rodgers, 2002). In other words, students should be actively involved in the teaching of chemistry content by allowing them to work

in groups so they may share ideas and opinions about the content taught and be able to use LMP to learn the content.

Furthermore, See the survey study conducted by Muthoosamy, Lee, and Chiang (2012) at The University of Nottingham, Malaysia Campus, in UK. The aim of the study was to investigate student reflections of the usefulness of Moodle in terms of teaching and learning chemistry content. The questionnaire was used to survey 124 students for data generation purposes. The study outlined that the use of Moodle was meant to accommodate both international and local students for active participation during discussion and assessment. The study further assert that 73% of students valued the use of Moodle in teaching chemistry. The study concluded that students positively acknowledged the use of Moodle in the learning of chemistry because of easy communication (discussion forum), accessing the course materials with relevant content, and completing the online assessment tasks such as assignments. This then suggests that lecturers' informal reflection on the use of Moodle when teaching chemistry enhances lecturers to become facilitators. This is because lecturers provides support to students via Chat activities, forum activities and others, they also provide chemistry content via books, articles, videos to students to study at their own not to spoon-feed them (Chittleborough, 2014; Roberts & Bybee, 2014). Thus, assertion suggests that the character of lecturers as facilitators is opposite to the one of lecturers as instructors or transmitters of content knowledge in the teaching of science.

3.7.6.3 Lecture as the assessor (physics)

Moreover, Hoadley and Jansen (2013), Berkvens et al. (2014), Behari-Leak (2017), Khoza (2015d), and Govender and Khoza (2017), argue that lecturers as assessors are influenced by formal reflection where they are driven by objectives (goals) to offer the lecture in teaching the content, and their teaching only addresses the content of module which can be assessed. This suggests that lecturers are teaching the content only for assessment sake which shows that lecturers use formal reflection to meet module needs in terms of meeting module objectives. As a result, Khoza (2015d) outlines that lecturers as facilitators in teaching the module content simple indicates that their teaching is driven by learning outcomes in order to address the students' needs (societal needs). Lecturers are also influenced by informal reflection in order to actively engage students in

all teaching activities. As a result, Spiller (2012), and Spiller and Ferguson (2011), outline that lecturers as assessors in teaching a module are influenced by formal reflection which is driven by the cognitive approach whereby lecturers are expected to stimulate each learner to construct his or her mental thinking and also connect new thinking with existing schema. In other words, lecturers as assessors use content-centred approach which is based more on Stenhouse (1975) process approach where the process of teaching and learning (attainment of content module-objectives) matters more than the end product (attainment of learning outcomes) (Khoza, 2015). This suggests that lecturers are concerned with the formal reflections on the ways and means of how the content should be clearly addressed to students in order to meet the module objectives (module needs).

In addition to the above, studies done on the teaching of science modules in higher education outline that lecture become assessors when teaching physics as they use relevant theories based on proven facts to find solution towards given physics' problems (Antunes et al., 2012; Eilks & Byers, 2009; Fry' et al., 2008; Giancoli, 2005; Roberts & Bybee, 2014; Waight & Abd-El-Khalick, 2012). These studies suggest some possible content that can be covered in Physical Science which includes: motions, sound, light, vectors, force, laws, energy, work, power, and momentum. This suggests that teaching of the content in physics is influenced by formal reflection on the principles of physics such as Newton's law of motion, work-energy theorem and others (Asikainen & Hirvonen, 2010). In other words, the teaching of physics requires mastering formulas, equations, and theories, and lecturers are expected to use them to unpack the content (Asikainen & Hirvonen, 2010). Moreover, both Becher (1990) and Huibregtse, Korthagen, and Wubbels (1994) assert that lecturers as assessors are only keen to achieve module objectives via formal reflections.

In addition to the above, see a qualitative case study conducted by Borondo, Benito, and Losada (2014) at one of the universities in Spain. The aim of this study was to explore the lecturers' reflection on the use of Moodle to teach physics content. The study revealed that the physics content was displayed on Moodle with relevant activities with specific due dates for submission. Further to this various ways of interaction with the content was enhanced through Assisted exercises (sets of problems and exercises for each content), Self-evaluating test (question bank with possible answers), and Online lab (experimental practise). The study concluded that Moodle

platform assisted lecturers to set mandatory examination where student were compelled to write them based on the content covered. The study suggests that the lecturers' character as assessors influenced them to use formal reflection in addressing the content of the module through setting compulsory examinations, self-exercises with due dates in order to address the module need (Hoadley & Jansen, 2013; Khoza, 2015). This is in line with the Bernstein (1999) view of vertical or performance approach in teaching the curriculum where lecturers are expected to access only what is prescribed in the curriculum within the specified period of time.

According to Berkvens et al. (2014), and Khoza (2015d), lecturers are termed to be instructors because they are influenced by personal reflection in order to address their needs. Personal reflection helps lecturers to use aims to drives their lectures, and those lectures were influenced by behaviourism teaching and learning theory which promoted lecturer-centred activities (Biggs', 2011; Hoadley & Jansen, 2013). This then suggests that lecturers' only transmit information to learners as empty vessels without engaging them in any discussion. That is why Hoadley and Jansen (2013, p. 68) aver to when they claim that lecturers are instructors, "the learning consist of a set of instructions issued by the teacher. The learners follow these instructions". Moreover, this character does not address student or module needs, and it addresses the personal need (Khoza*, 2016b). This suggests that it is up to the lecturers to decide which content to cover according to their needs, and what teaching approach to use; whether it should be content-centred or student-centred.

3.8 Concluding statement of the chapter

Moving from Chapter One, which explored the concepts of lecturers reflections and the use of resources (Moodle), Chapter Three presented a critical discussion on the definition of curriculum which outlined formal, informal, and personal curriculum activities that have levels of curriculum (intended, implemented, enacted, and produced). The chapter stipulated that all curriculum level are influenced by informal, formal, and personal reflections including curriculum development beliefs and approaches (Tylerian approach, Stenhousian approach, Freireian approach,

instrumental approach, communicative approach, pragmatic approach). Moreover, this chapter also presented the curriculum signals on Moodle such as Moodle permission, Justice to Moodle, Content in Moodle, Moodle activities, Lecturers' character, Moodle platform, Time scheduled for Moodle, and Assessment in Moodle. All these curriculum signals were framed around lecturers' informal, formal, and personal reflection on the use of Moodle during teaching and learning of Science Modules.

CHAPTER FOUR

Theorising the reflections, procedures, and Physical Science modules in building theoretical framework

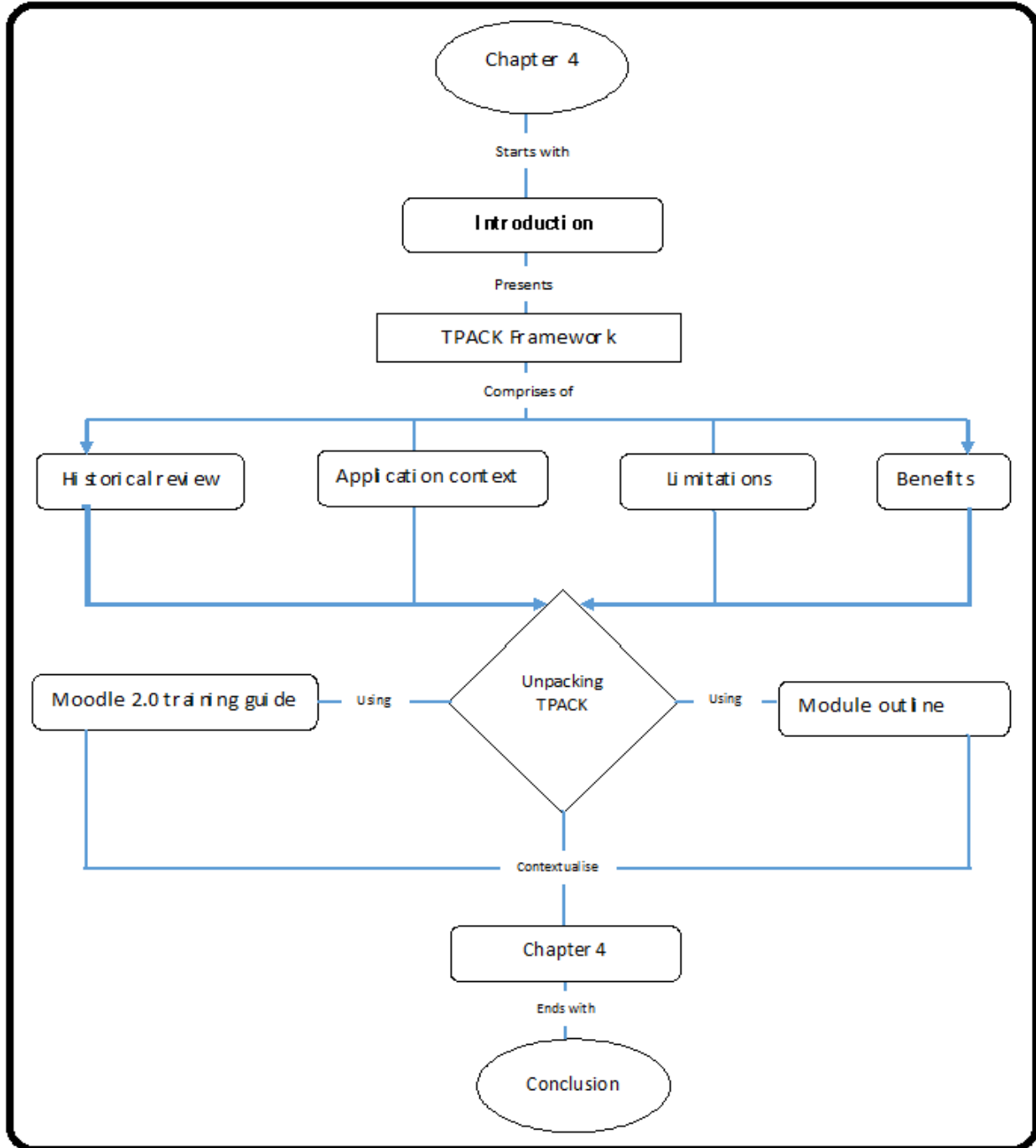


Figure 4.1: Chapter 4 conceptual map

4.1 Introduction

The previous chapters strongly unpacked the literature on lecturers' reflections on the use of Moodle when teaching science modules. Thus, Chapter Two discussed the literature pertaining to lecturers' reflection (phenomenon) as well as the use of Moodle resources (IwR, HwR, and SwR). This chapter outline the realisation of the importance of curriculum signals. Chapter Two therefore produced the need to unpack the literature on curriculum signals. As a result, Chapter Three, intensely unpacked the literature on curriculum signals with reference to this study, which includes Moodle permission, justice to Moodle, content in Moodle, Moodle activities, lecturers' character, Moodle time schedules, Moodle platforms, as well as assessment in Moodle. Moreover, both Cohen' et al. (2013), as well as Creswell. (2014), affirm that the theoretical framework of any research study carries the philosophical bases by incorporating both theoretical and practical aspects together, and it further stipulates the key concepts that has impact on the phenomenon. As a result, the last two chapters indicated the importance of TPACK as the necessary and relevant theoretical framework for this study. Upon interrogating various theories (connectivism, CHAT, behaviourism, five-stage model of learning, TPACK), TPACK proved to be the most relevant theory for this study because it seeks and asserts the relevant knowledge of the literature framed by three signals, namely: Technological, Pedagogical, And Content Knowledge; which addresses the phenomenon of this study namely: Informal reflection (Technological knowledge), Formal reflection (content knowledge), and Personal reflection (Pedagogical knowledge).

This chapter intends to unpack the TPACK framework in terms of historical review, benefits, as well as limitation of using TPACK theory, and display the application of TPACK in various contexts. Consequently, the chapter intends to recontextualise TPACKS concepts within relevant concepts and propositions of the reflections (phenomenon) using relevant documents which includes, Moodle 2.0 training guide and module outline. Note that these documents are replacing the online learning policy document, in its absentia, at the university. As result, in this study, these documents (Moodle 2.0 training guide and module outline) constitute the policy document in the absence of university online policy document.

4.2 Technological, Pedagogical, and Content Knowledge (TPACK): historical overview

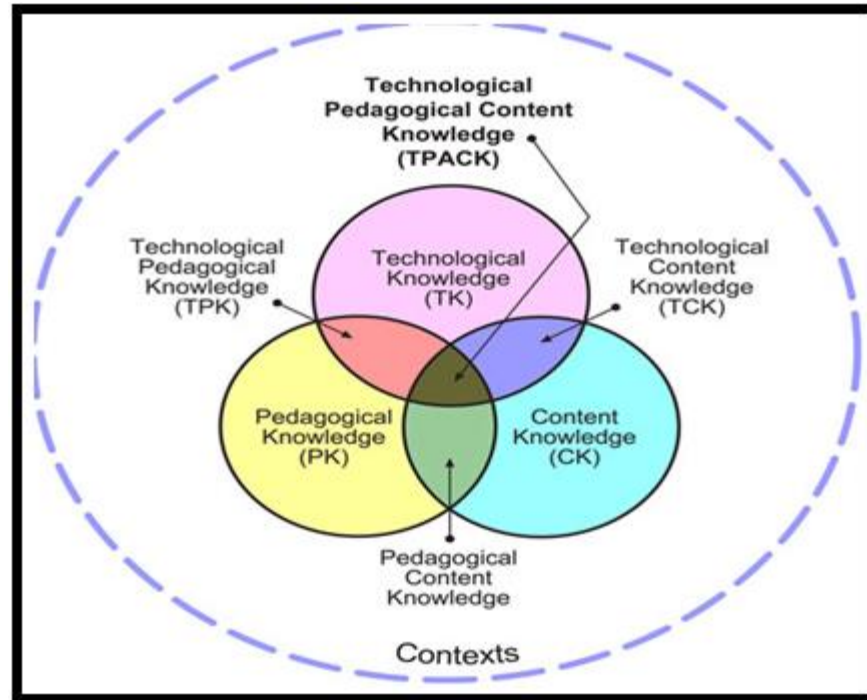


Figure 4.2: The TPACK Framework and its Knowledge Components (<http://tpack.org>, 2012, reproduced by permission of the publisher)

According to Koehler- and Mishra (2005), the TPACK framework was presented as Technological Pedagogical Content Knowledge (TPCK) as an extension from Shulman (1986) work of Content and Pedagogy Knowledge (CPK) during teaching and learning. This framework was then refined in 2006 to become Technological, Pedagogical, and Content Knowledge (TPACK) (Mishra & Koehler, 2006), which is relevant in any environment that integrates technology in curriculum (Khoza, 2017). This theory was developed in order to infuse technology into the teaching (pedagogy) of the curriculum (content), and it advocates that it is not enough to know the pedagogy and the content without reflecting on the impact of technological resources (Moodle) used in the world of digital immigrant versus digital natives (Koehler', Shin, & Mishra, 2012; Mishra- & Koehler', 2006; Prensky, 2001). See Figure 4.2 for all components of TPACK.

In addition to the above, the work of Govender and Khoza (2017) support what Mishra and Koehler (2006) assert on the TPACK framework, indicating that this framework consists of seven components of knowledge namely: 1. Pedagogical Knowledge (PK); 2. Content Knowledge (CK); 3. Technological Knowledge (TK); 4. Pedagogical Content Knowledge (PCK); 5. Technological Content Knowledge (TCK); 6. Technological Pedagogical Knowledge (TPK); and 7. Technological, Pedagogical, And Content Knowledge (TPACK). With reference to Figure 4.2, PK, CK and TK are represented in three circles, whereas the intersection of the three circles represents TPK, TCK, and PCK respectively, and the intersection of all circles forms the gist of the TPACK theory (Lehtinen et al., 2016). Thus, according to the context of this study all these TPACK components of teacher knowledge are referred to as signals since they show the direction during the teaching and learning process (Khoza & Manik, 2015)

Moreover, various studies further unpack these signals as follows: Firstly, TK signals refer to the lecturers' knowledge about technology in education which can be divided as hard-ware, soft-ware and ideological-ware resources, and which are utilised in the implementation/enactment of curriculum (Govender & Khoza, 2017; Koehler' et al., 2012; Koehler & Mishra, 2009; Lehtinen et al., 2016; Margerum-Leys & Marx, 2002; Mishra- & Koehler', 2006; Schmidt, Sahin, Thompson, & Seymour, 2008). This signal is influenced by informal reflection in order to address the needs of the society. For an example, lecturers can use LMS like Moodle to actively engage students in the process of teaching and learning in order to address their needs. This signal requires lectures to know, use, and adapt to the new emerging technological resources like the use of Moodle LMS during teaching and learning. Secondly, the PK signal is about the methods and theories in relation to the process of teaching and learning, which may be drawn from behaviourism, connectivism, constructivism, and others. This signal gives direction to lecturers and it is influenced by personal reflection. For instance, lecturers should have a direction in terms of a lesson plan, class management, teaching and assessment strategies, including goals to be achieved. Thirdly, CK is regarded as the knowledge about the module/subject to be taught and learned. Lecturers should be ground with the module content that addresses the discipline or profession (science, education, and

others) and this signal is informed by the formal reflection based on what studies are saying about the module/subject. In other words, this signal requires lecturers to be experts in their disciplines.

In the fourth signal, which is PCK, it is about the possession of relevant teaching and learning theories that are eligible to unpack the module content. This seeks lecturers to be able to arrange the content in order to suit their teaching strategies with reference to their platforms. This is informed by both personal and formal reflection in order to address the needs of the lecturer and the module (personal and module need). The fifth signal is TCK, which is about the interaction in relation to how technology influences the module content. This signal is influenced by informal and formal reflection in order to interrogate technical resources with the curriculum (module content) in order to address the module needs and societal needs. For instance, lecturers should be able to use Moodle LMS to influence their teaching and learning of the module content with students.

In addition to the above, the sixth signal is the TPK signal which is about having the skill of using technological resource effectively as according to its stipulated theories during the teaching and learning process. For instance, the use of Moodle by lecturers should be according to the constructivism learning theory principles, where students should be provided with a social space (discussion forum) to share and construct knowledge from their own experiences for teaching and learning (Govender & Khoza, 2017; Graham, 2011). This signal is driven by both informal and personal reflection in order to address personal needs and societal needs. Lastly, TPACK framework seeks lecturers to have a clear understanding of technological, pedagogical, and content knowledge in order to unpack the teaching and learning process. It requires lecturers to use technological resources in a manner that is fruitful, effective, and constructive to teach the module content. This framework is advocating for the use of technological resources in engaging students to construct new knowledge from the prior knowledge. In other words, TPACK seeks for lecturer's reflection in all signals in order to improve and have direction during teaching and learning. See Figure 4.3 indicating TPACK signals with reflections.

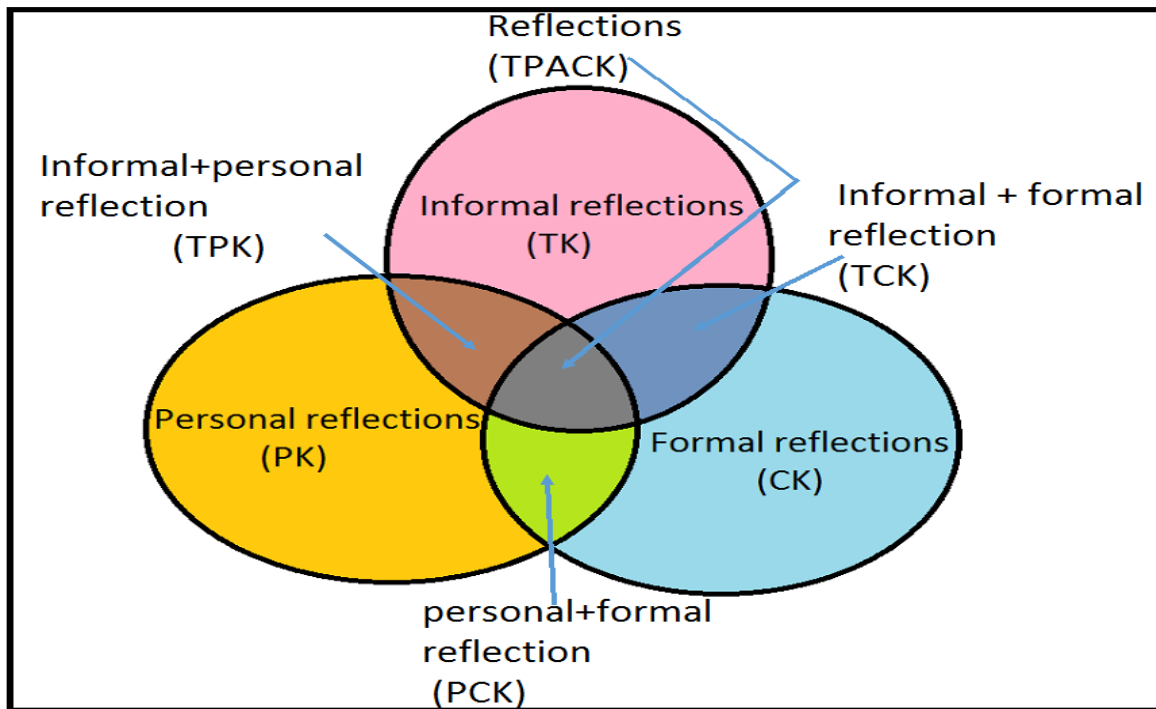


Figure 4.3: TPACK frame work with reflections

4.3 The context of the TPACK application

Refer to Table 4.1 below indicating some of the context from different studies where the application of TPACK is of paramount importance.

Table 4.1: The application of TPACK framework

Authors	Study summery	Conclusion/application
Srisawasdi (2012)	This was a qualitative case study conducted in a Faculty of Education in Thailand, at Khon Kaen University. The main aim of the study was to explore the role of TPACK’s signals in a Physics classroom. Three preservice	The study revealed that TPACK signals assisted teachers to plan, understand and teach their science subject effectively. The study recommended the use of TPACK framework in resolving challenges

	Physics teachers were made participants.	about the preparation and teaching of science modules. This application seems to address the formal reflection (module need)
Messina and Tabone (2012)	The study was conducted in the Department of Education Sciences, in Italy. Survey and questionnaire were used for data generation from in-service science teachers teaching science subjects. The study was aiming to determine the use of TPACK Framework to guide science teachers in the integration of technology into their teaching practices.	The study concluded that the use of TPACK of framework in their training programmes will assist in-services teachers in order to deal with the challenges of lack of technological knowledge, planning of activities, teaching methods and the lack of understanding of the content. TPACK seem to address informal, formal, as well as, personal reflection (societal, module, and personal need)
Lye (2013)	This is the case study of the University of Malaysia campus namely: Penang, Seremban, Pahang, Kuala Lumpur, Sabah, and Sarawak states. The main aim of the study was to explore the challenges faced by lectures on the use of TPACK during teaching and learning. The questionnaire and interviews were used to collect data and the TPACK model was used to frame the study.	The study revealed that all campuses provide lectures with all resources like hard-ware (computers), soft-ware (LMS), and module content. Thus, it was discovered that lecturers were failing to use all resources available. The study therefore recommended the use of TPACK training to be undergone by lecturers in order to possess technological knowledge. Thus, TPACK usage was influencing the use of informal reflection for societal needs

<p>Chai, Ng, Li, Hong, and Koh (2013)</p>	<p>The survey study of 550 lecturers from Asian universities in China, Hong Kong, Singapore and Taiwan, and Australia. The aim of the study was to validate the TPACK model in their teaching of modules. Questionnaires were used for data generation.</p>	<p>The study revealed that there were limitations of the use of TPACK model during teaching and learning of modules. As a result the study concluded that the university should have relevant policy in place guiding the implementation of TPACK's signals. TPACK's application was moving towards the use of formal reflection (module need).</p>
<p>(Niess, van Zee, & Gillow-Wiles, 2014)</p>	<p>This was an interpretive case study done at an Oregon State University. 12 teachers teaching science and mathematics were used to explore their understanding on the use of spreadsheets to teach an online course. Observation and reflective activities were used to generate data. TPACK was used to frame the study.</p>	<p>The study revealed that 10 out of 12 teachers had some difficulties in using the spreadsheets to teach mathematics and science since they had no previous experience. The study therefore recommended the use of TPACK in the teaching in order to master the technology resources (spreadsheet), the content (science and mathematics). This then suggests this application is moving towards informal and formal reflection for societal and module need respectively.</p>
<p>M. Phillips (2014)</p>	<p>This is a case study of ten teachers teaching science and mathematics. The aim of the study was to explore the teacher's reflection on the non-use of</p>	<p>The findings indicated that the non-use of technological resources is caused by putting more focus on formal reflection (addressing the</p>

	digital technology during the teaching and learning process. The study was conducted at Monash University in Australia. TPACK framework was used in conducting the study.	content for assessment) of TPACK rather than being influenced by personal reflection (identity development and informal reflection (process of practice). The study therefore concluded that teachers should bring development and practice in the context of teaching and learning. TPACK's application is taking a direction of informal direction of bringing in skill practices to address societal needs.
Evens, Elen, and Depaepe (2015)	This quantitative study was conducted in Belgium with an aim of investigating the level of intervention studies done using TPACK in different teaching subject. Three databases namely: ERIC, PsycInfo, and Web of Science were used to extract articles framed by TPACK.	The study reveal that out of 122 studies reviewed from different search engines indicates that the majority of intervention studies done using TPACK are from Science and Mathematics subjects. The study therefore concluded that TPACK signals are vital in science field because it equips teachers with balanced knowledge required to address modules. This application is moving to the direction of formal reflection for lecturer to have module content knowledge.
Kafyulilo, Fisser, Pieters, and Voogt (2015)	The mixed method study was conducted in colleges from Department of higher education with an aim to explore the ICT use by teachers teaching science and Mathematics. 22 teachers	The study revealed that teachers were lacking skills of integrating ICT with their subjects. The study concluded that the use of TPACK framework enhance teachers to do micro team-

	<p>participated and data was collected using survey and observation. TPACK was used as a theoretical framework.</p>	<p>teaching, hands-on ICT training, collaborative lesson design and undergoing reflection in order to master technological, and content Mathematics. Thus, both informal and formal reflection are incorporated in this application of TPACK.</p>
<p>Jen, Yeh, Hsu, Wu, and Chen (2016)</p>	<p>This is the mixed-method study where data was collected using survey to collect data quantitatively and one-on-one semi-structured interviews were used to generate data qualitatively. The study was conducted at Science Education Center, National Taiwan Normal University in China. The aim of the study was to measure the levels of science teachers' proficiency level of TPACK during actual teaching and learning process of their science subjects.</p>	<p>The study revealed that most science teachers who were teaching Physics, Chemistry and Biology have high proficiency in pedagogical and content knowledge, but are lacking technological knowledge. As a result teachers, do not meet student needs since they are digital natives. The study therefore recommends science teachers share and have seminars on how technological tools are used to support their science subjects. TPACK is advocating the use of informal reflection (skills for societal needs) to supplement formal reflection(module need)</p>
<p>Lehtinen et al. (2016)</p>	<p>The aim of this study was to explore preservice teachers' TPACK reflection toward Simulations in science classes. This was a quantitative study using single-group pre-test – post-test research design. The study was conducted by the University of Jyvaskyla in Finland.</p>	<p>The study revealed that when technological knowledge is integrated with content knowledge it unpacks the curriculum concepts and this may result in an increased lecturers' attitudes and beliefs in order to teach efficiently using technology (simulation). The study recommended</p>

		teacher- self-development to understand TPACK framework in order to have positive attitudes towards science simulation. TPACK application is moving towards personal reflection (personal teaching methods)
Khoza and Mpungose (2017)	This is a qualitative interpretive case study of six academics from south African universities. Purpose and convenient sampling was used to select six academic teaching science modules. The purpose of the study was to explore the physiological spaces (self, societal, and professional) used by academic in the use of Turnitin to assess students' work from plagiarism. Reflective journal and one-one semi-structured interviews were used to generate data.	The study revealed that the use of Turnitin by academics was driven by self (pedagogy) and societal (technology) physiological space more than a professional (content) space. The study concluded by recommending the alignment of all spaces to drive the use of Turnitin, and this could be achieve by adapting TPACK framework which covers all these spaces (content, pedagogy, and technology). Application addresses all reflections (personal, informal, and formal).
Govender and Khoza (2017)	This is a chapter done under the theme, technology in education for teachers. The aim of the chapter was to equip academics with the awareness of modern technologies in the field of education. This chapter was written by two authors teaching curriculum,	The study revealed that the world is moving away from analogue to digital, and this pressures universities to adopt LMS' such as Moodle. Be that as it may, academics like lecturers teaching science, mathematics, and ICT struggle to use those systems in place. This chapter

	<p>technology, and science modules at a South African university.</p>	<p>therefore recommends useful theories to assist academic, which include TPACK. As result, the chapter outlines that TPACK is useful because it may equip academic with relevant knowledge of what technology can offer and how it can be used to address the module need and the personal need (pedagogy). All reflections (personal, informal, and formal) are taken care of in this TPACK application.</p>

With reference to the above assertions from various stated studies in Table 4.1, on the application of TPACK in various contexts, it is noticeable that TPACK’s main signals (content, pedagogy, and technology) play a major role in the effective teaching and learning of science modules if lecturers reflect on Moodle usage. This assertion suggests that the technology signal is influenced by informal reflection because technology actively involves all stakeholders in teaching and learning in order to address the societal need (Govender & Khoza, 2017; Nkohla, 2017). Moreover, it is also suggested from the application of TPACK that both pedagogy and content signals from TPACK are influenced by personal and formal reflection respectively, since it is vital for academics to have teaching methods or theories before the teaching of the content begins in order to address the module need as well as personal need. Further to this, assertions from Table 4.1 suggest that there should be an alignment of TPACK’s signals, namely Technology, Pedagogy, and Content signal, in order to bring justice in the integration of technology with the teaching of curriculum in higher education (Schubert, 2009; Van den Akker- et al., 2012). As a result, these studies outline that the alignment between these three main TPACK signals come into existence only when academics reflect in, on, and for actions (Amory-, 2015; Boud^ et al., 2013; Lehtinen et al., 2016; Maxwell, 2013; Mishra- & Koehler', 2006; Pedro, 2005; Prensky, 2001). In other words, these studies suggest that the teaching and learning processes of lecturers should be

influenced by formal, informal, and personal reflection in order to address the needs of the module content (module need), lecturers (personal need), and students (societal needs). This alignment is depicted in Figure 4.4 below.

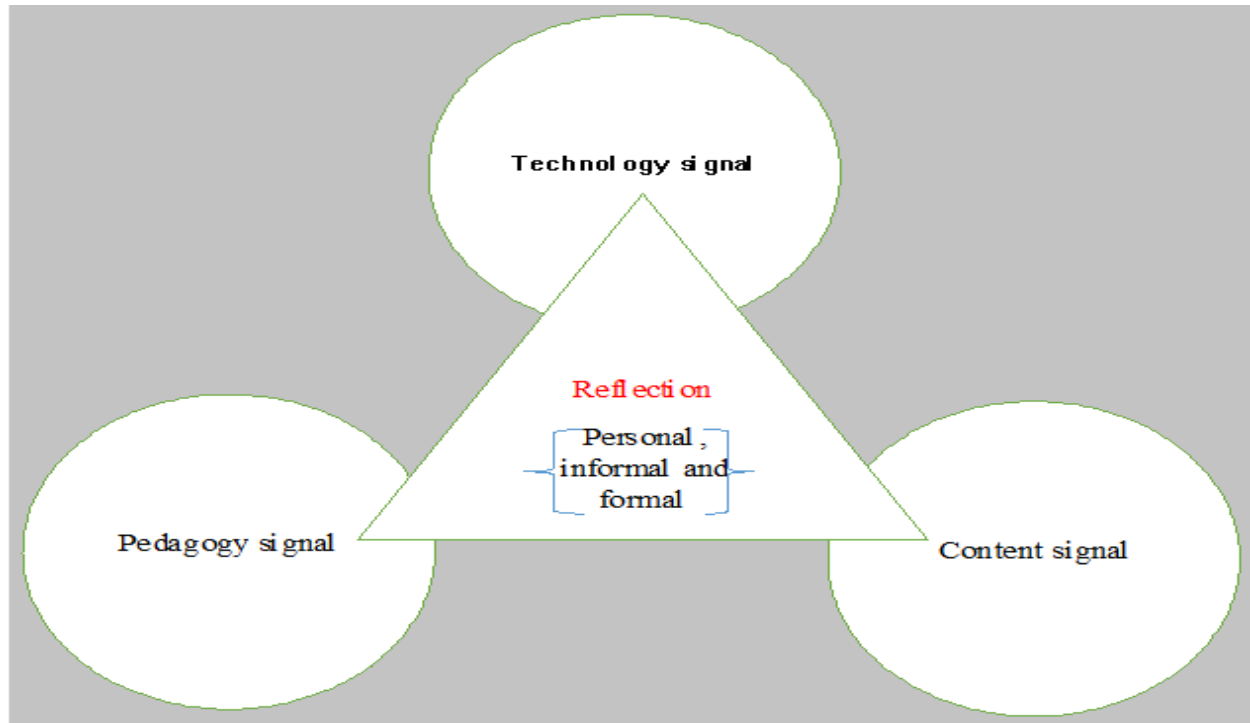


Figure 4.4: The alignment among TPACK signals.

4.4 Limitations of TPACK framework

This section attempts to explore possible limitations from the literature around the discourse of the TPACK framework. Even though the literature is limited in this matter there are a few possible studies that outline possible limitations of TPACK theoretical framework. As a result, a study conducted by Todd and Douglas (2016) asserted certain critiques or limitations on TPACK framework. The aim of the study was to reconceptualise the TPACK framework in order to meet the personal, informal, as well as formal needs. The study articulated the limitation based on three main signals, namely: technology, content, and pedagogy signal. Thus, the limitation of TPACK in the study is taken from the affirmation of technological signals by Koehler and Mishra (2009, p. 64) who outlined that “persons should understand information technology broadly enough to apply it productively at work and in their everyday lives, to recognize when information

technology can assist or impede the achievement of a goal, and to continually adapt to changes in information technology”. However, Todd and Douglas (2016) assert that there is a limitation with this affirmation because it puts more focus on the platforms (where) and time (when) or period at which technology is used, and not on providing the ways and theories (how) of using that particular technology. Even though Graham, Borup, and Smith (2012) further outline that technology signal is about having the knowledge of how to utilise the educational technologies, TPACK does not have detailed and clear stipulated methods of using those technologies for teaching and learning in this digital world. In other words, TPACK framework only puts emphasis on the informal reflections of using technological resources in order to address societal needs during teaching and learning but it does not put forward any ways of how to use those resources to meet the needs of society. For instance, the university can adopt any LMS resources such as Moodle and Blackboard to be utilised by academics or lecturers for teaching and learning of modules but such resources do not stipulates methods of how it should be used by lecturers in order to meet the needs of students.

In addition to the above, Keane, Keane, and Blicblau (2016) critiques on TPACK framework is in line with that of Cox and Graham (2009), asserting that content signal is about the means of unpacking the content of a subject matter. This assertion is in line with what Shulman (1986) outlined, that content signals require lecturers to have knowledge that is made up of discipline specific epistemology such as Mathematics, Science, and others. Moreover, Mishra and Koehler (2006), as well as Koehler and Mishra (2009), assert that content signal is on the basis that a lecturer has a required content of module or a subject before teaching and learning process begins. All these assertions suggest that content signal takes a position of formal reflection in order to address the needs of the subject or the module. Be that as it may, these assertions suggest that it is limited because it only speaks to the module-area content to be considered during teaching and learning. As a result, Todd and Douglas (2016) further assert that this assertion on the content signal excludes the various factors that have impact on the actual content to be taught which may include professional ethics, politics (race), gender, cultural values and others. In other words content signal from TPACK framework is pushing for formal reflection where the focus is only put on the implementation of the curriculum, and forgetting the enactment of the curriculum where

other factors like learners experiences, identity, and others may be included in order to address the content (Govender' & Govender-, 2014; Khoza & Mpungose, 2017)

Furthermore, in TPACK's pedagogy signal "focus is placed more on the teacher and less on student learning" (Todd & Douglas, 2016, p. 10). This limitations is evident when Shulman (1986) asserts that pedagogy signal is regarded as the whole of the teaching process that needs to be mastered by teachers or lecturers. Moreover, this is in line with the description asserted by Koehler and Mishra (2009, p. 64) that the pedagogy signal is described as a "generic form of knowledge that applies to understanding how students learn, general classroom management skills, lesson planning, and student assessment" (p. 64). Further to this Cox and Graham (2009) assert that pedagogy signal is all about a knowledge that a teacher must possess in order to master all teaching activities. This suggests that pedagogy signal is informed by personal reflection which addresses the personal or individual needs of teachers. In other words, pedagogy puts the teacher at the centre and tends to forget other stakeholders needs, like students who are playing the big role during the teaching and learning process. As a result, it must be understood that pedagogy elements must work in partnership with the other elements to inform the teaching and learning process (Todd & Douglas, 2016; Voogt & McKenney, 2017).

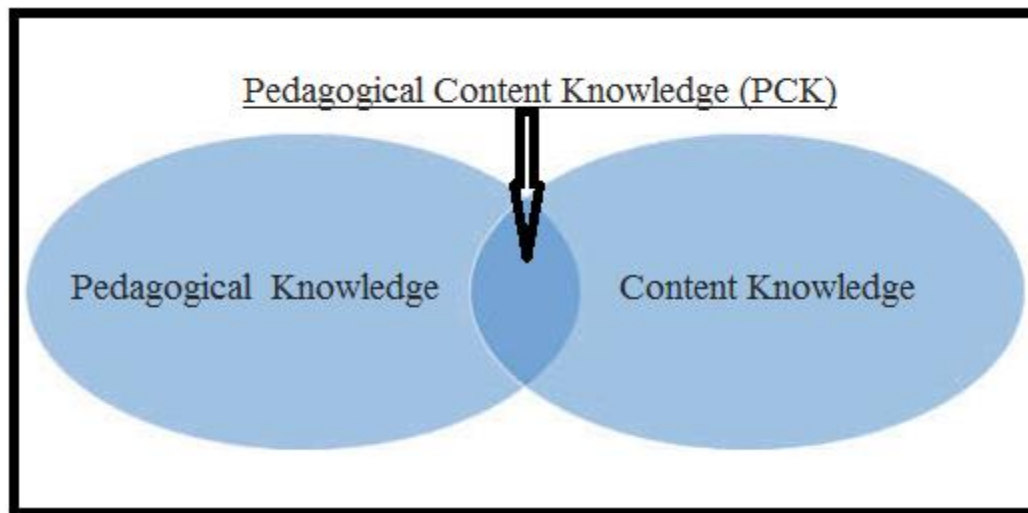


Figure: 4.5 pedagogical content knowledge framework adopted from (Shulman, 1986)

Moreover, the conceptualisation of PCK by Shulman (1986), as depicted in the Figure 4.4, leads to the stance taken by Mishra and Koehler (2006) of revising the framework by adding and asserting the use of technology signals in integrating the content with pedagogy during the teaching and learning process. Technology signals include existing technologies (textbooks, chalk boards, and overhead projectors, pencils and others) and emerging technologies or digital technologies (computers, laptops, tablets, PowerPoint, MS Word and others) (Govender & Khoza, 2017; Koh & Chai, 2014). Moreover, Koehler and Mishra (2009, p. 60) note the limitation of using technology by asserting that the inclusion of technology in pedagogy complicates teaching, and this was termed to be a “wicked problem due to the protean, unstable, and opaque nature of these newer technologies as well as the unique propensities, potentials, affordances, and constraints” that each technology possesses. As a result, “these new technologies can disrupt the status quo, requiring teachers to reconfigure not just their understandings of technology but of all three components (technology, pedagogy, content)” (Mishra- & Koehler', 2006, p. 61). In other words, the misuse and misunderstanding of technical resources like laptops and PowerPoint, may cause havoc and states of confusion during the teaching and learning process, which may result in messing up the content to be taught and the teaching activities. Thus, other academics even indicated their frustration of the use of technology by indicating that, “learning how to teach with digital technologies was much more complex than teaching with traditional technologies” (Brantley-Dias & Ertmer, 2013, p. 107). Moreover, Khoza and Mpungose (2017) further aver that some academics use technological resources to punish students rather than to educate student, such as using Turnitin percentage (below 10%) to deduct students’ marks who have not met the recommended percentage of similarity during assessment instead of teaching students to avoid plagiarism.

Moreover, see the study conducted by Abbitt (2011) at a Miami University. The main purpose of the study was to review literature that the development of the TPACK framework focusing on assessing TPACK in the perspective of teacher preparation programmes. The study revealed some of the limitations of the TPACK framework. The study revealed that the literature reviews indicated that although TPACK requires teachers to have seven different knowledge/signals during the teaching and learning process, it is difficult to differentiate between what they are supposed to know (knowledge) and the ways in which they use technology (skills). Thus, TPACK is not clear

whether it is addressing the skills, knowledge, or both. This confusion has not been addressed by authors of TPACK; they only focus on the knowledge (Mishra & Koehler, 2006). This suggests that lecturers can be influenced by informal reflection and have knowledge of a particular technological resource, only to find out that they have no skill to use those resources. For instance, lecturers may know how to use Moodle and at same time lack the skill of using it, and this may lead to the lack of effective teaching and learning which may result in the failure of the module content by students.

Furthermore, the study conducted by Brantley-Dias and Ertmer (2013) assert that the TPACK framework requires lecturers to possess the content knowledge but it does not require the degree of content knowledge that the lecturer should have. The study further reveals that TPACK does not indicate degree of sufficient knowledge required in a module/subject, and it is not clear what makes up a sufficient knowledge. In other words, formal reflection in addressing the module is not clear as to when one is regarded as having sufficient knowledge of the module content. For instance, a lecturer can have knowledge about chemistry module but this does not guarantee if a lecturer is able to demonstrate a practical on acid-base reaction. Similarly, “the TPACK framework adds a significant level of complexity to the already complex PCK framework by more than doubling the number of framework constructs (from three in PCK to seven in TPACK)” (Graham et al., 2012, p. 4). In other words, having seven signals that still have unanswered questions is termed to be a limitation. Thus, “TPACK takes the concept of technology integration and packages it as a framework that is much too big (i.e., one that embodies seven distinct knowledge types) while simultaneously making it too small by dividing the package into so many pieces that they have become impossible to distinguish from one another (e.g., TK vs. TCK)” (Brantley-Dias & Ertmer, 2013, p. 104). Be that as it may, there are some benefits which play a major role and which act as a driver in using the TPACK framework.

4.5 Benefits of TPACK framework

A survey study conducted by Graham et al. (2012) at Brigham Young University in USA, outlines the benefits of TPACK framework in integrating technology with curriculum; 133 out of 137 student-teachers participated and agreed to design teaching and learning activities using TPACK framework. The study reveals that the use of the TPACK framework to design teaching activities enhanced student-teachers to cover all kinds of knowledge (content, technology, and pedagogy). The study concluded that there are some challenges and complications of addressing learners' misconceptions when technology is not integrated with curriculum. This then suggests that the TPACK framework makes teaching and learning simple because it compels the use of technology (Moodle) which creates the authentic teaching and learning environment through the use of videos, audio and photos (Koehler & Mishra, 2009; Koh & Chai, 2014). In others words, TPACK framework, "emphasises the connections, interactions, affordances, and constrains between and among content, pedagogy, and technology " (Mishra & Koehler, 2006, p. 1025). This indicates that lecturers should use their reflection (personal, formal, and informal) on the use of TPACK as a very useful frame during teaching and learning (integration of technology with curriculum) so that they may improve their professional teaching practices.

In addition to the above, one of the benefits of using TPACK to frame the teaching and learning process was that it helps teachers to know the technology available or in place, and know how to use it for effective teaching and learning so that life will be easier (Govender & Khoza, 2017; Ngubane-Mokiwa & Khoza, 2016). In other words, when teachers reflects formally, personally, or informally on the use of TPACK, it becomes easy for them to notice any available technology resource for teaching (Moodle, laptops, Microsoft Power Point, and others) and use it in order to address the societal needs, module needs, and personal needs (Khoza & Mpungose, 2017; Nkohla, 2017). Thus, TPACK is always used to identify the best resources that support constructivism teaching, and learning process, where students are expected to actively participate in order to develop skills and minimise the misconceptions about the concepts studied (Govender & Khoza, 2017; Harris* & Hofer, 2011). As a result, Kilbane and Milman (2014, p. 51) assert that TPACK "can serve as a tool enabling an analysis of a teacher's knowledge and for planning future professional development he or she requires for optimal use of educational technology" . This

suggests that TPACK is also concerned with addressing the personal needs of lecturers during the teaching and learning process.

Furthermore, note the study conducted by Harris* and Hofer (2011) at the School of Education, College of William & Mary Williamsburg in the USA. The study's main objective was to explore lecturers' reflections on the use of learning activity types towards development of an understanding of TPACK. Both in-service teachers and preservice teachers were sampled as participants in this study. The study revealed the benefits of using TPACK, by participants in all learning activities, lies with cost-effectiveness and understanding of the content. In support of this revelation, Harris', Mishra, and Koehler (2009), as well as Jen et al. (2016), assert that TPACK helps teachers to understand technological resources like Moodle which economically play a major role in minimising costs (it is free of charge). For instance, the reflections (personal, formal, and informal) may assist lecturers to minimise cost by allowing students to submit their assignment as soft copies rather than as printed hardcopies; and also allows students to access study material online so that teaching and learning becomes easier. This suggests that informal reflection on the use of TPACK may assist lecturers to possess technological knowledge. This may include the possession of skills which can save money for both lecturers and students in the world that is affected by economic recession and reform as well as socio-economic issues like poverty (Reeves et al., 2012; Rizvi & Lingard, 2010).

Moreover, studies done on the benefits of using TPACK, further aver that formal reflection drives lecturers to use TPACK to be able to unpack the content (Govender & Khoza, 2017; Harris et al., 2012; Harris* & Hofer, 2011; Koehler' et al., 2012). These studies outline that TPACK enhances lecturers to have relevant content knowledge, use effective teaching strategies, and have an understanding of how to intergrade technology with any available content (curriculum). In other words, if lecturers can have relevant technological, pedagogical, and content knowledge, they are able to create a conducive environment for social interaction among students in order to address the module content through the use of technological resources via the influence of reflection (personal, formal, informal) (Coban Gul, Akpınar, Baran, Sağlam, & Özcan, 2016; Figg & Burson, 2011). For instance, instead of offering lectures in a face-to-face platform, lecturers will be able to

use online platforms for teaching and learning and create discussion forum for social interaction in order to share the module content effectively.

Furthermore, the findings from the study conducted by Gluck, Dillihunt, and Gilmore (2000), as well as Piguillem Poch et al. (2012), are in line with the findings from the study conducted by Olakanmi (2016) on the benefits of using TPACK when teaching science subjects. These findings assert that the personal reflection on the use of TPACK assist lecturers to create and use student-centred approach to learning which is in line with competence curriculum where students have control over the selection and pace of the teaching and learning process (Bernstein, 1999; Biggs', 2011). In other words, TPACK allows lecturers to create an environment where students are able to listen, write, and speak to each other while the lecturers acts as a facilitator in order to provide support where students have difficulties in terms of unpacking the content (Hoadley & Jansen, 2013; Van den Akker- et al., 2012). This then suggests that TPACK assists lecturers to use relevant teaching and learning theories in order to unpack the module content through the influence of reflection (personal, informal, and formal)

Moreover, see the study conducted by Wu and Wang (2015), at the Department of English, National Taichung University of Education in China. The main objective of this study was to evaluate the benefits of using TPACK in teaching foreign languages such as English. Observation and interviews were used to generate data from twenty two out of twenty five in-service English teachers. The study revealed that TPACK allows teachers to enhance students to use technology not for only socialising but for creating opportunities for students to use English language meaningfully and authentically, and this requires teachers have skills and technological knowledge. This suggests that through informal reflection on TPACK, lecturers can address the needs of students by engaging them to use technology effectively, and this may assist lecturers to reflect on whether they have adequate skills to use that particular technology in order to address the needs of students (Parr, Bellis, & Bulfin, 2013; Wang, 2016). In other words, via personal reflection, TPACK may assist lecturers to identify the areas of personal development so that teaching and learning may be effective.

Studies outline that TPACK framework is good because it is not subject or discipline specific but it accommodates everyone from any discipline (Finger, Jamieson-Proctor, & Grimbeek, 2013; Piguillem Poch et al., 2012; Srisawasdi, 2012; Thompson & Mishra, 2007; Wang, 2016). As a result, studies outline that TPACK allows lecturers to use different pedagogical, content, and technology knowledge depending on their reflection (personal, informal, and formal) in order to address different needs (personal, societal and module need). This suggests that the TPACK framework covers and accommodates a wide range of teaching and learning theories (constructivism, connectivism, and others), technological resources (Moodle, Blackboard, and others) as well as different modules offered in higher education.

Similarly, in the context of studies conducted in higher education, both in the UK and USA, it is outlined that students are familiar with technological resources whereas academics are a little bit reluctant on the use of those resources in higher education (Ebert-May et al., 2011; Rienties et al., 2012). Be that as it may, Rienties, Brouwer, and Lygo-Baker (2013) assert that the use of TPACK framework creates a great demand for higher education institutions to provide practical training to lecturers so that they are able to use their reflections (personal, informal, and formal) to master technological, pedagogical, and content knowledge in order to address the personal, module, and societal needs. Thus, training based on TPACK provided by institutions assists academics to align the module content to be in line with technological resources used by the institutions via applying the relevant teaching and learning theories (Lux, Bangert, & Whittier, 2011; Tseng, 2016). This then suggests that TPACK framework encourages lecturers to be influenced by personal, formal, and informal reflection in order to address student, module, and personal needs. Further to this, Koehler et al. (2012) assert that for the lecturer to bring effective teaching and learning, there should be an interplay between technology, pedagogy, and subject or module specific content. For instance, lecturers may use discussion forum (technological resource) to engage students (student-centred approach) on the discussions of properties of matter (chemistry). Moreover, the benefits of using that TPACK framework facilitates the process of unpacking the curriculum signal in all policy documents used for the teaching and learning process (technology, pedagogy, and content signals).

4.6 Contextualising TPACK components using relevant documents.

4.6.1 TPACK's signals: Technology

Table 4.2 TPACK's signals: Technology

TPACK's signals: Technology		
Preposition	Training guide 209	Module outline 2017
Hard-ware resource	Laptops, desktop computer	Desktop computers, laptops and Prescribed textbooks
Soft-ware resources	Chrome, Firefox or Internet Explorer (latest)	Electronic Lecture's notes/sides, tutorial solutions, past exam papers,
Ideological-ware resources	No theory stated	No theory stated

The Science Module Outline (2017) (policy document for science modules offered from level three to four) seeks lecturers reflect on various resources to be utilised in teaching the science modules. Thus, this document entails that lecturers and students should possess hard-ware resources before teaching and learning begins. Those hard-ware resources include desktop computers, laptops connected to the internet including prescribed textbooks such as Giancoli, DC – Physics 6th or 7th editions, Prentice Hall, New Jersey. Moreover, the Science Module Outline (2017) puts more emphasis on soft-ware resources in such a way that it stipulates that all notes are available online in an electronic format for students to download in a format of PowerPoint slides, PDF past examination papers as well as Microsoft Word tutorial solutions. However, the Science Module Outline (2017) does not state any ideology or theory (Ideological-ware resources) that is to be used by lecturers in the use of Moodle during teaching and learning process. Moving further, the University Moodle Training Guide (2017) is similar to the module outline because it does not stipulate any teaching and learning ideology to be used by lecturers when using Moodle. Interestingly, this training guide reveals that for lecturers to have access to Moodle LMS, they need to have internet browsers such as Chrome, Firefox, or Internet Explorer (soft-ware resources), and also have laptops and desktop computers (hard-ware resources) in place before any activity

related to teaching and learning can begin. Thus, both documents covered the assertion on formal reflection (hard-ware for module need), as well as informal reflection (soft-ware for societal need).

However, there are less assertions from the two documents (module outline and Moodle training guide) highlighted in terms of lecturers' personal reflection (ideological-ware resource for personal need) component. Be that as it may, the studies from the literature outline the importance of ideological-ware resources which address the personal needs of lecturers (Behari-Leak, 2017; Berkvens et al., 2014; Borondo et al., 2014; Escobar-Rodriguez & Monge-Lozano, 2012; Fernández et al., 2011; Govender & Khoza, 2017; Khoza & Mpungose, 2017). Studies further reveal that Moodle resources should have both Technology of Education (soft-ware and hard-ware resource) and Technology in Education (ideological-ware resource). These studies further aver that, having only the soft-ware and hard-ware resources is worthless because there will be no direction in the teaching and learning process. In other words, having laptops (hard-ware) and PowerPoint slides (soft-ware) will not help lecturers if they do not know the method or ideology behind its usage, and there will be no effective teaching and learning. Similarly, this suggests that addressing the needs of student (societal needs) via informal reflection, addressing the needs of a module via formal reflection without addressing personal needs (lecturers' needs) via personal reflection will not create balance in the implementation and enactment of the curriculum (Berkvens et al., 2014; Hoadley & Jansen, 2013; Schubert, 2009; Van den Akker- et al., 2012; Van Manen, 1991). In other words, Moodle resource, as a technology of education and technology in education, advocates for the balance among informal, formal, and personal reflection (Amory-, 2015; Khoza & Manik, 2015). That is why Khoza and Mpungose (2017) further assert that lecturers should first reflect on relevant psychological spaces (ideologies or theories) that underpin their teaching before the usage of any technology of education (hard-ware and soft-ware) in place, in order to help students and also address the module need accordingly.

In contrary of the above, most of the assertions from the Science Module Outline (2017) and the University Moodle Training Guide (2017) indicate that lecturers must be driven by formal reflection in order to use Moodle hard-ware resources (computer and laptops) to address the module need; and be driven by informal reflection in order to use Moodle soft-ware resources

(computer and laptops) to address the societal needs (students and others) (Boud[^] et al., 2013; Khoza, 2015d; Pedro, 2005). This suggests that these assertions are moving towards formal reflection and informal reflection to the use of Moodle LMS resource. In support of this move, Shulman (1986), in his work on technology integration with curriculum, having a sufficient content knowledge and general ideology (pedagogy) of a module is not complete if there is no connection between them so that students needs can be addressed. As a result. Mishra- and Koehler' (2006) further assert that the connection between content and ideology/pedagogy can be maintained via the formal and informal reflection on the use of technology which enhances the lecturers to use and have knowledge about different technological tools ranging from traditional technologies (textbooks, chalkboard, and others) to digital technologies (internet, LMS, and others). In other words, reflecting on the approaches that will address the content without knowing the Technology of education or technological knowledge that will help students to understand the content is not sufficient. Similarly, technological knowledge as TPACK's signal seems to move towards the direction of soft-ware (informal reflection) and hard-ware (formal reflection) Moodle resource. This then suggests that technological Knowledge signal from TPACK may be replaced by resource knowledge influenced by reflection in order to fit the context of this study.

Moreover, see the study conducted by Jita (2016) at the university of the Free State in South Africa. The aim of the study was to explore pre-service teacher's reflection on the integration of information and communication technology (ICT) resources with the teaching of science subjects. The study revealed that there are variations in competences on the use of ICT resources. The study therefore recommended that all pre-service teachers should use their informal and formal reflection in order to possess the knowledge of ICT resources. This then suggests that, in this digital age, all academics such as lecturers should reflect and possess the knowledge of resources that are useful in the teaching of all modules in order to address the societal and module need (Khoza & Mpungose, 2017; Khoza*, 2016b). As a result, Jita (2016, p. 48) emphasises that reflection on resources includes, "knowing how to use different digital information and communication technologies for teaching and learning such as internet, video simulation, and other devices related to computers."

4.6.2 TPACK's signals: content

Table 4.3 TPACK's signals: Content

TPACK's signals: content		
preposition	Training guide 2.9	Module outline 2017
Physics	File, folder, label, Page and URL in a form of Word documents, PowerPoint, PDF's, videos and others	<u>Mechanics</u> <ul style="list-style-type: none"> • Elasticity • Forces and Newton's laws, Gravitation • Rotational dynamics – Moments, Equilibrium • Kinematics: Motion in 1-D and 2-D, Relative motion & frames of reference, Circular motion • Energy and energy transfer (including work) • Momentum • Practical work
Chemistry	File, folder, label, Page and URL in a form of Word documents, PowerPoint, PDF's, videos and others	<ul style="list-style-type: none"> • Kinetic theory and state of matter • Chemical energetics chemical kinetics • Chemical equilibrium • Acid and base • Inorganic chemistry • Qualitative analysis of cations and anions • Practical work
Produced content	File, folder, label, web Page and URL in a form of Word documents, PowerPoint, PDF's and videos	<u>Teaching methods in science</u> <ul style="list-style-type: none"> • Teaching and learning strategies • Resources-based learning • Assessment • Addressing misconception in teaching • Reflection on the above during professional teaching practice

The University Moodle Training Guide (2017)' only stipulates that content of a module being uploaded in Moodle LMP should be in a format of file, folder, label, web page, Uniform Resource Locator (URL) for World Wide Web (WWW), PowerPoint, PDF, and video. This training guide

does not stipulate the kind of content in terms of proposition of science module contentment (Chemistry, Physics, and produced content) that needs to be unpacked in each semester. This is not in line with what the literature advocates, that science modules in education should cover Physics (mechanics, heat, light and other radiation, sound, electricity, magnetism, and the structure of atom), chemistry (study of matter- Organic and Inorganic molecules) and teaching methods (pedagogy) ((Antunes et al., 2012; Comunian & Gilmore, 2016; Fry' et al., 2008; Govender' & Govender-, 2014). This suggests that the module knowledge should be informed by informal reflection which influences the teaching of chemistry, formal reflection which influences the teaching Physics, and personal reflection which influences the teaching methods in order to address the needs of students, lecturers, and of the science modules. Therefore, it is not clear from the training guide as to what science content needs to be uploaded or covered in Moodle LMS, and this may provide space for lecturers to upload any content they prefer which at times does not address any module needs during teaching and learning. As a result, it is quite essential for lecturers to always use reflection on the content that is taught in their science modules (Dimiyati & Budiastira, 2016; Goodstein, 2014; Khoza & Mpungose, 2017).

However, the Science Module Outline (2017) addresses and reflect on all science module content. Thus, the module outline stipulates that the science module should cover Physics, chemistry, and teaching methods. Moreover, it is indicated from the module outlines that the following content should be covered under the Physics section, namely: Elasticity Forces and Newton's laws; Gravitation; Rotational dynamics – Moments, Equilibrium; Kinematics: Motion in 1-D and 2-D; Relative motion & frames of reference, Circular motion; Energy and energy transfer (including work); Momentum; and Practical work. According to Giancoli (2005), Coelho (2012), as well as Cavus (2013), these Physics components require lecturers' formal reflection in order to address the module needs so that student are able to cite and apply laws in solving any problem from this section. On the contrary, the module outline also covers the informal part of the science module, and it is indicated that the science module should have chemistry which is influenced by lecturers' informal reflection in order to address the needs of students (Fry' et al., 2008; Govender' & Govender-, 2014; Mpungose-, 2016a; Sidharth, 2002). Thus, the module outline asserts that the chemistry part should consist of the following components, namely: Kinetic theory and state of

matter; Chemical energetics chemical kinetics; Chemical equilibrium; Acid and base; Inorganic chemistry; Qualitative analysis of cations and anions; and Practical work. In most cases, chemistry requires students to be hands-on in all components in order to socially construct their own understanding such as when doing reactions of molecules (Govender' & Govender-, 2014; Mpungose-, 2016a). As a result, this requires lecturers to be driven by informal reflection in order to address the student needs (societal needs) during teaching and learning of any science modules. Moreover, the Science Module Outline (2017) also provides the content that covers the teaching methods of Physics and chemistry namely: Teaching and learning strategies; Resources-based learning; Assessment methods; Addressing misconception in teaching; and Reflection on the professional teaching practice. This suggests lecturers teach students what they practice, which implies that lecturers use the very same teaching methods to cover their personal needs through personal reflection on the teaching of the module Physics and chemistry (Fry' et al., 2008; Hewitt, 2002; Kondepudi, 2008; Muthoosamy et al., 2012). In other words, teaching the Physics and chemistry module revolves around the teaching methods stipulated from the module outline, and this implies that lectures needs are catered for since they know which methods to use when teaching science modules.

In addition to the above, the quantitative survey study conducted by Akman and Güven (2015) at Necmettin Erbakan University in Turkey reflect on the importance of content knowledge. The aim of the study was to explore the scale of Social Sciences Teachers in understanding TPACK signals. The study revealed that there was a high scale of understanding of TPACK signal like content and pedagogy knowledge by Sciences Science, Mathematics and Computer Science teachers but most of them were lacking understanding in Technology because of their age and lack of support from their institutions. This concurs with the findings from the study conducted by Lin, Tsai, Chai, and Lee (2013) in Taiwan University on science teachers' reflection of TPACK. The findings indicate that both female and male teachers reflect a very high confidence on teaching of their modules content, and this relates very well to all components of TPACK. In other words, studies advocate for module/subject content as TPACK's most vital signal. Thus, it is taken as a background signal than others, and this indicates that a module without any stipulated content does not worth to be taught. In other words, any science module is made up of content such as Physics, chemistry, and

teaching methods. This then indicates the move of content knowledge in TPACK framework to become a Module signal that is informed by formal reflection in order to fit the context of this study.

In addition to the above, the findings from the study conducted by Chatterji (2016) is in line with the study conducted by Sherman and MacDonald (2007) at the University of Calgary in Canada. The main aim of the study was to understand teachers’ reflection on the module offered in a two-year degree Bachelor of Education programme. Science teachers participated, and surveys, as well as interviews, were used to generate data. The study revealed that science teachers were doing the module with little or no science knowledge. The study recommended that the module should be linked with science content in order to address the needs of a module and the science teachers. The studies suggest that the main building block of a module is the specific content addressing the module needs. Moreover, it is a clear hint that there is a move of content knowledge to a module signal in order to fit the context of this study. In other words, module signal may be taken as an umbrella signal just like any other signal like pedagogy, technology, and others. As a result, Jita (2016) further asserts that “a teacher needs to have a comprehensive base of content knowledge to be considered competent in their subject” in order to address all needs in their modules via personal, informal, and formal reflection. This then indicates that having the pedagogy and technological resources is fruitless if lecturers do not have module signal which may show the way during teaching and learning of the module.

4.6.3 TPACK’s signals: pedagogy

Table 4.4 TPACK’s signals: pedagogy

TPACK’s signals: pedagogy		
1. Assessment	Training guide	Module outline
Assessment of learning	Assignment, Quiz,	<ul style="list-style-type: none"> • Test • Assignment

		<ul style="list-style-type: none"> • Examination
Assessment as learning	Chat, workshop	<ul style="list-style-type: none"> • Practical work • presentation
Assessment for learning	Survey, Questionnaire	<ul style="list-style-type: none"> • Tutorial task
2. Justice	Training guide	Module outline
Aims	Move away from providing paper based notes to students, to providing notes and lecture materials in an electronic form.	<ul style="list-style-type: none"> • Provides with opportunities to develop values and attitudes
Objectives	Lecturers will upload all notes and learning material on the Moodle system	<ul style="list-style-type: none"> • Covers knowledge of concepts in physics and chemistry
Learning outcomes	all students will acquire the necessary skills and be able to use all forms of electronic media confidently as graduates	<ul style="list-style-type: none"> • Student are provided with opportunities to develop skills
3. Activities	Training guide	Module outline
Informal activities (problem-centred)	Chat activity	<ul style="list-style-type: none"> • Consultation forum • News forum • Emails for announcement
Formal activities (content-centred)	Assignment activity Quiz activity	<ul style="list-style-type: none"> • Revision
Personal activities (teacher/lecturer-centred).	Questionnaire activity Survey activity	<ul style="list-style-type: none"> • Attendance register
4. Platform and Time	Training guide	Module outline
Informal platform (online environment)	Online	<ul style="list-style-type: none"> • Online Moodle platform (any time)

Formal platform (face-to-face environment)	None / not stated	<ul style="list-style-type: none"> • Lecture hall, (contact time) • Offices (consultation times) • Laboratory (time table)
Personal platform (blended environment)	None / not stated	<ul style="list-style-type: none"> • None / not stated
5. Lecturers' character	Training guide	Module outline
Instructors (lecturer-centred approach)	Character as Teacher or non-editing teacher	<ul style="list-style-type: none"> • Traditional approach
Facilitators (student-centred approach)	Character as student	<ul style="list-style-type: none"> • Learner-centred approach • Social constructivism
Assessors (content-centered approach)	None / not stated	<ul style="list-style-type: none"> • A minimum of 40% course mark. • Test (25%) • Assignments/Projects (25%) • Examination (50%)
6. Granting permission	Training guide	Module outline
Physical permission	Login details	<ul style="list-style-type: none"> • Not stated
Financial permission	Registered students, staff with login details	<ul style="list-style-type: none"> • Registered student who can receive emails from lecturers
Cultural permission	Not stated	<ul style="list-style-type: none"> • Not stated

According to the literature pedagogy is about lecturers having the necessary teaching and learning methods, technique, or theories, in order to address the different needs to address the curriculum (Berkvens et al., 2014; Koehler' et al., 2012; Shulman, 1986; Van den Akker- et al., 2012; Voogt & McKenney, 2017). The literature further asserts that pedagogy is all about following certain procedures which may lead to addressing the module needs, societal needs, and lecturers' needs to possess various teaching methods that is relevant enough to teach the module using technological resources. This then suggests that pedagogy signals are highly influenced by personal reflection where lecturers should be well-equipped with theories to meet the needs of the

society and of the module. Moreover, both Berkvens et al. (2014), and Biggs' (2011), concur with Mishra- and Koehler' (2006), when asserting that pedagogy consists of various curriculum procedures which includes assessment, justice, activities, platform and time, lecturers' role, and granting permission.

4.6.3.1 Contextualising assessment

In addition to the above, studies on assessment aver that assessment are categorised into three main levels namely: assessment for learning (formative assessment), assessment of learning (summative assessment), as well as assessment as learning (peer assessment); which are influenced by personal, formal, and informal reflection respectively (Bitzer & Botha, 2011; Black & Wiliam, 2009; Bloom', 1956; Purvis et al., 2011; Shepard & Sheppard, 2000; Wiliam, 2011; Yorke, 2003). Further to this, according to the Science Module Outline (2017), assessments of learning that are to be conducted by lecturers are clearly stated which includes test, assignments, and examination. This suggests that formal reflection may be very influential when lecturers are administering assessment of learning in order to address the module need (pass or fail the module). This outline further stipulated means of conducting assessment as learning through the process of implementing practical work including presentations where students are tasked and grouped to do presentations based on a given assessment task. In other words, informal reflection informs lectures to address the societal needs of students through engaging them in social discussion such as practical work and presentation. The Science Module Outline (2017) puts tutorial task in place where students are given problems to solve with an aim of checking their understanding on the content studied. As a result, lecturers intervene by providing relevant solutions. This then suggests that lecturers seek to be guided by personal reflection in order to check if they do work or teach towards stipulated goals of the module (Khoza & Mpungose, 2017).

Similarly, the University Moodle Training Guide (2017) asserts that all assessment strategies under each form/level of assessment. Moreover, this guide informs lecturers how to use chat and workshop activity for discussion forums with an aim of assessing each other's' work. When it comes to assessment for learning, lecturers are guided to use activities like survey and questionnaire (University Moodle Training Guide, 2017). In other words, both survey and

questionnaire help lecturers to check the progress that they make during teaching and learning of the module so that they may change and improve their teaching and learning methods if there is no progress, and this seeks lecturers to personally reflect so that they are able to identify their own areas of development.

Furthermore, both the University Moodle Training Guide (2017) and the Science Module Outline (2017) do provide means and ways of informal, formal, as well as personal reflection. Thus, the Science Module Outline (2017) ensures that each assessment form plays a major role towards the final percentage of the module. Note that, lecturers give tutorials (assessment for learning) to students so that they will prepare themselves for tests and examinations (assessment of learning), and students are also given presentations and practical work (assessment as learning) which contributes a certain mark to the final mark of the module (Science Module Outline, 2017). For instance course work (presentation and practical) may weigh 50% and examination mark also weighs 50%. On the contrary, the University Moodle Training Guide (2017) does not provide the weighing and contribution towards the final assessment mark but, it only provides Moodle functions or activities of performing assessment for learning (survey), assessment of learning (quiz), and assessment as learning (workshop). This then suggests that the two documents do address the needs of a module, lecturer, and student via the influence of personal, formal, and informal reflection.

In support of the above assertion from two documents, the literature reveals that assessment is asserted as the most influential procedure that plays a major role in mastering TPACK signals (pedagogy), and assessment guides the teaching and learning of a particular module or subject (Knight, 2002; Koehler' et al., 2012; Rush, 2012; Spiller, 2013; Spiller & Ferguson, 2011; Wiliam, 2011; Yorke, 2003). In other words, lecturers assess the module content that is taught in class (Biggs', 2011). The literature further asserts that assessment is the key driver of change in higher education, especially influencing learning behaviour or procedures in the teaching and learning of the module. This suggests that assessment is influenced by lecturers' reflection in addressing all needs (personal, module, and societal).

4.6.3.2 Contextualising Justice

According to the Science Module Outline (2017), there is clear justice (goals) maintained in terms of aims, objectives, and learning outcomes during the teaching and learning of science modules since this document stipulates that lecturers are aiming at providing opportunities to develop values and attitudes (aims), cover knowledge of concepts in Physics and chemistry (objectives), and to provide students with opportunities to develop skills (learning outcomes). This suggests that if aims, objectives, and learning outcomes are maintained there is justice in the teaching of science modules because personal needs, societal needs, and module needs are addressed (Ayers, 2011; Hyland, Kennedy, & Ryan, 2006). In other words, this seeks lecturers to be driven by personal, formal, and informal reflection to provide justice in the teaching of a module. As a result, justice procedures stipulated in the module outline forms part of the pedagogy signal of TPACK framework, and this may lead to the successful alignment among pedagogy (justice procedure), content, and technology signals (Govender & Khoza, 2017; Mishra- & Koehler', 2006). This module outline is also used concurrently with the Moodle training guide.

In addition to the above, the University Moodle Training Guide (2017) outlines aims, objectives, and learning outcomes of using Moodle to teach science subjects. For instance, this guide asserts that lecturers should move away from providing paper-based notes to providing notes and lecture materials in an electronic form (aims); lecturers will upload all notes and learning material on the Moodle system (objectives, and all students will acquire the necessary skills and be able to use all forms of electronic media confidently (learning outcomes). The suggests that this guide ensures justice in the teaching and learning science modules since all societal needs (learning outcomes), personal needs (aims), as well as module needs (objectives) are articulated. In other words, the use of this guide seek lecturers' personal, formal, and informal reflection to unfold. This seeks lecturers to have the drive of using the guide for the success of teaching and learning in higher education (Pedro, 2005; Rodgers, 2002; Sator & Bullock, 2017). This suggests that, justice as procedure addresses the pedagogy (TPACK) in teaching and learning of science modules.

In support of the two above-discussed documents, the literature avers that justice in any curriculum is brought into place if aims, objective, and learning outcomes are clearly set (Ayers, 2011;

Berkvens et al., 2014; Bloom', 1956; Hyland, Kennedy, & Ryan, 2006; Le Grange* & Reddy, 2017; Schubert, 2009). These studies recognise that the successful implementation or enactment of curriculum is driven by goals which bring justice into the teaching and learning process in order to meet the needs of the module, society (students), and lecturers. This suggests that both policy documents and lecturers should put across aims, objectives, and learning outcomes, and this can be attained provided that lecturers are driven by personal, formal, and informal reflection to meet the needs of modules, students, as well as of lecturers (Khoza & Manik, 2015; Khoza & Mpungose, 2017).

Furthermore, see the recent study conducted by Sadler (2016) at a School of Education in the university of Queensland, in Australia. The main purpose was to explore student throughput as compared to their inputs at a university. The study revealed that students outcomes (graduation) is aligned with higher order capabilities of students so that there will be competent graduates; this could be achieve if there are clear goals (aims, objectives, and learning outcomes) set and in place to be achieved. In support of this Biggs' (2011) asserts that high quality of teaching and learning can be achieved if there is alignment of goals and assessment tasks given. This (pedagogy) is attained provided curriculum goals are set and are balanced in term of addressing the needs (personal, societal, and module), and this requires lecturers to undertake reflections (personal, informal, and formal). As a result, any teaching and learning programme aiming to maintain higher order capabilities in terms of content assessment and other curriculum concepts should possess aims, objectives, and learning outcomes (Harvey et al., 2017; Reddy & le Grange, 2017).

4.6.3.3 Contextualising activities

According to the literature on curriculum teaching and learning activities, teaching activities are problem-centred (informal activities), content-centred (formal activities), and teacher/lecturer-centred (personal activities) (Ayers, 2011; Khoza, 2015; Le Grange* & Reddy, 2017; Marsh, 2009; Reddy & le Grange, 2017; Van den Akker- et al., 2012). The literature further avers that problem-centred activities seek lecturers to give activities to student so that they create a platform for discussion and sharing ideas towards finding the solutions; content-centred are the activities given to students with the aim of unpacking specific content through questions such as assignments; and

lecturer-centred activities are done to meet the needs of the lecturers or teachers, and these activities acts as performance indicators during the process of teaching and learning.

In support of the above literature, see the University Moodle Training Guide (2017) as the documents guiding the use of Moodle during teaching and learning. It stipulates that chat activity is provided for lecturers to give students problem-based activities to be discussed by students using their own social experience. This activity is taken as informal activity since it is not done for grading purposes but for sharing ideas and opinions among students. Further to this, this training guide assert that one of the ways of administering content-centred activities is to use assignments or quiz activities, and this allows both student and lecturers to unpack the module content. Moreover, the training guide provides activities that assist and enhance lecturers to improve and develop their teaching practices, such as questionnaire activities. The assertions from this training guide suggest that all kinds of activities (informal, formal, and personal), as asserted in the literature, are catered for. For instance, a lecturer can meet the social needs of students by allowing them to share ideas on the given problems, such as opening the discussion on the principles of motion. In other words, the training document seeks to enhance lecturers to undergo personal reflection, formal reflection, and informal reflection, so that they are able to use personal, formal, and informal activities in order to address the personal, formal, and informal needs during the teaching and learning process.

In line to the above assertion, the Science Module Outline (2017) also provide means to ensure informal, formal, and personal activities respectively. The outline provides consultation time or forums for discussing any social problems that impact the performance of each student, allows lecturers to use news forum and send emails to students for any social communication pertaining to a module. Furthermore, this outline stipulates chances of providing students with revision activities to unpack the content of the module studied (formal activity), and it is stipulated that lecturers should use attendance register to ensure that student do attend lectures which in turn helps students for their duly performance (DP). (Harvey et al., 2017; Voogt & McKenney, 2017). Both documents outline that teaching activities is one of the most vital procedure and pedagogy in TPACK that must be taken into consideration during the teaching and learning process. As a result,

informal, personal, and formal procedure play a pedagogical role in the TPACK framework (Anderson, 2016; Apple, 2004; Koehler' et al., 2012).

4.6.3.4 Contextualising platform and time schedules

Procedures and both policy documents outlines different aspects when it comes to In terms of platform and time schedules. Note that the Science Module Outline (2017) asserts that lectures should take place at an online Moodle platform at any time, and it also stipulates workable contact times for lecturers to be attended in lecturer halls and consultations times where students may be given time for consultation. This document also outlines the time schedules for attending practical work in different laboratory depending on the level of study. Surprisingly, the Science Module Outline (2017) is silent when it comes to blended learning where lectures can attended face-to-face while online lectures goes on concurrently. On the contrary, the University Moodle Training Guide (2017) recommend online learning platform through which lectures can be offered, and it is silent when it comes to face-to-face environment as well as the blended learning platform.

Furthermore, according to the literature, teaching activities of the curriculum may be informal activities based on problem-centred task, formal activities based on content-centred task, and personal activities based on lecturer-centred task (Anderson, 2016; Apple, 2004; Berkvens et al., 2014; Bernstein, 1999; Hoadley & Jansen, 2013; Jackson, 2017; Khoza & Mpungose, 2017). The literature further outlines that informal activities are influenced by lecturers' informal reflections where student will be provided with a space or a platform for social interaction, and in most cases this platform turns out to be online. For instance, a lecturer may decide to offer an online lecture based on the chemical change theme of chemistry, and this allows students to connect to the internet in order to have access to the lecture provided they remain connected to internet. Thus, both the guide and outline document support the online environment. This suggests that the both documents are commonly influenced by lecturers' informal reflection in order to cater to the needs of the society.

Moreover, Dreyer- (2015) assertion on formal activities is in line with Bitzer and Botha (2011) in that, formal activities are influenced by formal reflection in order to meet the module need. This suggests that formal platform provides a face-to-face platform in order to unpack the module content where lecturers should be influenced by formal reflection. Based on the above assertion from the outline document and training guide, it is indicated that only the module outline assert the formal activities whereas the guide is silent when it comes to formal activities. For instance, the outline encourages lecturers to prepare slides to unpack the content and be presented in a lecture hall while students are present. Further this, various studies aver that personal activities addresses the needs of the lecturers through the process of produced or personal reflection, and this is addressed through a blended learning platform to meet the personal needs of both students and lecturers (Khoza & Manik, 2015; Lee Grange-, 2016; Reddy & le Grange, 2017). In other words, personal platform accommodates every personal need by making sure that lecturers offer their lectures in their own comfortable platform, and this in turn applies to students for attendance. Moreover, the documents (outline and guide) are silent on this platform. Be that as it may, both Jackson (2017), and Mishra- and Koehler' (2006), assert that learning platforms and time schedule procedures play a significant role in pedagogy signal of TPACK framework. In other words, platform and time procedure are some of the components of pedagogy signal in teaching any science modules, which seek lecturers' reflections to prevail especially This helps lecturers to reflect on other components of pedagogy signal like the character of lecturers.

4.6.3.5 Contextualising character

Moreover, the character of lecturers has an impact on the success or failure of the teaching and learning of the module offered (Msibi & Mchunu, 2013; Myers, 2016). As a result, according to Mpungose (2017) the character of a teacher or lecturer depends on the pedagogy or teaching theories adopted by lecturers. Further to this, the literature assert that when lecturers are driven by lecturer-centred approach (traditional teaching approach), they are termed to be instructors and are influenced by personal reflection (Bernstein, 1999; Ramrathan, 2017; Ramsden, 2003; Roberts & Bybee, 2014; Schubert, 2009; Van den Akker- et al., 2012). In other words, lecturers are the ones who have control over the teaching and learning pace as well as the selection of activities in order to meet their needs during the teaching and learning process (Khoza & Mpungose, 2017). Further

to this, the literature asserts that lecturers become facilitators if they are influenced by informal reflection in such a way that they are driven by student-centred approaches. This suggests that this character of lecturers is moving towards the direction of meeting the needs of students (societal needs). Thus, students are given a chance to discuss and share their personal experiences in order to construct their own understanding of the module content (Bitzer & Botha, 2011; Dhunpath et al., 2016; Freire, 2000). Moreover, according to various studies, lecturers chose the character of being the assessors if they are driven by content-centred approach during the teaching and learning process (Berkvens et al., 2014; Jansen, 2013; Khoza*, 2016b; Le Grange* & Reddy, 2017). Black and Wiliam (2009), and Kehdinga (2014), further aver that assessors only teach learners the content that will be assessed, and they are teaching in order to assess. This suggests that assessors are influenced by formal reflection since their character in teaching is guided by the content stipulated in the planned curriculum (Le Grange* & Reddy, 2017; Maharajh et al., 2013). The above assertion on lecturers' character indicates that all policy documents used should have a certain procedures stipulated in it so that lecturers will know their character or role they are supposed to play when teaching modules.

Interestingly, Science Module Outline (2017) articulates on all lecturers' characters when teaching the science module. Thus, this outline indicates that lecturers should use lecturing method (traditional method) during the teaching and learning process of science modules. This suggests that lecturers act as instructors in this case, and become controllers of all teaching and learning activities. This method is administered mostly in classes that have large numbers of students where time is always a concern and it allows teachers to be experts who deposit knowledge and skills to students (Bernstein, 1999; Freire, 2000). In other words, lecturers are teaching the science module in order to meet their aims and to address their personal needs such that students are not actively engaged in the teaching and learning process. Further to this, Science Module Outline (2017) outlines that teaching of science modules should be learner-centred and social constructivism theory should be used by lecturers. In other words, lecturers are termed to be facilitators because they are bound to provide space for social interaction among students so that students can actively participate during the teaching and learning process (Ayers, 2011; Comunian & Gilmore, 2016). This suggests that this character seeks lecturers to be driven by informal reflections in order to

meet the needs of students. Thus, lecturers are bound to use student-centred approach so that students can easily construct their own understanding of the module content in place (Hoadley & Jansen, 2013; Moon-, 2002). Moreover, Science Module Outline (2017) indicates the weighing of all activities done for each module. For instance, it is outlined that the minimum of 40% course mark (duly performance) is required. Thus, 25% of all tests written is required, as well as 25% of written assignments and projects is required, including the 50% of examination. In this case, lecturers are termed to be assessors in order to address the module content needs in terms of assignment, coursework, examination, and others. This seeks lecturers to be influenced by formal reflection in order to meet the module objectives by using the content-approach during the teaching and learning process.

In addition to the above, the University Moodle Training Guide (2017) outlines that the character of lecturers in Moodle platform can be a teacher who can either edit or not edit the Moodle functions. Thus, editing teacher controls the use of Moodle functions as compared to non-editing teacher who have access to few Moodle functions. This suggests the character of using Moodle, in this case, is lecturer-centred because it is up to the lecturer to see the need of editing Moodle functions like sending messages to students or uploading slides for the content. Thus, lecturers are termed be instructors and they are bound to be driven by personal reflection in order to address their personal needs during the use of Moodle in teaching science modules. Surprisingly, the guide is silent when it comes to lecturers as facilitators (student-centred-approach), as well as assessors (content-centred approach). This suggests that the guide does not entail informal reflection and formal reflection which address the student needs and module need respectively. Be that as it may, the lecturers' character procedures seem to be the one of the science curriculum procedures which makes contribution towards unpacking of pedagogy signal in TPACK framework. As a result, lecturers' understanding of their characters goes hand-in-hand with having the understanding ways of getting permission to the teaching of science modules.

4.6.3.6 Contextualising permission

According to various studies, the access or permission to the teaching of science modules can be granted in terms of physical permission, financial permission as well as cultural permission

(Dreyer-, 2015; Fullan, 2007; Meierdirk, 2016; Pinar, 2012; Voogt & McKenney, 2017). These studies further aver that physical permission is influenced by formal reflection where there are stipulated and written steps to be followed in order to have access to the teaching and learning of science modules. Further to this, studies assert that financial permissions seek all lecturers have the funds to cover the cost of having access to the teaching and learning of science modules. As a result, lecturers are termed to be influenced by informal reflections which provide space so socialise with all stakeholders in the teaching of science module. This suggests that financial permission addresses the needs of the society. Moreover, studies assert that cultural permission is about bringing personal and cultural experience together in order to access teaching and learning, and this includes addressing the issues of race, colour, language and others in teaching and learning of modules. All assertions on the permission in teaching and learning of modules seek policy documents to address the means and ways of getting permission in order to teach science modules.

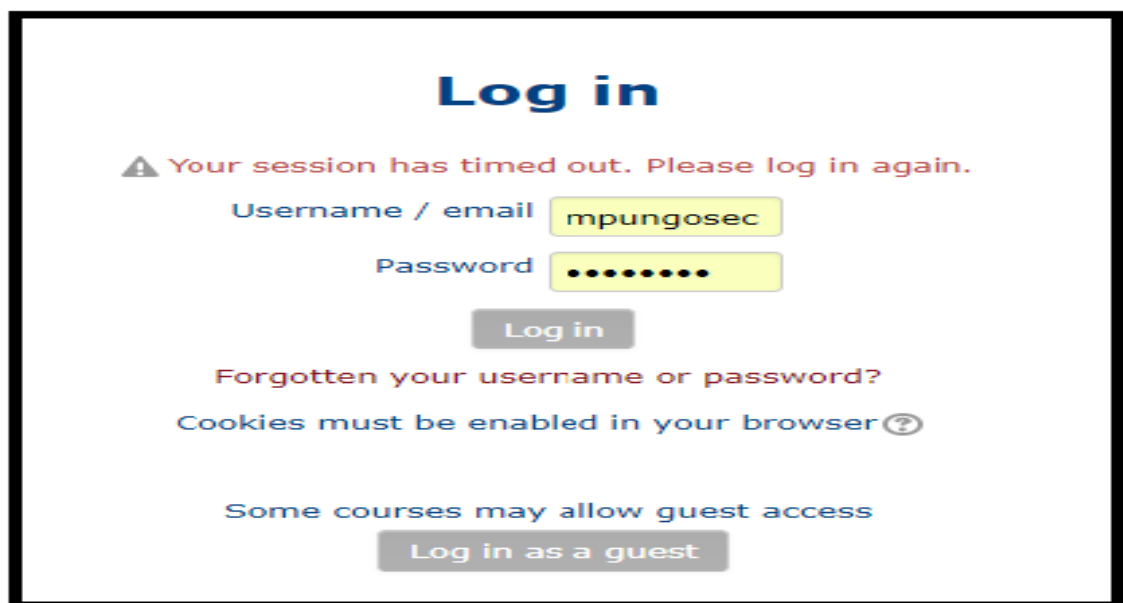


Figure 4.6: Physical permission into Moodle with login details

Note that the University Moodle Training Guide (2017) asserts that lecturers should be able to provide login details in order to have access or permission into Moodle platform for teaching and learning of science modules. For instance, refer to Figure 4.5 which seeks login details for a lecturer to be able to access the Moodle platform, and a lecturer is expected to use their formal

reflection in order to follow a step-by-step procedure of entering username and a password in order to address the needs of the science module after access is granted by a system. The training guide further articulate on the financial permission that only registered lecturers can have a full access to Moodle platform. Note that, even though the access can be granted to login in as a guest user as depicted in Figure 4.5 but the guest users are not given full access or permission to all function like editing Moodle resources or activities. This suggests that permanent university staff can have permission to Moodle platform, and contract staff can have access to Moodle provided they are registered with the university. Surprisingly, the training guide is silent when it comes to the procedure pertaining to the cultural permission. In other words, the guide is not clear as to who should access Moodle platform in terms of socio-economic background, race, etc. This implies that the guide is not taking into consideration the personal needs of Moodle users, like lecturers. On the contrary, Science Module Outline (2017), only speaks to the financial permission and it is silent when it comes to physical as well as cultural permission. Thus, this documents asserts that only registered students can receive emails from lecturers. This requires lecturers' informal reflection to prevail so that lecturers can send emails or messages only to those student that are registered (financial cleared) in order to address their needs (societal needs). Note that, the assertions on permission to the teaching of science modules lays procedures of how one can access the teaching and learning science modules. This this is one of the most vital pedagogy which addresses TPACK framework.

In conclusion, of all the assertions of pedagogical signals of TPACK (assessment, justice, activities, platform and time, lecturers' role, granting permission) framework, almost all of these signals seem to address all needs (societal, personal, and module need). Thus, all kinds of reflection (personal, informal, and formal) seem to play a huge role for the success of this pedagogy signal of the TPACK framework. Interestingly, most of these procedures (assessment, justice, activities, platform and time, lecturers' role, granting permission) take the direction of addressing the pedagogical personal needs of lecturers. This suggests that for teaching and learning process to take place, each lecturer needs to address these procedures which have an impact towards the teaching and learning of science modules (Beatty & Feldman, 2012; Koehler' et al., 2012). In other words, the pedagogy signals of TPACK are mostly influenced by personal reflections which

address the needs of lecturers by articulating on these procedures. Note that pedagogy signals of the TPACK framework seem to take a move to be called procedures signal in order to fit the context of this study.

Remember that the above discussion was unpacking the three main TPACK's signals (technology, content, and pedagogy) using two policy documents namely: Moodle training guide of the university and Module outline of the module offered in science discipline. The outcomes of the discussion in each component/signal reveal the moves of TPACK signals. For instance, the assertion on technological Knowledge of TPACK framework suggest to take a move to be called resource signal, a move of content TPACK knowledge to be called Module signal, as well as a move from pedagogical knowledge of TPACK framework to be called procedures in order to fit the context of this study.

This then suggests that the outcomes of the whole discussion on TPACK components indicate the move of the whole TPACK framework such that instead of technology, pedagogy, and content knowledge, it is now appropriate to have recourses, procedure, and module signals; refer to the Figure 4.7 below.

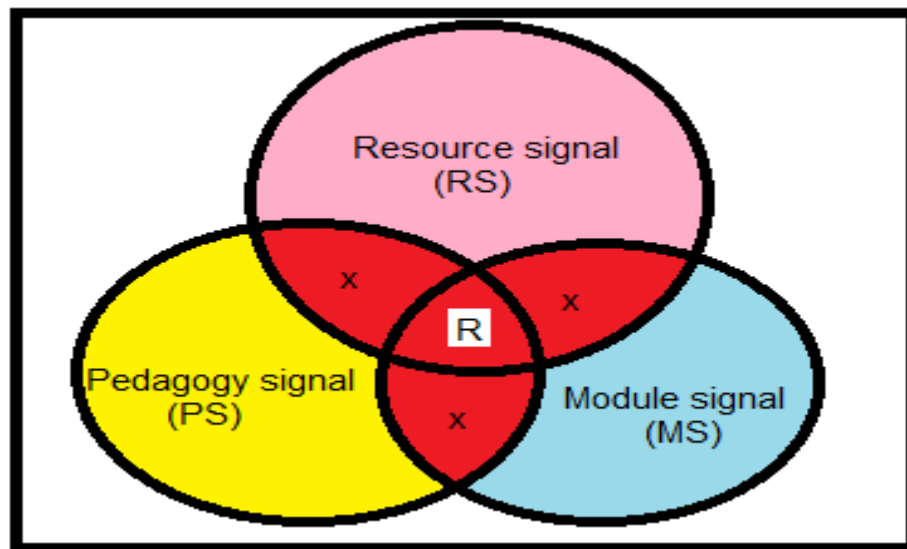


Figure 4.7: Reflecting TPACK signals

Furthermore, in terms of the TPACK intersections (TPK, TCK, and PCK) of the three circles represented by x in Figure 4.6, the above articulation from the discussion of two documents indicates the move of replacement them by reflections (personal, informal, and formal). Moreover, this suggests that the overall intersection indicated by a letter R (TPACK) is now termed to be reflection on resources, procedures, and module signal, as depicted in Figure 4.7 below

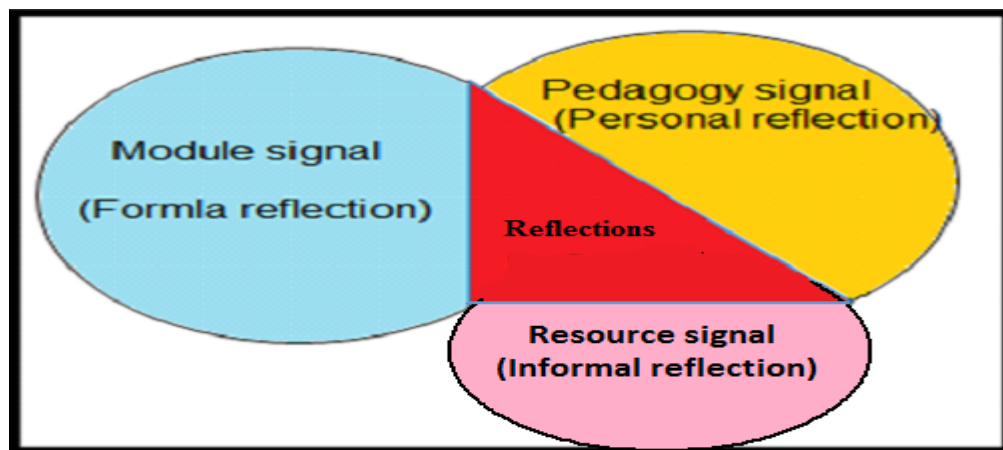


Figure 4.8: Reflections, Resources, Procedures and Module Signal (RRPAMS)

4.7 The conclusion of the chapter

In conclusion, the chapter did allude and embark on TPACK framework that emerged after the discussion of concepts from the previous chapter. This chapter explored the accounts on the historical review of TPACK, its application context, limitation in the use of TPACK, as well as the benefits of using TPACK framework. Moreover, informal, formal, and personal reflection as the phenomenon of this study became the basic skeleton to unpack these discussions on TPACK. On the basis of contextualising TPACK components or signals, two documents were unpacked, namely: Moodle 2.0 training guide and Module outline. Further to this, three main knowledge components (technology, pedagogy, and content) of TPACK were unpacked in terms of curriculum signals (Moodle permission, justice to Moodle, content in Moodle, Moodle activities, lecturers' character, Moodle time schedules, Moodle platforms, as well as assessment in Moodle), and this discussion was influenced by reflection phenomenon of this study. Thus the TPACK knowledge was unpacked and recontextualised to show the broader aspect of how they could unfold in the context of using Moodle to teach science modules.

In addition to the above, see Figure 4.7 and 4.8 in the above sections reflecting on the TPACK signal after contextualising it. These diagrams indicated important moves and direction taken by TPACK after it was contextualized. Most TPACK knowledge has indicated the move to signals. In support of this assertion, this chapter concludes that there seems to be a move from technological knowledge to resource signal, pedagogy knowledge to procedures signal, and from content knowledge to module signal. This chapter concludes that the TPACK framework was recontextualised as Reflections, Resources, Procedures, and Module Signal (RRPAMS). In addition, the moves of TPACK knowledge to signals was as a result of how policy documents (training guide and outline) are used by lecturers in the teaching of science modules guided by informal, formal, and personal reflections. Finally, the study in this chapter takes a firm stance that RRPAMS is a most relevant and a powerful theoretical framework for analysis of data in this study. As result, this suggests the need for the next chapter to unpack and put more emphasis on the research design and methodology utilised to generate the data.

CHAPTER FIVE

Conceptualising reflections into action in the field context

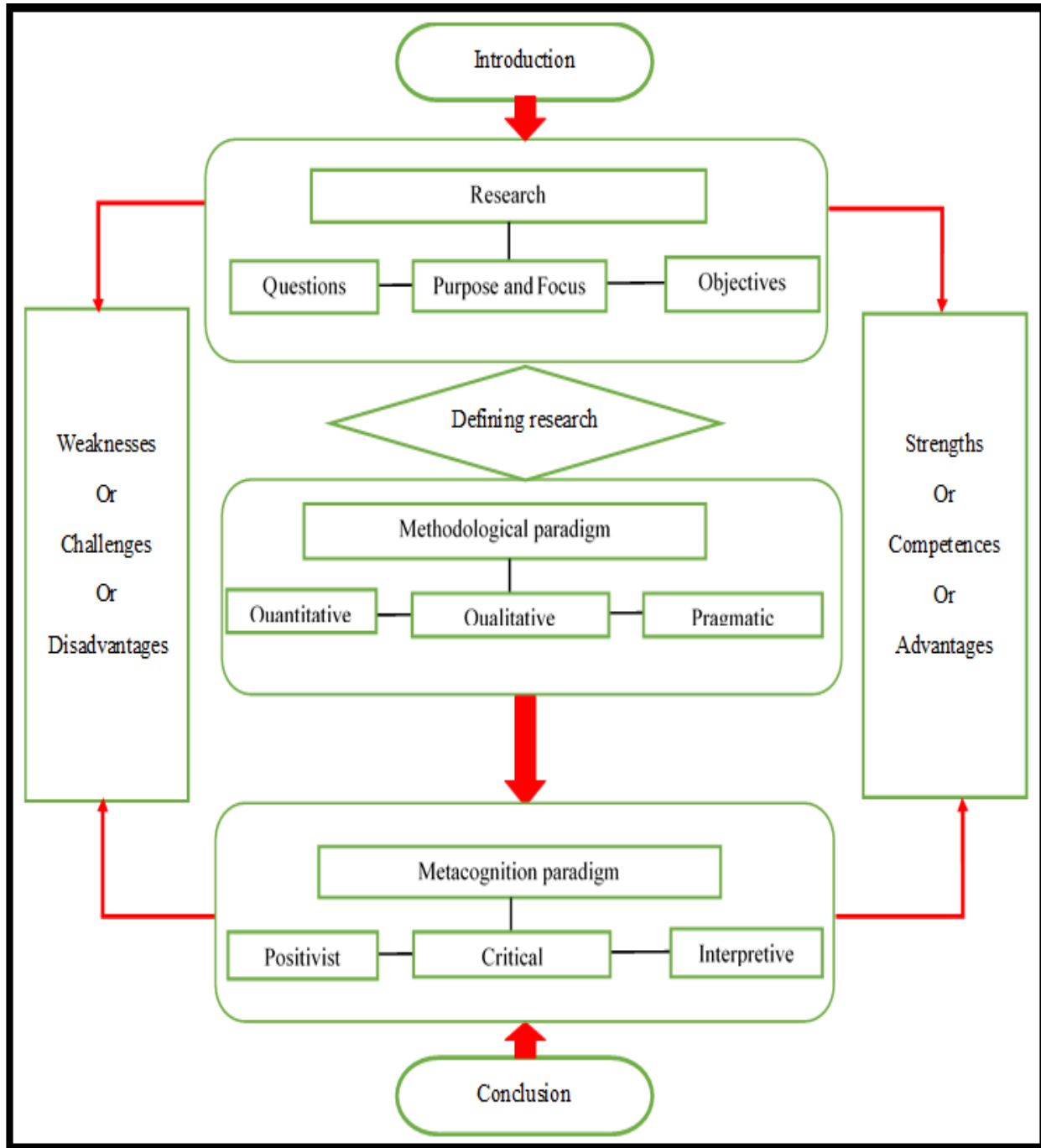


Figure 5.1: Chapter Five organogram

5.1 Introduction

Firstly, the previous chapter presented a broad account of theorising reflections and signals of curriculum from the literature (chapter 2 and 3) into the TPACK/ RRPAMS theoretical framework. This chapter then moves further to bring a better understating of how reflections (phenomenon) and curriculum signals can be easily understood or analysed in order to form themes and categories. In support of this allusion, this chapter resides in the process of unpacking the first part of the research design and methodology in order to bring an alignment of curriculum signals with TPACK/ RRPAMS principles. In other words, this chapter provides more clarity to specific research design that are only most suitable for data generating from lecturers on the use of Moodle in teaching science Modules. Strydom, Fouche, and Delpont (2014, p. 215) is in line with Creswell. (2014) in that, any research involves planning (research design) for action, and this includes philosophical underpinnings that depend on the type of design adopted. As a result, this chapter displays ontological and epistemological underpinnings of the adopted approach or design in order to conceptualise lecturers' reflections into actions in the field of using Moodle to teach science modules in education. Interestingly, this chapters provides the special discussion in unpacking the adopted type of methodological paradigm (qualitative research design/approach), and the type of metacognition paradigm (critical paradigm) which entails or represents the lens and the nature through which the study is looked at. Moreover, the discussion of research design in this chapter is influenced by reflections which include formal, informal, and personal reflection, see the Table 5.1 below.

Table 5.1: Research design concepts with reflections

Research concept	Formal reflection	Informal reflection	Personal reflection
Metacognition paradigm	Positivist	Interpretive	Critical
Methodological paradigm	Quantitative	Qualitative	Mixed-method approach (Pragmatic)

5.2 Focus and Purpose

The purpose of this study was to explore lecturers' reflections on the use of Moodle to teach Physical Science modules at a South African university. The study also intended to unpack the lecturers' reflections in order to understand what made the lecturers reluctant to use Moodle when teaching modules. This study then focused on the use of Moodle to teach modules as it was adopted by the university in 2010 and made compulsory in 2016. In other words, the study also discusses the eagerness or the readiness of lecturers to use new emerging learning management platforms.

5.3 Research Objectives

The study sought to attain the following objectives which led to the exploration of the lecturers' reflections. In other words, these are objectives which led to attaining the purpose of the study.

- Understand lecturers' reflections on the use of Moodle to teach the Physical Science module
- Explain the lessons that can be learned from teachers' reflections on the use of Moodle to teach the Physical Science module
- Explain what informs lecturers' reflections on the use of Moodle when teaching the Physical Science module

5.4 Research Questions

These are the research questions as listed below, that sought to assist this study to generate data in order to attain above research objectives.

- How do lecturers reflect on the use of Moodle to teach the Physical Science module?
- How do lecturers' reflections on the use of Moodle influence the teaching of the Physical Science module?
- Why do lecturers' reflect in particular ways on the use of Moodle when teaching the Physical Science module?

5.5 Reflecting on the definition of research

The etymological definition of the word research is reflected from the French word ‘recherche’, it is compounded from two terms ‘re’- and ‘cherche’, which implies ‘to go seeking or searching’ (Dictionary, 2002). As a result, this definition further affirms that research is believed to be a process of seeking, enquiry, examination, or experiment that is aimed at finding and interpreting phenomenon for facts and that it includes revising existing theories in order to invent new theories to establish new facts. This is in line with the articulation from (Creswell, 2008, p. 8) that a "research is a process of steps used to collect and analyse information to increase our understanding of a topic or issue... It consists of three steps: pose a question, [generate] data to answer the question, and present an answer to the question". Moreover, "In the broadest sense of the word, the definition of research includes any [generation] of data, information and facts for the advancement of knowledge" (Armstrong & Sperry, 1994, p. 48). In the context of this study, and summarising of the above definition, “research is a process of systematic inquiry, with the purpose of gaining more insight. It draws from empirical evidence” (Christiansen et al., 2010, p. 6).

In addition to the above, in summarising the research definition, firstly, this therefore suggests that research includes formal systematic steps to be followed in the information-seeking process in order to find facts or truth about the phenomenon being studied (in this case, phenomenon being lecturers reflection on the use of Moodle) (Christiansen et al., 2010; Creswell-, 2012). This part of the definition seems to take a direction of formal reflection where enquiry is dependent on scholarly knowledge and not on everyday knowledge (Christiansen et al., 2010; Khoza & Mpungose, 2017). Secondly, research is based on generating evidence from various sources, like participants, in order to inform the construction of facts, and this part of the research definition seems to be influenced by informal reflection because evidence is subjectively constructed by what others are saying (opinions) (Khoza, 2017; Maree, 2007). Lastly, the third part of the definition dwells on personal reflection where research is based on providing more insight in conjunction with the personal interpretation of findings by the researcher (Creswell-, 2012; Khoza & Mpungose, 2017).

In support of the above interpretation, Ramrathan (2017, p. 405) concluded that “research is the systematic process of collecting, analysing and interpreting information with a view to increasing understanding of a phenomenon that one is interested in knowing more about”. This suggests that the research definition addresses issues of formal reflection (systematic process), informal reflection (collection of data), as well as personal reflection (analysing and interpreting information), in order to understand the phenomenon (lecturers’ reflection on the use of Moodle). In other words, research involves research design and methodology (Cohen' et al., 2013).

Note that studies in research design and methodology further assert that the research process seeks certain and relevant procedures to be followed in order to conduct research correctly (Christiansen et al., 2010; Cohen' et al., 2013; Cohen* et al., 2011; Creswell', 2013; Creswell., 2014; Maree, 2007; McNiff, 2013; Ramrathan, 2017). These studies outline that research occurs as a result of wanting to understand the problems faced by human beings in their own social context, and this requires certain formal procedures to be administered. In other words, research is conducted using formal research design and methodology and this is influenced by the process of reflection which seeks formal, informal, and personal inputs of doing research. (Creswell-, 2012; Maxwell, 2013). Creswell_ et al. (2010), as well as Leedy and Ormrod (2014), further aver that it is quite intriguing to differentiate the research design from research methodology. As a result, these two studies further outline that research design has to do with procedures or plans in place that need to be followed in order to reach the stage of generating and analysing data in order to understand the phenomenon. In other words, research design is a structure that takes place before research methodology can occur. Interestingly, research design seems to take the direction of formal reflection in the context of this study because it advocates for formal approaches, interpretive lens towards understanding and interpreting the phenomenon, whereas research methodology propagates informal reflection since it is informed about data generation from participants’ ideas and opinions. Further to this, Ramrathan (2017) posit that the literature use different terminology to refer to research design such as research approach, research plan, and others but in the context of this study research approach was used to refer to research design.

Moreover, Creswell. (2014) asserts that research approach is termed to be a broader path of conducting research which can be categorised as qualitative approach (informal reflection),

quantitative approach (formal reflection) and mixed-method approach or pragmatic approach (personal reflection). This gives a sequential plan and manner in which a research should be conducted and it seeks a way or lens which interrogates the phenomenon in order to answer research questions in place (Leedy & Ormrod, 2014). In other words, this suggests that research approach puts a plan forward to addresses the research phenomenon and research question of the study.

In addition to the above, research methodology seeks to find ways and means of unpacking the problem in the study, and this includes the lens of viewing research (paradigms), ways of generating data from participants, analysis of data, sampling, methods, framing of the study (theoretical or conceptual framework), ethical issues, trustworthiness in the process of generating data, research style, and others (Creswell., 2014; Leedy & Ormrod, 2014; Ramrathan, 2017). In other words, research methodology is mostly dominated by informal reflection because it advocates for collaborative sources of data in order to address research phenomenon, in this case, the lecturers' reflection on the use Moodle. Further to this, Mona (2016 p. 139) asserts that, "the research design and methodology are different, yet somewhat interdependent". In other words, the research design addresses the end product of research whereas research methodology focuses on the process of achieving research objectives including instruments and methods to be used (Cohen' et al., 2013). As a result, the basic component of the research process takes a stance on the approach that is adopted by the study (Christiansen et al., 2010).

5.6 Why use qualitative approach in the context of lecturers' reflections?

According to Ramrathan (2017), the only broader approaches that currently exist in the field of research are categorised as qualitative approach (informal reflection), quantitative approach (formal reflection), as well as mixed-method approach or pragmatic approach (personal reflection). Quantitative approach mainly deals with enquiry that is grounded with figures and patterns, in other words, it deals with statistical patterns in order to describe the phenomenon (Creswell-, 2012). Moreover, Budden (2017) also assert that in this enquiry humans are taken as objects, hence they observe and measure the phenomenon objectively, and this seems to be an inadequate method of enquiry when dealing with human beings in a social world (informal world). In

overcoming this weakness in the field of research, qualitative approach was put in place as the most appropriate research approach as it takes human beings as subject, and researchers can subjectively observe and measure the phenomenon based on the participants' own experiences in their own context of the social world (Creswell., 2014; Leedy & Ormrod, 2014). Most interestingly, the mixed-method approach is the current emerging research approach that tries to merge the two main approaches (quantitative and qualitative) by considering both objectivity and the subjectivity in the enquiry or research. This then suggests that quantitative is more scientific which seems to be driven mostly by formal reflection, whereas qualitative is more societal which seems to addressing informal reflection, and it is dependent on social humans' experiences from their own social context. On the contrary, mixed-method seems to be taking the direction of personal reflection of bringing in the personal identity in order to understand the phenomenon. It is therefore worth noting that in the context of this study, qualitative approach seems to be the most suitable research approach in order to understand lecturers' reflection on the use Moodle LMP when teaching science modules.

Interestingly, Creswell. (2014), and Ramrathan (2017), and Cohen' et al. (2013), further assert that in a qualitative approach the study is given an opportunity to try to understand and describe the ways in which different human beings make subjective sense of their lives in their own context through the process of reflection. Further to this, Denzin et al. (2006, p. 3) reveals that “qualitative researchers study things in their own natural settings, attempting to make sense of, or interpret, phenomenon in terms of the meanings people bring to them”. In other words, qualitative research approach is mostly driven by informal reflection in attempting to dig deeper in order to gain an in-depth understanding of the phenomenon by asking questions that not only inform the study but also stimulate the participants (humans) to reflect on why they engage in particular activities (Cohen' et al., 2013; Mouton, 1996). In support of this, Ramrathan (2017, pp. 411-412) asserts that “qualitative research is a situated activity that locates the observer in the world. It consist of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings and memos to the self”. This suggests that qualitative research approach is informed by reflections (personal, formal, and informal) but dominated with

informal reflection which favours the interpretation of the phenomenon in the naturalistic manner via their experiences (Christiansen et al., 2010; Leedy & Ormrod, 2014). In other words, qualitative research approach uses dialogue through words uttered by participants in order to ensure subjectivity, thereby making the meaning and the interpretation of the phenomenon.

In addition to the above, Creswell. (2014, p. 44) asserts that “qualitative research begins with assumptions and the use of interpretive/theoretical framework that inform the study of research problem addressing the meaning of individuals or groups ascribe to a social or a human problem... qualitative approach use an emerging qualitative approach to enquiry, the collection of data in the natural setting sensitive to the people and places under study, and data analysis that is both inductive and deductive... the final report or presentation includes the voices of the participants a, the reflexivity of the researcher ”. This definition suggests that qualitative research approach is as a result of trying to solve a particular societal problem, and it involves the formal process of undertaking some steps in order to bring an interpretation of the phenomenon which is more of a formal reflection. In addition, this definition also propagates informal reflection in the process of generating data from the participants in their own social context. Finally, it involves the process of self-introspection where a researcher is expected to provide personal reflection about the matter being studied (lecturers’ reflections). As a result, I sought to use qualitative approach in order to follow qualitative processes (data generating methods, data analysis, as well as others) so that I can describe, understand, and interpret how various participants, in their social setting (university), constructed their own understanding of using Moodle when teaching science modules (Babbie', 2004; Maree, 2007). Thus, data generation methods like reflective activity, artefacts, and one-one semi-structured interview, were used, and this enabled me to gain greater in-depth understanding of lecturers’ reflection on the use of Moodle since I was available where actions and behaviours where manifested in lecturers’ social context. In other words, through the use of this approach I had an opportunity to understand and interpret lecturers autobiographical lived experiences (currere) on the use of Moodle (Pinar-, 2005). Remember, qualitative research is all about social action of practitioners not about themselves being(Bradbury-Huang, 2010). As a results, one of the main agendas of this study is to support the move from research approaches that only address the social need (informal reflection) and the module need (informal reflection) to approaches that

addresses the personal need (personal reflection), which is the pragmatic approach to research (mixed methods). According to Badley (2003), and Creswell. (2014), as well as Krebs and Denton (2005), the pragmatic approach to research (mixed methods) seeks to address the personal needs of researchers in order to know their identity so that they can have a choice of research methods or procedures that best suit their needs. This suggests that the use of the pragmatic approach may in turn assist participants to be free to participate in the study and engage in research methods that develop their own personal identity. Be that as it may, this study used qualitative research to unpack the research phenomenon (reflections) by engaging lecturers to construct their own social world around them (Moodle environment) through their actions of teaching science modules. Thus, one of the reasons of adopting qualitative research is that this study was not dependent on statistical procedures in order to generate data.

5.6.1 Historical background of a qualitative approach in research

It is worth noting that this section intends to unpack the historical background of qualitative research after the etymological definition has unfolded in the above section (5.3). According to studies done in qualitative research (Dyer, 1916; Glaser & Strauss, 2009; Miles & Huberman, 1994; Ritchie, Lewis, Nicholls, & Ormston, 2013; Spencer, Ritchie, Lewis, & Dillon, 2003), social research (qualitative research) emerged in the 16th century through the work of philosopher, Rene Descartes. In 1637, Descartes, published work on research and insisted that research should be evidence-based in order acquire the truth. Further to this, studies outline that during the 17th century the research field was highly contested; for instance some of the well-known scientists like Sir Isaac Newton and Francis Bacon asserted that any truth, facts, or knowledge concerning any matter in the world can only be acquired through the use of direct observation (induction) rather than the use of deduced abstract propositions. Moreover, studies outline that from the 18th century to the 19th century, research still followed in the footsteps of previous scientist in advancing qualitative research. As a result, studies asserted that social researchers like Auguste Conte believed that the social world can be studied using particular lens or paradigms (interpretive paradigm, critical paradigm, and others) in order to find truth.

Above all, the use of qualitative research started to be highly recognised in the 20th century, and was most prominent in the discipline of Anthropology (research of numerous aspects of humans within past and present societies), Philosophy (research of the basic nature of knowledge, reality, and existence), and Sociology (research of the development, structure as well as the functioning of human society) (Leedy & Ormrod, 2014; Spencer et al., 2003). Further to this, Denzin' and Lincoln (2011) assert that, during the 1920s and 1930s, Anthropologist such as Malinowski and Mead from the academia of Chicago started to put more focus on qualitative research to seek the societal understanding of the lived experiences of humans. Similarly, the sociologist Burgess (1925) indicated the move from the scientific approach (quantitative) which was most domineering during that time, to a social approach in research which propagated the essence of a natural setting such as slums, foreign places, street to studied in order to understand humans' own natural settings for intervention on their own socio-economic problems (poverty, health and others). This suggests that historically, qualitative research was most influenced by informal reflection which seeks humans' opinions or ideas from their own societal spaces for intervention on their own socio-economic and political problems.

In addition, in the 1960s qualitative research was dominant in fields of education and health discipline, and various types of qualitative research was discovered (Becker, Geer, Hughes, & Strause, 1962). Moreover, Strauss and Corbin (1967) played a huge role in the discovery of grounded theory, and it is about understanding human behaviour processes. Spradley (1979) was dominant in the development of ethnography qualitative research. Ethnography is referred to as a study focusing on culture, values, and believes of humans. Interestingly, Giorgi (1985) was a leading scholar on the publications of phenomenology research type from the United States of America, which is the study of human experiences. Lincoln and Guba (1985) work was unpacking the case study, which is the study looking at a more specific case or a context of human. Note that Milne and Chan (1999) were also dominant scholars on the narrative study which sought to unpack stories from individual persons from the community. Babbie (2010) acknowledge that all the five types' different types of qualitative research seem to be more influenced by informal reflection because each types is driven by human ideas or opinions from the society in a particular context in order to find truth.

Interestingly, qualitative research seems to be the most adopted approach in other parts of the world. See the studies conducted by Denzin' and Lincoln (2011) in Britain which shows a huge development of qualitative research in the book titled, 'Handbook of qualitative research'; in the United Kingdom (UK), qualitative research became the most dominant and fashionable research approach. In fact, from the last decade of the 20th century to first the decade of the 21st century, qualitative research spread more widely to all over the world including Africa and other countries like Russia, Australia, and others. (Budden, 2017). This is evident on the studies conducted because they used different terms to refer to qualitative research; some refer to it as naturalistic research (Lincoln & Guba, 1985), field research (Park, Burgess, & McKenzie, 1984), case study research (Hartley, 2004), and interpretive research (Bryman, 2015; Travers, 2001). This suggests that qualitative research is still the most appropriate approach towards doing enquiry into any kind of the social problems since it is driven by human reflections. In other words, opting for such kind of approach is important in unpacking the lecturers' reflection on the use of Moodle in the context of teaching and learning of science module in education and curriculum studies discipline in HEIs.

In addition to the above suggestion, it is supported by the current and most dominating studies (Creswell', 2013; Creswell-, 2012; Creswell, 2008; Creswell., 2014; Creswell_ et al., 2010) in the field of qualitative research. These studies further aver that all qualitative research types (ethnography, case study, phenomenology, grounded theory, and narrative enquiry) focus on the societal lived experiences of participants, interaction among them and the researcher, and the communicating language used during the process of enquiry. This advocates for informal reflection in the conduction of qualitative research enquiry where the study should recognise the presence of the participants from the relevant field of study (Denzin' & Lincoln, 2011). For instance, in the context of this study, I valued the presence of lecturers as the participants from education and curriculum discipline sharing their own lived experiences on the use of Moodle for the teaching and learning process. Be that as it may, Creswell. (2014), further assert that qualitative research has its basic characteristics.

5.6.2 Characteristics and purposes of qualitative approach

According to Creswell* and Poth (2017), the most prominent characteristics of qualitative research includes the importance of data generation, contextualisation of research, immersing the natural research settings, emic aspect of research, thick description, relationship in the research, data analysis, and presentation. The first characteristic seeks to show the primacy of data before any theory can be brought in; the research is expected to generate data from participants as based on their social experiences, in order to have an in-depth understanding (Creswell-, 2012; Denzin' & Lincoln, 2011). This suggests that this property is advocating for generating data first before bringing in issue of theoretical framework so that there will a move from specific to general truth in order to easily understand the facts or the truth about the phenomenon. In other words, inductive data analysis (from specific to general) is most favoured in this characteristic since it propagates the move from data to theoretical framework (Cohen' et al., 2013). Moving further, this approach is most influenced by informal reflection because what matters most comes from participants. This suggests that the study not only imposes opinions but draws from the reality that is socially constructed from participants. Not that reality in qualitative research emerge from textual data from having a dialogue with people and also studying artefacts to understand their reflections (photographs, diagrams and others) (Christiansen et al., 2010; Creswell., 2014). In the context of this study, the literature based on the lecturers' reflection on the use of Moodle was reviewed and put in place before data generation processes commenced. Thus, the process of data generation led to the development of TPACK/ RRPAMS theory, and data generated were inductively analysed as based on themes and patterns related to the theory in order to understand the lecturers' reflection.

The second characteristic of contextualisation in qualitative research requires qualitative studies be most cognisant and sensitive to the context under which research is done, and this requires them to be immersed in the participants' settings (Cohen' et al., 2013). In other words, the societal context of participants such as the living or working environments, or conditions associated with their social experiences and behaviours from which the study will generate data. This, therefore, articulates that qualitative studies need to respect the culture, history, time, and values, of participants so that the perception of participants on the phenomenon can be easily interpreted after consideration of economic, social, and political issues (Denzin' & Lincoln, 2011; Ritchie et al.,

2013). This characteristic seems to take a direction of informal reflection, and it was well observed since I had to consider the time, cultural, and historical background of the university before and after the adoption of Moodle (Khoza & Mpungose, 2017). Thus, I also considered that some lecturers were reluctant and some were active in the use of Moodle. Moreover, I was aware and I acknowledged that some lecturers are expected to write and publish articles, and teach modules while having their own family responsibility, and I was therefore sensitive to each lecturer's situation when generating data.

Most importantly, the third characteristic seeks the immersion of qualitative studies in the real world or setting of participants, and has certain strategies in place to question and listen to participants (Creswell., 2014; Ritchie et al., 2013). This can then assist qualitative studies to understand the natural setting in which the culture of participants is embedded. This can allow studies to set or change rules and work collaboratively with participants in order to understand and intervene on the phenomenon (Ritchie et al., 2013; Spencer et al., 2003). In other words, the immersion of researchers enhances them to become participants by default so that they can observe, interact, and become familiar with the settings in order to prevent any misconception that may arise (Cohen' et al., 2013). As a result, this characteristic seems to take the formal reflection of conducting research. As a results, I was very much professional during the process of data generation because I knew that I was dealing with academics. Thus, I had to make an appointments with lecturers so that they can fit me in their busy schedules before pursuing data generation process. I also used emails for communication with them as a professional way of communicating with academics.

Moreover, Christiansen et al. (2010) parallels Creswell* and Poth (2017) when asserting that the emic perspective requires a researcher to explore the experience, perceptions, feelings, emotions, and ideas of the participants in the study rather than imposing their own understanding about the phenomenon. This then advocates qualitative studies create a free environment for participants to express or share their experiencing in unpacking the phenomenon (Spencer et al., 2003). This characteristic allows participants to be given time to be heard while researcher are listening to their accounts (Bryman, 2015; Ritchie et al., 2013). This characteristic seeks personal reflection from

the study so that all voices of participants can be catered for and listened to since they all contribute to the study (Maxwell, 2013; Mpungose*, 2016). Thus, I observed this characteristic in this study because all lecturers were given freedom and an equal chance to express themselves as to how they use Moodle for teaching and learning while using science modules. Further to this, I accepted all views of participants without positively or negatively influencing them, and they were given enough time to draw the artefact based on their best or worst emotional experience/reflection on the use of Moodle.

Furthermore, qualitative research is characterised by receiving detailed reports from participants' experiences which describe their profiles, present mind maps of the setting and events, and transcribe narratives of each participant's accounts (Budden, 2017; Spencer et al., 2003). In other words, the study expects to provide a thick, vivid, dense, and descriptive account of participants' experiences and this includes the alignment of experiences with the theoretical framework in order to make meaning of the phenomenon (Bryman, 2015; Christiansen et al., 2010). The situation (as a consequence of the phenomenon and research questions) should be documented in a way that provides an explicit revelation of the relationships, the context, and emotions that initiated behaviour and actions (Ritchie et al., 2013). This does not primarily inspire a factual representation but is inclusive of analytical and theoretical descriptions (Ramrathan, 2017). As a result, this characteristic is embraced by formal reflection since it advocates for qualitative studies to be a good story tellers in such a way that when readers reads the participants' accounts from can easily imagine themselves doing the same experience (Khoza, 2017; Pedro, 2005). Thus, all data generation instruments were systematically developed and used for generating data. Data was recorded and therefore transcribed and analysed using guided analysis in order to make meaning to the readers. Moreover, findings on lecturers' reflection on the use of Moodle were logically presented in the form of a meaningful story.

One of the main characteristics of maintaining the relation between the researcher and the researched is that there must be close relationship based on the spirit of equality as human beings (Ritchie et al., 2013). In other words, the study must not be judgmental towards the ideas, perceptions, and the experiences shared by participants (Bryman, 2015). Moreover, it is expected

that studies maintain a sense of continuous negotiation with participants in order to create a chance of probing (Christiansen et al., 2010). Further to this, the issue of ethics is catered in this characteristic because this characteristic is driven by personal reflection where the study in the study there should be respect of values of participant in the study (Cohen* et al., 2011). As a result, this was alluded to in this study because, during interviews, I did not discuss the knowledge I had about the use of Moodle for teaching and learning. I was friendly to participants because I brought in refreshments (food and soft drinks) during one-on-one semi-structured interviews in order to bring ensure a close relationship with them. I also negotiated a suitable venue for conducting the interviews for each participant, while ensuring that the ethical principles were ensured such that their real names were not disclosed in the study.

Lastly, the final characteristics of qualitative research involves the rigorous process of using multiple data generation methods and the qualitative methods of data generation (Ramrathan, 2017). This suggests that qualitative research gives a variety of opportunities to generate textual data through the use of different qualitative data generation methods such as semi-structured interviews, unstructured observation, document analysis, reflective activities, individual journals, artefacts, discussion forums, and others (Cohen' et al., 2013). According to Creswell. (2014), the use of these data generation methods are guided by the qualitative lens through which research is looked at, such as the interpretive paradigm, critical paradigm, and others. This plays a great role when it comes to data analysis. Christiansen et al. (2010) asserts that data analysis is characterised with the notion of categorising data into different layers, themes, and patterns and these should be well interpreted in order to make a deeper meaning of the phenomenon. This then invokes informal, formal, as well as personal reflection where the study can be dependent on generated data from participants, and follow the relevant themes of analysis from data and the literature so that they can be easily presented. As a result, this study also met this characteristic because I used various data generation methods which included reflective activity, artefact, and semi-structured interview. This assisted me to generate more data which was analysed using qualitative data analysis through the process of inductive and deductive reasoning. Further to this, critical paradigm was used as the lens guiding the enquiry in this study. In conclusion, the main objective of qualitative research is nothing much other than the exploration of the participants' phenomenon

though their experiences in order to understanding their real life world. (Bryman, 2015; Christiansen et al., 2010; Cohen' et al., 2013; Creswell* & Poth, 2017; Ritchie et al., 2013). This then enhances us to understanding the strength of qualitative research when it is contextualised in the field of the study.

5.6.3 Strength in contextualizing qualitative approach

According to Griffin (2004), Atieno (2009), as well as Creswell* and Poth (2017), contextualisation of qualitative research is commonly based on particular assumptions of qualitative research, these studies assert that those assumptions include that: qualitative research is descriptive, it is a meaning making process, participants are taken as primary instruments, qualitative research involves fieldwork, and that qualitative research is inductive. In support of this assertion, both Yin (2013) and Creswell. (2014) further aver that qualitative research is descriptive in a manner that the study is most interested in process of understanding participants reflections rather being interested in the end product or outcome of the research. This assists the study to fully unpack the phenomenon in order to gain an in-depth and deeper understanding of the phenomenon. In other words, the outcome of the research does not matter, what matters most is the process of attaining the outcomes. This suggests that study in qualitative approach can be influenced by both informal and formal reflection in order to give the descriptive account of the phenomenon by having a plan of conducting or generating data from participants in the meaning making process. As a result, I showed the interest in the process rather on the outcome of the research by having data generation plan that involved lecturers as participant in order to produce data based on their reflection of using Moodle to teach science module at a university. This played a huge role in having an in-depth and detailed description of the phenomenon in this study.

Furthermore, qualitative studies are very interested in meaning, specifically the ways in which people make sense of their lives (Choy, 2014). The meaning is well constructed through understanding of peoples' experiences and the setting or the structure of the world they are living in, and the generated data in qualitative research depends on the experience of participants (Creswell-, 2012; Creswell, 2008). In other words, qualitative studies have a clear vision of their participants' environment or the structures they live in so that it is easy for participants to share

their own experiences in an open way. This allows researchers to have effort to paint a bigger picture of the phenomenon (Atieno, 2009; Kothari, 2004). This assertion propagates informal reflection where I sought to understand the participant life in terms of their culture, language, socio-economic, and the political factors affecting participants working environment (Budden, 2017; Khoza, 2017). As a result, this study sought for participants profiles after the consent letters were sent. Moreover the study, used user friendly data generation methods such as one-on-one semi-structured interview, and I sought to probe lecturers (participant) in order to gain a deep and in-depth understanding of their reflection on the use of Moodle in their own context of teaching curriculum studies or science modules. I was also aware of the structure of their work that they were teaching modules while they were busy doing research. In overcoming this I used their own lunch time, spare time or after work for data generation process.

Quite interestingly, participants in qualitative research are taken as primary sources of data, and this suggests that the generation of data, including the analysis of data, depends on the findings generated from participants. Importantly, participants are referred to as subjects rather than objects (Creswell* & Poth, 2017; Merriam & Tisdell, 2015). Moreover, Yin (2013) further asserts that data is degenerated through the human instrument rather than through questionnaires and machines. This highlights the importance of social human beings in participating in research for transformation and emancipation purposes. In support of the above articulation, this research incorporates people rather machines to participate in this study. In others words, lecturers were used as the primary sources of data generation towards understanding their reflections (phenomenon) when teaching using Moodle LMP (Singh-, 2014; Wild, 2011). Thus, this sought my informal reflection towards understanding their human social behaviour, thought, actions experiences as well as their reflections. I did not impose to the participants the knowledge I had about the phenomenon.

In addition to the above, qualitative research involves fieldwork which requires that researchers physically go out to the participants' site, place, or institutions in order to observe and record data from natural settings (Denzin' & Lincoln, 2011; Griffin, 2004). Further to this, fieldwork helps the study to attain first-hand information from the participants from their own natural settings, and this

avoids assumption that can be made by the study about participants (Creswell* & Poth, 2017). In other words, the study can easily feel and understand the social ills and difficulties that the participants meet on daily bases, and this allows both the study and the participants to come up with an intervention towards the problem (Khoza, 2017; Kothari, 2004). Both informal and formal reflection influences the fieldwork in qualitative research. This was evident when I needed to plan semi-structured interviews for generating data and also be involved with participants in the field so that they could be flexible in devising solutions or intervention towards the process of unpacking the phenomenon (Khoza & Mpungose, 2017). It for this reason that I went out to the field (university) where Moodle was adopted and I used lecturers teaching science modules. I was also involved in the all process of action research in trying to find the solution on the lecturer's reluctance of using Moodle.

Most importantly, qualitative research is inductive in that theoretical framework and concepts are generated from the literature and participants (Choy, 2014). Further to this, according to Ramrathan (2017), studies in qualitative approach possess concepts, theories, or themes that emerge from the literature and from the participants, and this makes it easier for qualitative data analysis to takes place. This suggests that informal and formal reflection influences the enquiry in qualitative research in such a way that I was required to understand what the literature say about the phenomenon. In the context of this study, the literature (reflection, resources and other concept of curriculum) was read before the data generation process began. I observed in this study that some themes emerged from data through the process of inductive reasoning.

In addition to the above, studies assert that the integrity of qualitative research is that it is capable of managing and simplifying data without destroying the context in which it is generated (Cohen' et al., 2013; Creswell* & Poth, 2017; Merriam & Tisdell, 2015; Ramrathan, 2017; Yin, 2013). In other words, studies outline that ethical issues and trustworthiness of the study is always prioritised in the process of enquiry so that the common goal or purpose of generating new knowledge or intervention about the phenomenon can be attained. In addition to this, qualitative research is conducted in order to serve particular research needs in the society (Griffin, 2004). This suggest that qualitative studies manage and simplify data generated from the participants with a purpose

of understanding and emancipating or transforming the participants involved and this requires the researchers' personal and informal reflection (Choy, 2014; Creswell., 2014). As result, this study involved lecturers with one purpose of understanding their reflections and emancipating and transforming them on the use of LMPs, like Moodle, in this context. That is the reason why this study was more humanistic, moral, ethical, worthy and radical transformative because the study purpose was clear addressing the research questions in order to attain research objectives. Note that qualitative research is mainly constituted of textual data in order to provide a full descriptive account about the phenomenon, and this textual data can be coded numerically in order to provide a greater insight in the phenomenon (Atieno, 2009; Kothari, 2004).

5.6.4 5.3.4 Overcoming weakness in qualitative approach

Creswell* and Poth (2017) and Ramrathan (2017) assert that a large number of benefits while using qualitative approach in research does not mean there are no limitations. There studies further assert that qualitative research is sometimes not easily acknowledged and understood, most especially within scientific communities since it often uses textual data. In support of this assertion “qualitative research usually involves relatively small numbers of participants, and this can mean that it is less likely to be taken seriously by other academic researchers or practitioners and policy makers” (Griffin, 2004, pp. 9-10). Be that as it may, in the context of this study, this limitation was catered for, since this study used graphical presentation of textual data in the discussion of the study's major findings. In administering this, formal reflection influenced me to use my digital and scientific skills. Moving further, studies affirm that findings from qualitative research cannot be extended or generalised to wider populations (Creswell., 2014; Denzin' & Lincoln, 2011; Ritchie et al., 2013; Spencer et al., 2003). As a result, findings of this study were not generalised to a wider population but the study recommended for other lecturers of the similar context (using Moodle to teach science modules) to refer to the findings of this study and this was most influenced by formal reflection (literature).

In addition to the above, it is affirmed that the quantity of generated data makes interpretation, and analysis time-consuming (Ramrathan, 2017). Moreover, according to Denzin et al. (2006), language can hinder the meaning-making process between the researcher and the participants.

Thus, in overcoming this limitation, both formal and informal reflection had to prevail in such a way that I had to allow lecturers to use simple English, I also used simple language in all data generation instruments (reflective activity, artefact, and one-on-one semi-structured interview). The presence of researcher in qualitative research, in the process of data gathering cannot be avoided and it can affect or influence the responses about the phenomenon. (Cohen' et al., 2013; Yin, 2013). This study therefore ensured the use of reflective activity and artefacts in both the first and second phase of action research; the participants were given much time to be alone to give responses. As a result, I did not have much influence or biases on the process of data generation. Further to this, Ritchie et al. (2013) assert that issues on confidentiality and anonymity can even cause problems during the process of presentation of findings. Thus, this study, assured confidentiality and anonymity by requesting participant's permission to participate in this study through consent forms, and they made aware that their real names will not be used but instead acronyms like Lecturer 1 (L1) and Lecture 2 (L2) would be used. However, a foundational step in instituting the research design is to establish the research paradigm (Creswell* & Poth, 2017)

5.7 Ways of reflecting on the world around us

Interestingly, studies done on paradigms in qualitative research assert that paradigms are of paramount importance for the conduction of an enquiry (Babbie, 2010; Cohen' et al., 2013; Collis & Hussey, 2013; Creswell* & Poth, 2017; De Vos, Delport, Fouché, & Strydom, 2014; Mouton, 1996; Neuman & Robson, 2014). Thus, these studies further assert that the etymological definition of the term paradigm is well articulated in work done by Thomas Kuhn in the booked titled, '*The structure of scientific revolutions*', which was first published in 1960s and secondly in 1970s. As a result, Kuhn (1962); (Kuhn, 1970) as well as (Kuhn & Hawkins, 1963) further assert that the term paradigm basically originated from the Greek term '*paradeigma*' which implies a pattern. Paradigm was used to represent a conceptual framework, or a lens, by a community of scientists studying science in order to have, or establish, the relevant model for exploring or solving social science problems. As a result, paradigm is referred to as a research culture with a set of beliefs, values, and assumptions that a particular researcher possess regarding the nature and conduction of research (Kuhn, 1970; Kuhn & Hawkins, 1963). Further to this, (Olsen, Lodwick, & Dunlap, 1992, p. 16) view a paradigm as "a pattern, structure and framework or system of scientific and

academic ideas, values and assumptions” used in a research in order to unpack the phenomenon. In simple terms, paradigms “are basic set of beliefs that guides actions” (Guba, 1990, p. 17). In other words, a paradigm influenced me to reflect (based on personal, informal, and formal reflection) in order to have the structure of doing this study (formal).

Furthermore, “research paradigms, in essence, reflect the multiple views, perceptions, and assumptions about how the world is understood and perceived” (Budden, 2017, p. 140). In addition to this, “the search of truth is, in turn, dependent upon the positionality a researcher takes in constructing the knowledge. This positionality is referred to as paradigm, the set of lenses one assumes when viewing the world in search of truth” (Budden, 2017, p. 140). This suggests that a paradigm is about the ways of reflecting the world around the study. As a result, according to Ramrathan (2017) as well as Creswell* and Poth (2017) there are different, diverse, and unique commonly known and used ways of reflecting (paradigms) in the world of research. Those ways includes interpretivist paradigm, critical paradigm, postmodernist paradigm as well as positivist paradigm as detailed in the Table 5.2 below

Table 5.2: Dominant ways of reflecting the world

Paradigm	The purpose for doing research	Reflection
POSITIVIST	PREDICT: Discover natural laws so people can predict and control events	FORMAL
INTERPRETIVIST	UNDERSTAND: To understand and describe meaningful social action	INFORMAL
CRITICAL	EMANCIPATE	PERSONAL

	To smash myths and empower people to change themselves and the society radically	
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In summary of the above table, according to the studies like (Leedy & Ormrod, 2014) as well as Creswell. (2014), in the positivist paradigm, the ways of reflecting the world is scientific, and statistical interpretation of data is recommended. Further to that, in this paradigm knowledge is viewed as objective and it is constructed through observation. This therefore seems to propagate formal reflection towards understanding the phenomenon since all beliefs and assumptions are driven by stipulated laws and principles, and seem to be more influenced by quantitative approach. Moreover, these studies affirm that the interpretivist paradigm is concerned with the reflection on understanding human beings' behaviour, actions, and their subjective experiences and reality, and knowledge is taken as subjectively constructed since participants' interpretation, perception and actions are regarded as different. This then seems to take the direction of informal reflection where human beings social opinions and ideas are more important in unpacking the phenomenon and it is driven by qualitative reflection which is influenced by informal reflection. Further, to this Ramathan (2017) asserts that critical paradigm is built on the basis that any conducted enquiry can bring the emancipation of participants in the society they are living in. This therefore suggests that personal reflection prevails so that I can understand and explain the phenomenon via participants' social experience with a central aim of affecting change and transformation by challenging the issues of power and inequalities in order to address individual needs (personal reflections). This paradigm encourages both the researcher and the participants to be free to negotiate and select research methods that can suit their needs. This takes a move of pragmatic approach which advocates for personal identify and development of both the researcher and the researched (Krebs & Denton, 2005; Zeichner & Noffke, 2001). For this reason this study has adopted the use of the critical paradigm as its main purpose is to explore lecturers' reflection on the use of Moodle in order that they may find their own personal identities and developments and improve their practices so as to minimise their reluctance to use Moodle after it was made compulsory by the university.

5.7.1 Why the use of critical paradigm in the context of reflection

The lance of reflection in the critical paradigm goes beyond the point where the main aim is to describe and understand the phenomenon in a social context. It extends to the deeper engagement with the socially constructed and subjective realities of participants and communities in the society for personal emancipation purposes (Cohen' et al., 2013; Ramrathan, 2017). Further to this Creswell. (2014) is in line with Neuman and Robson (2014) when asserting that the critical paradigm puts a strong emphasis on the historical background and social context of participants in order to unpack the phenomenon, and it is believed that humans natural settings are made of certain structures which are hierarchical in nature. In support of this assertion, De Vos et al. (2014) further outline that it is the normativity of critical studies to create a reasoning of criticising and challenging the nature of existing structures of the society. As a result, the critical paradigm always admits that in any structure of the society there is always bias that exists because of power relations among the members of the society (Denzin' & Lincoln, 2011). In other words, there is a possibility that humans or individuals in the society may be unequal in terms of power, class, language, gender, and others (Leedy & Ormrod, 2014). For this reason, Neuman and Robson (2014) assert that studies' intention in critical paradigm is not all about to study and understand the phenomenon in the society, but it is about integrating, critiquing, decolonising and transforming the way in which the society do things on daily basis which begins by each person living in the society. This suggests that the critical paradigm is most influenced by personal reflection for personal development of each member in the society, where there is hierarchy of positions held by those in power who are capable of making decisions on behalf of others. This then requires that critical paradigm posit the maintenance of power relations among the superior and minor in the society (Ramrathan, 2017; Ritchie et al., 2013). Thus, with the purpose of this study in mind, which is to explore lecturers reflections on the use of Moodle LMP for teaching science modules, this then suggests that the critical paradigm is most suitable since it enhances lecturers (oppressed) to be critical of oppressive power relations between them and the university management (VC and DVC) who imposes the oppression and hegemony by allowing the university system to compel all lecturers to use Moodle at its maximum potential irrespective of their diverse capacity, technological skill, intellectual capacity, position (permanent or contract staff) and others. In other words critical paradigm advocates for personal reflection that can drive lecturers to transform, emancipate, and improve their practices on the use of Moodle LMP.

In addition to the above, studies on the critical paradigm are of the view that facts are continuously being constructed and are affected by social, political, and cultural issues that have impact on their daily life (Spencer et al., 2003). Moving further, Babbie (2010) affirms that studies in the critical paradigm are always fighting for exposure or liberation from historical oppression, structural oppression, and a value-basis oppression in society. As a result, studies in critical paradigm always prefer researchers to be part and engage with the everyday life of each individual from the society in unpacking of the phenomenon (Cohen' et al., 2013). In other words, it is the duty of critical researcher to use personal reflection to create the environment where participants can be free to share their own ideas of their own situation and in their natural setting which they live in. As a result, “the focus of the critical paradigm is thus on an understanding and practical transformation of social circumstances for emancipation and reinforcement” (Babbie, Mouton, & Strydom, 2011, p. 36).

Moreover, Edwards and Skinner (2010), as well as Spencer et al. (2003), further aver that the main purpose of the critical paradigm is to bring about transformation in understanding of a particular phenomenon and situation by personally taking part in the research. This then propagates the use of personal reflection in such a way that I should encourage participants to personally critique all the systems and ideologies that enhance the inequality among themselves in the society in order to develop changes of their practices (Babbie et al., 2011; Ramrathan, 2017). That is why this paradigm is evocating for personal reflection through the use of action research so that both the researcher and participants can engage towards finding the solution on the basis of inequality among the society members (Harvey et al., 2017; Leedy & Ormrod, 2014). Consequently, in this study, I have been involved in all critical action research stages by trying to find the solution to the reluctant use of Moodle after the university management has compelled lecturers to use Moodle, irrespective of their capacity.

Interestingly, the study conducted by Maree (2007) indicated that the use of the critical paradigm is independent of some of its principles which include that reality is socially constructed and

identity is created within the political field of knowledge, rules are based on historical periods, (Maree, 2007; McNiff, 2013). This assertion propagates personal reflection where I was expected to strive for emancipation by eliminating oppression and domination through listening and sharing people's ideas and opinions. As a result, this study involved the lecturers who were compelled and oppressed to use Moodle after it was adopted by the university, to voice out their perception and reflection as to how they can overcome their reluctance on the use of Moodle. The study managed to point out some of the relevant interventions based on social, economic, and political factors.

In addition to the above, the second principle amended that the identity of people is mainly based on the political point of view, and this means that the lens used to question the existing system is subjective and depends on the personal experiences of both participants and researchers. As such, all interpretation is not dependent of scientific verifications (De Vos et al., 2014; Maree, 2007). This then suggests that critical paradigm is not alluding to the use of personal reflections in order to understand and transform participants from any particular oppressive condition or place. This study therefore, sought to consider the historical background of the university and the political background under which lecturers were working. As such, participants were allowed to interpret the current situation of using Moodle based on what they were experiencing. The third principle advocates the use of the historical background of the participants in order to unpack the phenomenon, and it is therefore the task of me, as a critical researcher, to consider the historical background of the institution and participants towards unpacking the phenomenon (Denzin' & Lincoln, 2011; Maree, 2007). This propagates both personal reflection, and it requires both the researcher and the researched to personally read policies of the institution guiding the use of Moodle, including issues of genders, class, and others; participants can voice their ideas about the policy in place. Consequently, this study looked at the historical background of the university including the policy on the use of Moodle and the teaching of the science modules.

Interestingly, these propagate the personal reflection where the critical researchers are expected to provide the space for participants to disclose the power relations with the oppressive working environment (Maree, 2007; Ramrathan, 2017). Thus, the study used different data generation methods to allow the participants to speak their own personal minds and use their conscience to

disclose the oppressive relations in the university since the use of Moodle for teaching and learning was adopted. Be that as it may, “critical theory provides a framework of both philosophy and method for approaching research and evaluation as fundamentally and explicitly political, and as change orientated of engagement” (De Vos et al., 2014, p. 9). According to Creswell. (2014) philosophy is referred to be the first prevailing intellectual ideas, beliefs, and assumptions that influence the research enquiry, and it assisted me to typically develop the study in terms of selecting the relevant research strategies, paradigms, approaches, data analysis methods, and others. As a result, philosophy is vital because it helps the study to formulate research questions that are to be addressed by research objectives. It also assist to direct the researcher to the relevant literature of the study (Creswell., 2014; Denzin' & Lincoln, 2011). This suggests that philosophy in conducting research seems to be more driven by personal reflection than formal reflection because I should cater for lecturers’ personal and intellectual space in order to conduct this study. Note that there are four philosophical assumptions used in the critical paradigm which includes issues of ontology, epistemology, axiology, and methodology (Creswell* & Poth, 2017; Creswell., 2014; Ramrathan, 2017).

5.7.2 Philosophical assumptions in critical paradigm

According to Ramrathan (2017) and Creswell. (2014), when a study is conducted, ontology is referred to as the nature of reality and its characteristics. Ontology is basically concerned with how the study observes reality, and it is believed that reality is dependent on societal actions from individual human being living in that society in order bring understanding of the phenomenon. Denzin' and Lincoln (2011) outline that ontology plays a significant role in the study’s ability to establish the theoretical framework through which the nature of social reality of the phenomenon can be understood on the basis of the nature of existence, understand how it is made up of, and how its components interact with each other. Further to this, the study conducted by (Ramrathan, 2017) provided an example indicating that any phenomenon can have multiple truths and realities. The study studied the case of the Truth and Reconciliation Commission (TRC) which took place in 1995 in South Africa. The TRC identified multiple truths which includes factual or forensic truth (scientific evident truth), personal or narrative truth (individual subjective stories), social or dialogue truth (debate and discussion), and healing and restorative truth (facts to acknowledge

individual emotions). This then suggests that ontology, as philosophical assumptions, assisted me to use different ways to identify or come up with multiple realities or truths about the phenomenon. In the context of this study, ontology resonates with informal reflection where multiple truths and realities prevailed due to the facts that all lecturers were given opportunity to tell their stories about the use of Moodle from the time it was adopted until the time it was made compulsory for teaching and learning in the science modules. During data analysis in this study, direct quote were used to ensure that personal realities or truth prevailed, and during the discussion of findings social or dialogue truth were showed in details to bring clarity on the lecturers reflection on the use of Moodle (phenomenon). Moreover, “the nature of reality is more formally known as axiology, suggesting that there is a possibility of multiple truths” (Ramrathan, 2017, p. 406). Thus, multiple truths resonate with multiple realities which are referred to as the nature of being or existence (ontology). Arguably, what is seen to be reality to the individual researcher may not be real to another researcher. As a result, this study was capable of noticing the existence of multiple realities that arose.

In addition to the above, another important philosophical assumption in the qualitative research paradigm is epistemology, which is referred to as the kind of philosophical assumption that “deals with nature of knowledge systems through which one may view the world... it is referred to as the nature of knowledge” (Ramrathan, 2017, p. 407). For instance, half a glass of water may be described differently to construct the nature of knowledge; some may indicate that the class is half full while others may say it is half empty. This example suggests that the nature of knowledge through which the class is viewed depends on the different social experiences of individuals. Therefore, “subjective evidence is assembled based on an individual views. This how knowledge is known, through the subjective experience of people” (Budden, 2017, p. 140). Further to this, epistemology relates to the ways to produce and make, understand, and implement knowledge that is acceptable and valid in order to unpack the component of the phenomenon (De Vos et al., 2014). Moreover, this epistemology propagates personal reflection since the understanding of the phenomenon (lecturers’ reflection) is basically dependent on the subjective sense of individual participant (lecturer) as to what knowledge can be generated when teaching and learning modules using Moodle LMP. As a result, this study did observe this philosophical assumption

(epistemology). Consequently, I spent about two months in the field generating data, in such a way that the participants' subjective interpretation of their reflection on the use Moodle was clearly unpacked. This suggests that I was always close to the participants (lecturers) in order to influence them to draw the artefact indicating their subjective reflections on the use of Moodle.

Furthermore, "the ontological assumptions inform the epistemological assumption, in turn creating methods to generate data" (Budden, 2017, p. 141). As a result, methodological assumption is referred to as the nature of enquiry that creates the dialogic and dialectical platform between the researcher and the researched in order to unpack the phenomenon (Denzin' & Lincoln, 2011; Guba & Lincoln, 1994). Moreover, Creswell. (2014) assert that this assumption is taken as inductive, emerging, and are mostly shaped by the studies' options of selecting data generation methods and data analysis methods. This then propagates formal reflections where I was required to be cognisant of data generation methods and analysis methods relevant for the study in order to unpack the phenomenon. As a result, this study has maintained this philosophy by utilising three different data generations methods that were flexible enough to be modified to fit the needs of participants. Thus, lecturers were asked the semi-structured questions from one-on-one semi-structured interview schedule which were modified and were giving the space of probing. Moreover, Lecturers were requested to draw the artefacts and also to complete the reflective activity. Moving further, guided qualitative data analysis was used which allowed the themes to emerge from the generated data. This was done in order to create the deep understanding of the lecturers' reflection on the use of Moodle platform to teach science subjects. In summary of all three above-discussed philosophies, see the Table 5.3 below

Table 5.3: Summary of philosophical assumptions in critical paradigm

Feature	Description	Reflection
Purpose of enquiry	<ul style="list-style-type: none"> • Not only to understand and describe, but to empower and emancipate lecturers' reflection on the use of Moodle to teach science Modules. • It is transformative, concerned about the move from oppression and inequality in the society to the bring about the societal change, justice, equity, as well as equality • Deconstruct the lecturers minds on the use of Moodle 	<ul style="list-style-type: none"> • Personal, Informal and formal
Ontology	<ul style="list-style-type: none"> • There are multiple reality and truths (truth is many) • Reality is explored and social constructed through lecturers interaction and their basic human actions on the use of Moodle • Explores how lecturers make sense of their own natural settings (Moodle) for teaching science modules by being aware of their daily activities, conversation and others. • Many realities emerged due to different subjective reflections, perceptions views on the use of Moodle 	<ul style="list-style-type: none"> • Informal

Epistemology	<ul style="list-style-type: none"> • Lecturers, reflections on the use of Moodle were understood through intellectual process of interpretation based on their personal experiences in the society. • Study provides the common space of listening, talking and writing about their subjective sense of the phenomenon 	<ul style="list-style-type: none"> • Personal
Methodology	<ul style="list-style-type: none"> • Data negation methods were more friendly, social and interactive (one-on-one semi-structured interviews, artifacts and reflective activity) • Inductive and deductive reasoning were observed 	Formal

5.7.3 Application of the critical paradigm

According to Asghar (2013), the critical paradigm was first used at the Frankfurt School by the most well-known founders of critical theory namely Horkheimer, Adorno, and Marcuse, who adopted the Marxist tradition in conducting the empirical research. Thus, the critical paradigm is used in industries, education, and others fields to “seek human emancipation to liberate human being from the circumstances that enslave them” (Horkheimer, 1982, p. 244). Moreover, the critical paradigm is mostly applied in the context where the main objective is to challenge and question the status quo. Further to this, it also strives to attain the society that is balanced, just and democratic. Moreover, is predominantly critical with the issue of power relations (oppressive conditions) in the society in terms of education, race, capacity, class, gender, economy, religion and other social institutional issues (imbalances of the powers) (Creswell* & Poth, 2017; Hennessy, 2016). As a result, Bohman (2005, p. 312) articulated that critical theory can be applied in the context where “It must be explanatory about what is wrong with current social reality... It must identify the action to change it... It must provide both clear norms for criticism and transformation”. This then alludes to the use of informal reflection to find what is wrong (problem),

formal reflection to have a plan to intervene as well as personal reflection to furnish personal interpretation about the situation or context. This then suggests that there are various studies conducted in critical paradigms with the aim of serving different intentions in the society in order to understand the phenomenon. Therefore, considering these studies can display evidence and document the use of the critical paradigm so this may sustain and support the reflections that emerged in this study, Table 5.4 below makes provisions of these few selected studies.

Table 5.4: related studies showing the application of critical paradigm

Authors	Study summery	Conclusion/application
Khoza and Mpungose (2017)	The main of this article was to explore the psychological spaces used by academics in the assessment of postgraduate theses/dissertations supported by Turnitin at a South African university. Both purposive and convenient sampling were used to selects six academics that participated in this critical action research study.	The study revealed an oppressive state where the academics' usage of Turnitin in assessment was driven by self and societal spaces more than professional space. Therefore, the study recommended the alignment between the self, societal, and professional spaces to drive the academics' usage of Turnitin to support assessment of theses/dissertations. This study alluded to the use of personal reflection, in order to ensure transformation and empowerment
(Gaillard-Thurston, 2017)	This study was exploring the dropout rates of students from South African schools. The study question the status quo of South Africa's National Schools Uniform policy that compels students to wear uniforms when going to school. Critical Paradigm was used as theoretical framework for data interpretation.	The study therefore found the social injustices which have become embedded in the schools dress code, when the national policies were interpreted into school rules by the management, and this was fair to those learners who did afford to buy the uniform. The study therefore recommended reviews of the dress code policy to accommodate other students

		<p>who can not afford to buy the uniform. In this case the critical paradigm seeks personal reflection to prevail.</p>
Smith (2016)	<p>The study was in the Faculty of Education, York University in Canada. The aim of the study was to explore the reasons why lecturers are reluctant to use the adopted digital technology in learning, and critical theory was used to frame the study</p>	<p>The findings indicated that lecturers were finding it challenging to use digital technology resources due to the lack of relevant skills and support from the university management. The study therefore recommended the provision of timeous lecturer training, the personal motivation or drive from the lecturers including dialogue between management and staff. Application of critical paradigm seeks informal and personal reflection to prevail.</p>
Mpungose* (2016)	<p>The study was conducted in one of the High schools in South Africa, the main aim of the study was to transform the pedagogical practices of teachers teaching Science subjects. Grade 12 teachers were made participants and the study was framed using critical theory.</p>	<p>The study concluded science teachers where using same teaching activities and methods even if the Department of Basic Education had changed the curriculum, and it was recommended from the study that teachers should read curriculum policy documents to familiarise themselves about new pedagogy. this then propagates for both personal and formal reflection in critical theory</p>
Msibi (2012)	<p>The main purpose of the study was to empower and emancipate the sexually marginalised black students from conservative schools in South Africa. Queer theory (critical paradigm) was used to frame the study. The school learners, teachers,</p>	<p>The use of the critical paradigm (queer theory) assisted the study to conclude that queer students where oppressed in ways that ranged from hate speech to physical violence perpetrated. The study therefore recommended teachers to be at the forefront of protecting the queer students, and then re-educate</p>

	and student teachers were sampled as participants in this study	teachers about homophobia. This conclusion seems to take a direction of personal reflection, in the use of critical paradigm
Nkohla (2017)	This was a critical action research study aiming to explore reflections of the four teachers teaching agricultural science in South African schools. The study used reflective activity, one-on-one semi-structured interviews, and a focus group discussion for data generation methods.	The study found that agricultural science put more emphasis on practical skills whereas the actual content is more theoretical; teachers find it difficult to teach it due to a lack of resources. Thus, this critical action research recommended the use of reflection on their practice to improve and change their teaching methods. As result, this seeks for both personal reflection in order to change the status quo

In summary of the table above, the use of critical research in most studies indicated the influence and propagation of personal reflection. This indicates that the critical paradigm seeks to change, and emancipate, the participants and the researcher in order to improve the practices of themselves which in turn benefits the institution (Denzin' & Lincoln, 2011; Esau, 2017).

5.7.4 Significance of using the critical paradigm

The previous sections have alluded to the characteristics and etymological understanding of the critical paradigm. Moreover, various studies were presented to view how the critical paradigm has been implemented in different specific contexts. Moving further, this section seeks to display the potential strengths or possible advantages of using the critical paradigm as an umbrella for making sense of the data generated. Not that, critical research paradigm has a number of strengths which includes that it is potentially self-critical at the most basic level, and this implies that it is capable of stimulating self-introspection or self-reflection from participants (Cohen' et al., 2013; Spencer et al., 2003). In other words, the critical paradigm is “prescriptive and normative, entailing a view

of what of what a behavior in a social democracy should entail”. This suggests that the critical paradigm is driven by the process of reflections (personal, informal, formal) in order to ensure that there is democracy and equality in the society. This suggests that critical studies believes that changes starts with the personal reflection of individuals living in the society, and then it is supported by the informal reflection which is driven by members of the institution or the organisation towards achieving its goals, as well as formal reflection which is influenced by written laws and rules to ensure equality and democracy. In support of this, the critical paradigm through reflections is capable of redressing inequality and also of promoting democracy or freedom with societal members (Guba & Lincoln, 1994; Ritchie et al., 2013).

Interestingly, critical paradigm can also challenge the status quo in order to create immediate, positive, self-directed change (Ramrathan, 2017). In line with this, the critical paradigm “is transformative: to change society and individual to social democracy. In this respect the purpose of critical educational research is intensely practical and political to bring about a more just egalitarian society” (Cohen' et al., 2013, p. 31). In other words, through the use of reflections, the critical paradigm receives powers from the researched and researcher to question the actions taken or the status quo that is in place governing the society in a particular institution. As a result, this assertion has prevailed in this study because the process of this research was practical in such a way that lecturers (the researched) together with me, did question the status quo of the university of making Moodle LMP to be compulsory platform for teaching and learning. This made this study to adopt action research style which assisted the study to come up with possible interventions and recommendations that brought equality and democracy among the university community members.

In addition to the above, the critical paradigm can assist people and institution to align beliefs, norms, and actions (Creswell* & Poth, 2017; De Vos et al., 2014). As a result, studies in critical paradigms are seeking to transform rather than to understand and describe. This seeks the importance of the relationship between members of the society and the management of the institutions in order to create the just working environment. Further to this, participants’ actions are viewed as being more vital because the critical paradigm thinks of participants and producers (subjects) as products (objects) and this means that “they are not treated as instruments but rather

as key stakeholders in the data generation process” (Budden, 2017, p. 154). In this context, personal reflections prevailed during the processes of unpacking the phenomenon which is dependent on participant’s personal experiences. As result, this study has maintained a good relationship between a research and participant in such a way that a comfortable data generation environment was created in order to ensure their active participation by openly expressing their reflection on the use of Moodle to teach science modules. That is the reason why Creswell. (2014, p. 31) further asserts that the critical paradigm is good because “it makes people to think. Encourage people to interact, form networks, become activists, and form action-oriented groups, and help individuals examine the condition of their existence”.

Moreover, it is affirmed that critical studies are taken as liberators in any oppressive situation, and this strength is ensured through dialogue in order to make humans from the society aware of the oppressive structures in place in their institutions (Babbie, 2010; De Vos et al., 2014). It is for this reason that critical studies are taken as change agents, because they use personal reflection to create opportunities for a dialogue between those in management (power) and those who are managed (oppressed). Furthermore, the policy guiding the use of Moodle was requested from the registrar in order for participants to have access to it. Surprisingly the university did not have online policy document guiding the use of Moodle LMP. As a result, the study used module outlines documents and Moodle guideline documents as the replacement of online policy in order to unpack the use Moodle on the teaching and learning of science modules.

5.7.5 Overcoming weakness of using the critical paradigm

According to Creswell* and Poth (2017), as well as De Vos et al. (2014), the critical paradigm lacks empirical scientific evidence since it is more qualitative than quantitative. On the contrary, Denzin' and Lincoln (2011) further outline that there is no single way of conducting research, no correct or incorrect method to generate knowledge or data, not is there a unique method that automatically justifies the intellectual way of conducting research. For this reason, Cohen' et al. (2013) affirms that in overcoming this weakness critical paradigm does not stick to one scientific way of conducting research but it uses guiding principles or a set of criteria that is unique and relevant to each member of a group of people taking part the research process. As a result, this advocates the use of personal reflection in order to overcome this challenge. Thus, this study was

conducted in the social context of lecturers using Moodle, they used their personal experiences in their own university settings, and participatory action research was administered in order to unpack the study phenomenon.

A significant potential weakness includes the possibility of excessive researcher bias during the participatory research process. This can be dangerous as may lead to issues of safety where the research location is threatened, or it may disturb the entire research process (Asghar, 2013; Babbie, 2010; Christiansen et al., 2010). In support of this, Denzin' and Lincoln (2011) further assert that interactive nature of the study emerges the sense of superior (researcher) and inferior (researched). This impedes participant's freedom to freely express themselves and this in turn create possibilities of the study to create biases and prejudices or unnecessary judgment in the study. This seeks that personal reflection from the study prevail in order to overcome this weakness. Consequently, I have observed this challenge because I did not raise my voice indicating that I was much ware of Moodle LMP. The participants were not threatened in any way but instead a friendly research atmosphere was ensured. For instance, data generation was conducted in their own space during their own free time.

In addition to the above, “the critique of this approach is the view that critical theory has a deliberate political agenda” (Cohen' et al., 2013, p. 35). In overcoming this challenge, various studies further assert it is possible for studies in the critical paradigm to be ideologically neutral during the research process. This then propagates the personal in order to maintain the neutral state. In the context of this study this challenge was dealt with in such a way that even I was aware of the university politics, but it was not raised during the process of research; I allowed the status quo to prevail (Guba, 1990; Leedy & Ormrod, 2014; McNiff, 2013; Ramrathan, 2017).

5.8 Reflecting on the conclusion of the chapter

On the basis of the conclusion of this chapter on research design, this chapter did embarked on outlining the research question, objectives, and research questions which led to the contextualisation of the study in order to unpack the lecturers' reflection in their own context.

Further to this, Chapter Five went further to discuss the research approach (metacognition paradigm) adopted by this study, which is the qualitative approach; its history, philosophical underpinnings, advantages as well as its strength were also fully unpacked. This then led to the discussion of the methodological paradigms which included interpretivist, positivist, and critical paradigm. This chapter was clear that the critical paradigm was the most suitable in this study because it was meant to not only understand lecturers' reflections but to also change and empower lecturers in their own practices of using Moodle. The etymological definition, its application, including strengths and challenges, were fully unpacked. Note that this chapter indicated that all discussions on metacognition and methodological paradigms were all framed around the principles of reflection guiding and shaping arguments in this chapter. These reflections are called personal, formal and informal reflection.

CHAPTER SIX

Actualising lecturers' reflections

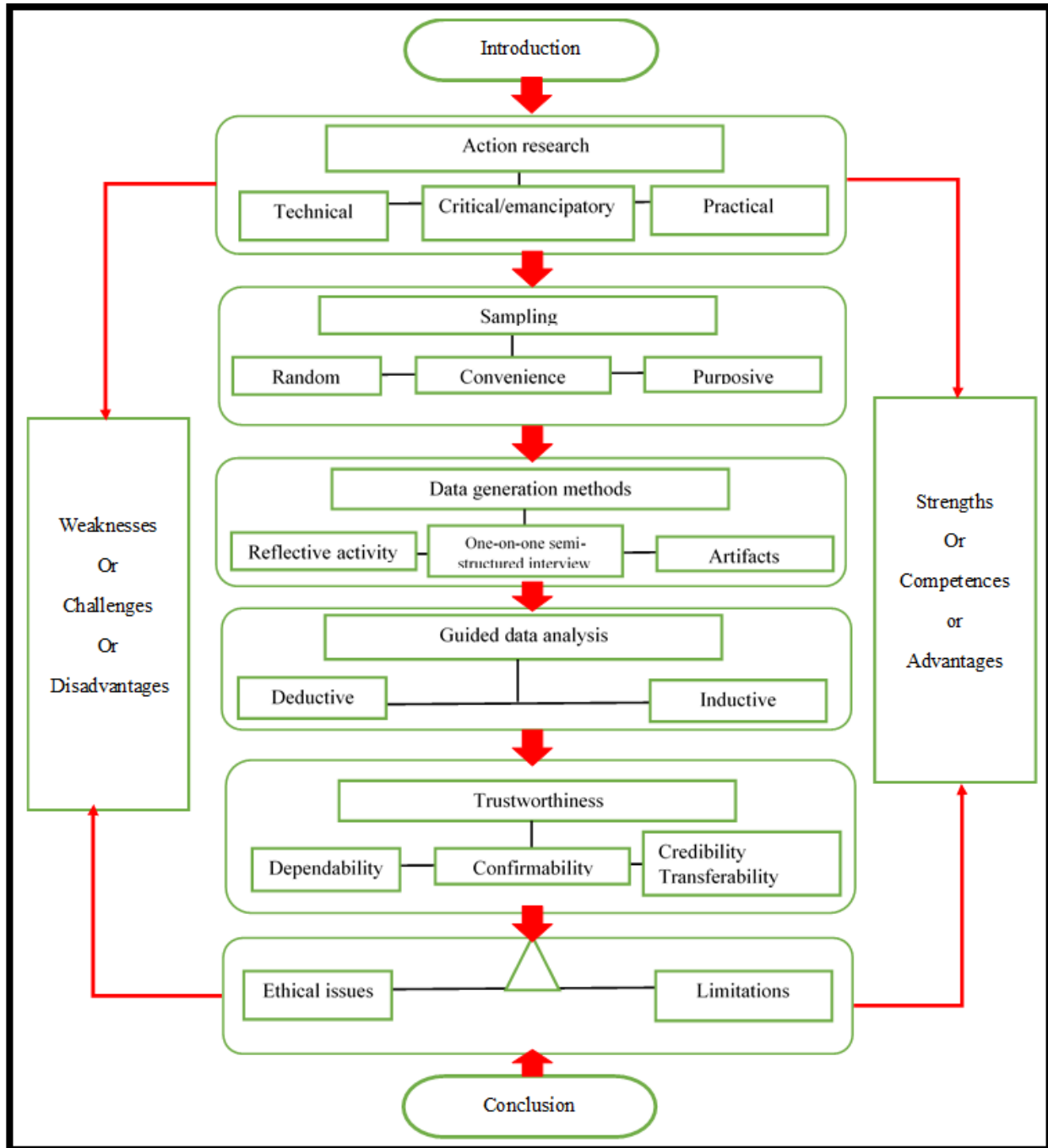


Figure 6.1: Chapter 6 organogram

6.1 Introduction

Note that the previous chapter (Chapter Five) before this displayed the first part of research and design methodology. Thus, the previous chapter outlined research design (metacognitive and methodological paradigm) which was framed by issues reflection. This chapter then saw the need to take a step further to discuss the second part, which is research methodology. As a result, this chapter paints a clear picture as to how lecturers' reflections were put into action. Moreover, Chapter Six unfold as depicted in Figure 6.1 above, that is, after this introduction the chapter then unpacks the adopted research style, which is action research, since the study is focusing on empowering lecturers on the use of Moodle to teach their modules. Moving further, sampling strategies (purposive and convenience is unpacked in this chapter. The data generation methods were unpacked which includes reflective activity, artefact, and one-on-one semi-structured interviews. The qualitative data analysis (guided) is fully unpacked in terms of inductive and deductive process. Moreover, this chapter also reflects on ethical aspects by articulating on issues of non-maleficence, beneficence, autonomy, and others in order for lecturers to be protected. Finally, issues of trustworthiness such as credibility, transferability, confirmability, and dependability are unpacked in this chapter. The discussion of research methodology in this chapter is influenced by reflections which include formal, informal, as well as personal reflection, see Table 6.1 below.

Table 6.1: Research methodology concepts

Research concept	Formal reflection	Informal reflection	Personal reflection
Action research	Technical	Practical	Critical/emancipatory
Sampling	Random	Purposive	Convenience
Data generation methods	Reflective activity	Artifacts	One-on-one semi-structured interview
Data analysis	Deductive reasoning/process	Inductive reasoning/process	N/A
Trustworthiness	Dependability	Credibility Transferability	Confirmability

Ethical issues	Informed consent	Harm and risk / Non-Maleficence	anonymity privacy confidentiality voluntary participation
Limitations	From the literature	From the research and design	From the researcher' reflection

6.2 Reflecting on the diverse historical background of Action research style

The term ‘action research’ was basically presented by Kurt Lewin in 1946 to indicate and outline the relevant approach toward social research which intertwines the generation of theory together with changing the social system. This is achieved through the researcher acting on, in and for the research process. See a participatory research study conducted a an American-German physiologist Lewin (1946). The study’s main objectives were to provide ways and means or techniques for the betterment of intergroup relations in the society. The participants were the representatives from leaders of the community, community representatives, and school representatives, labour representatives, management representatives, minority organisation representatives, and national department representatives. The research questions of the study were, “1. What is the present situation?; 2. What are the dangers?; 3; and most important of all, what shall we do” (Lewin, 1946, p. 34). Furthermore, the study displayed a clear picture on the meaning of action research and how it differed from the traditional scientific research. Thus, it was found from the study that “a research needed for social practices can best be characterised as research for social management and social engineering. It is a type of action a comparative research on the conditions and effects of various forms of social action and research leading to social action (Lewin, 1946, p. 35). As a result, the study further reveals that action research is mainly concerned with findings ways and means of dealing with critical problems with the society which may include issues like fascism, racism, feminist issues, anti-Semitism, crime, poverty, intergroup conflict, majority versus minority issues, power relations issues, and others. In interpreting findings from this study, this then suggests that action research is alluding for informal reflection because social problems are taken as the priority by findings or devising solutions through which can be resolved.

In the study conducted by Trist (1976), it was indicated that action research becomes prominent in Britain after World War II when social problems emerged, and action research was used by the Tavistock Institute of Human Relations (TIHR) as the technique to deal with social problems. TIHR had interdisciplinary group formed of psychology and sociology as well as psychiatry and this group was committed to the social engagement of the social sciences as a way of enabling the action research to contribute solutions that are vital to social problems. As result, this suggests that historically, action research “was at least grounded in the actual problems faced by organizational members and was carried out in close collaboration between researcher and practitioner. Sometimes researcher and practitioner were the same person.” (Susman & Evered, 1978, p. 582). This then suggests that action research is mostly influenced by informal reflection where both the researcher and the researched share their own experiences in order to understand the phenomenon. Thus, it is also observed in the context of this study because I also participated as a participant in the process of data generation by doing the reflective activity with an aim of finding the solution. In addition, I was also involved in the process of generating data using one-on-one semi-structure interviews.

Furthermore, Denzin' and Lincoln (2011), as well as Kemmis, McTaggart, and Nixon (2013), further assert that action research came into existence because it was opposing the traditional and scientific way of conducting research. These studies assert that action research seeks new epistemologies of practice where it is believed that knowledge is constructed from the social space where humans, plants, and animals are living. That is why Hall (1982) further assert that action research is a participatory form of doing research which is aimed at solving any practical problems that exist forever in human cultures. Further to this, action research have made contribution to all life-supporting human activities from plants and animals to political spheres. Further to this, “we can also trace the evolution of action research back to the Marxist dictum that the important thing is not to understand the world but to change it, through the theorising of Gramsci and others” (Reason & Bradbury, 2001, p. 2). This suggests that historically action research advocated instilling change in the behaviour of the society, and this implies that conducting action research in the context of lecturers using Moodle at a university might come may yield positive intervention.

As a result, action research seems to take a direction of informal reflection where opinions and experience are taken as the most important element in order to unpack the phenomenon.

In addition to the above, action research was witnessed in the study by Freire (2000) titled, ‘the pedagogy of the oppressed’ in the field of education. The study outlines the participatory action research of those working for liberation of the oppressed and those who are disadvantaged in this world. The study further insisted the participatory teaching methods in education in order to unpack the phenomenon. In other words, the study was driving the move away from the traditional way of teaching (as instructor) to the participatory way of teaching (facilitator) in the process of teaching and learning. This then suggests that action research is driven by informal reflection where participants should lead the way in the research project by sharing their ideas and experiences. This was observed in this study because lecturers were given different opportunities to tell their stories and share experiences about the use of Moodle during teaching and learning.

Interestingly, Toulmin and Gustavsen (1996, p. 186) assert that “Since 1945, the problems that have challenged reflective thinkers on a deep philosophical level... are matters of practice: including matters of life and death... The modern focus on the written, the universal, the general, the timeless... which monopolised the work of most philosophers after 1630... is being broadened to include once again the oral, the particular, the local and the timely. As a result, this assertion is further supported by Reason and Bradbury (2001), as well as Reason and Goodwin (1999), in that action research is currently and dominantly used almost in all fields which includes pragmatic philosophy, critical thinking, the practice of democracy, liberationist thought, humanistic and transpersonal psychology, constructionist theory, and more recently transformation in education.

6.2.1 Reflecting to the definition of Action research style

According to Reason and Bradbury (2001), “there is no short answer to the question ‘What is action research?’...but action research is a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview which we believe is emerging at this historical moment. It seeks to bring

together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities”. This definition of action research posits that the action research process is driven by personal reflection, informal reflection, as well as formal reflection where personal ideas including ideology from a certain discipline (theory) are of value in order to find the solution to the pressing and oppressive condition the communities or institution.

In addition to the above, Susman and Evered (1978, p. 587) aver that action research is referred to as the type of research that “aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework... it develops the self-help to competencies of people facing problems ”. In other words the problem situation itself is taken as process of changing, empowering, and emancipating the participants through their actions which results from their experiences of the problem (Cohen' et al., 2013; McNiff, 2013). Moreover, action research is termed to be the integrated approach to conducting research in social and humanities research that deals with various problems such as attitude and stereotypes, child and adolescent, poverty and housing, legal structures in the community or institutions, political issue, state and international problems, and others (Lewin, 1946; McAteer, 2013). This propagates the essence of informal and personal reflections in such a way that action research is greatly concerned with the socio-economic and political problems or factors that affect personal and daily output of humans in their society. This resonates with the use of action research in this study which have an aim of exploring lecturers’ reflection so that lecturers may take part to find solution towards the pressing condition of using Moodle after it was adopted and made compulsory to teach modules by the university.

Furthermore, another definition of action research which alludes to personal reflection is articulated by Kemmis et al. (2013), who assert that action research is a form of self-reflective enquiry where participants interrogate their actions in order to make some improvement on their understanding for their natural setting or context. This is in line with what is asserted by McNiff (2013) that action research seeks and creates support for people in the society to develop their own personal identities in order that they empower themselves for the good output of their institutions.

This definition alludes to the issue of personal reflection where humans in the society should develop their talent so that they are able to find their strengths in order to improve their own weakness to attain their goals. This in turn, “is concerned with improving the social conditions of existence” (Kemmis- & McTaggart, 2005, p. 601).

Furthermore, these studies (Cohen' et al., 2013; Corey, 1953; Creswell* & Poth, 2017; Hopkins, Joyce, & Calhoun, 2002; Noffke, 1997; Zeichner & Noffke, 2001) provides details on the definition of action research. Studies further outline that action research is on basis of action and the enquiry by the researcher on the researched. This enhances the attempt to understand, improve and reform or change the normal practice. Moreover, action research is considered by these studies as the systematic way of reflecting on the problem in order to improve the practices, and it is thus regarded as the small scale manner of providing intervention to any pressing situation. In support this, studies further assert that action research is a process in which practitioners like academics study a particular phenomenon with an aim to identify the problem, evaluate it, take decision about solving it in order to improve their practices. This suggests that, action research is on the basis of informal reflection (self-introspection for improvement and empowerment), informal reflection (to assist the institution and other people), as well as formal reflection (systematic way of solving problems). This was observed in this study that lecturers were given a chance to do self-introspection about their actions on the use of Moodle to teach their science modules through the given reflective activity. Having articulated on that, this study argues in defining action research that, action research is done on the basis of personal, informal, and formal reflection in order to identify a problem, plan, and reflect more carefully and systematically in order to improve practitioners action in their own disciplines.

In support of the above articulation on the definition of action research, Kemmis' and McTaggart (1998, p. 5) assert that “action research is a form of collective self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of the own social and educational practices, as well as their understanding of these practices and the situation in which these practices are carried out”. This definition seem to be on the basis of wanting both participants and researchers to do self-interrogation (personal reflection) in order to identify their

weakness for improvement and empowerment. The improved practices can have a positive impact to their social settings like universities, schools and others (informal settings). That is why Zeichner- (1995) and De Vos et al. (2014) affirm that action research is eager to bring about change in the lives of both the researcher and the researched in order to find their personal identity (confidence and strength) of their actions which will overcome their weakness. For instance, in the context of this study, lecturers have identified interventions towards challenges of Moodle usage in order to overcome their reluctance. Thus, both the lectures and I have found ways to improve their teaching practices while using Moodle.

Moving further, in defining action research the study conducted by Rapoport (1970) viewed action research as the cyclical process which involves five stages, namely: 1. Diagnosing stage; 2. Action planning stage; 3. Action taking stage; 4. Evaluating stage; and 5. Specifying learning; as depicted in Figure 6.2 below.

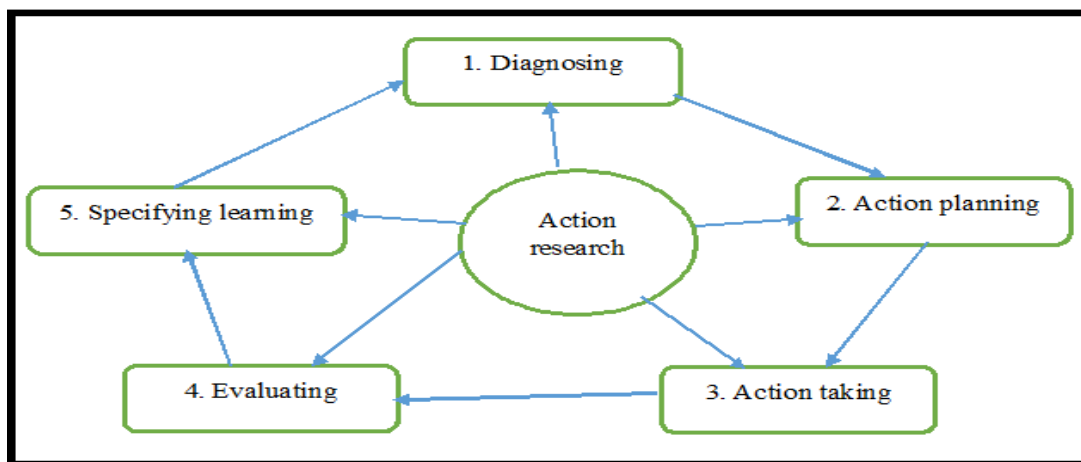


Figure 6.2: Action research as the cyclical process adopted from (Rapoport, 1970, p. 112)

Cohen' et al. (2013) asserts that stages in action research differs according to the different projects and studies. As a result, Rapoport (1970) further elaborate on stages in defining action research in such a way that the first stage is all about identifying the problem, second stage seeks alternative solution to the problem, thirds stage selects the best solution to the problem, fourth stage studies the results of action taken, the last stage display general findings. All these above action research

stages reflect the notion of personal reflection, informal reflection as well as formal reflection towards finding the solution in order to understand the phenomenon and bring change. Action research consists of guiding principles/characteristics in order for practitioners, like lecturers, to reflect on their practices (Cohen' et al., 2013).

6.2.2 Principles and characteristics guiding the use of action research

According to Kemmis et al. (2013), as well as Cohen' et al. (2013), action research has common and key guiding principles which must be observed. The section that follows will unpack the few key suggested principles that were witnessed and observed in this study. Note that one of the key principles of action research is that it is aimed at improving education by making changes through learning from the consequences of changing (Kemmis et al., 2013; McNiff, 2013). In other words, this principle seeks lecturers to come up with changes in order to improve their education systems and practices. This has been witnessed in this study because lecturers changed their practices which led to the reluctance on the use of Moodle. Thus, lecturers, after participating in this study, were driven by personal reflection in order to change their practices and provide changes towards improving the use of Moodle in teaching their modules.

Furthermore, action research is participatory as well as collaborative since it is a type of research that seeks practitioners to work together in order to improve their own practice in an institution, and it is also interdependent between a researcher and the researched (Creswell', 2013; McAteer, 2013). This principle suggests that both the researcher and the researched are working together in order to achieve the same goal to improve their practices in an institution (Cohen' et al., 2013; Susman & Evered, 1978). This principle was made cognisant in the conduction of this study since I was working together with lecturers as participants in finding the solution towards their reluctant use of Moodle after it was adopted by the university. Further to this, both the researchers and lectures were involved in all stages of action research by reflecting on the use of Moodle in order to improve the practices during the teaching of science modules. This use of this principle was influenced more by informal reflection (working collaborative) than personal reflection (individual improvement of the practice) in the process of reflecting on the use of Moodle in teaching science modules.

Action research is cyclical, it consist of the circles of planning, acting (implementing the plan), systematic observation, reflection which in turn seeks re-planning which is the aim of self-reflection (Kemmis et al., 2013; Susman & Evered, 1978). The main intention of this principle is to create a systematic way of developing in which the problem can be looked at in order to bring a good way of communicating towards solving the problem in an institution (McAteer, 2013). This principles seek self-reflection in order to identify the problem, come up with a solution and implement it, observe it and reflect on it. (Cohen' et al., 2013; De Vos et al., 2014). In the words, these principles propagate personal reflection where lecturers were questioning themselves based on their problems with their use of Moodle when teaching the science modules. Thus, in the context of this study, lecturers were able to undergo all stages of action research. For instance, lecturers were all sent to complete the reflectivity activity with the aim for each individual lecturer to identify their problems on the use of Moodle during teaching and learning of science modules; from there they all participated towards finding the solution. In support of this, action research is a systematic learning process in which people act deliberately, though remaining open to surprise and response to opportunities(Cohen' et al., 2013).

According to Denzin' and Lincoln (2011) action research is future oriented, and it is driven by goals towards dealing with practical oppressive matters in the institution. In other words, action research seeks that people have ideas and assumption about their institutions for the future and this can be attained by asking the status quo through the integration of policies in place (Le Grange* & Reddy, 2017; McNiff, 2013). This principle seems to be influenced by formal reflection when the research is driven by written goals to be achieved. Thus, the question of existing policies (online policy) prevails in order to make provision of suggesting possible solutions for the future of the university (Khoza & Mpungose, 2017). As a result, this study has observed these principles for the fact that lectures were given a chance to look at their set goals during the action research which assisted them to be able to use the Moodle 2.0 training guide as well as the Module outline to question their present action for their future and the future of their university.

Moreover, action research is political and it allows people to make critical analysis about their natural settings which includes lecturer hall, management structures, institutions systems, and others, in which they work (Kemmis et al., 2013; McAteer, 2013). In other words, action research seek practitioners to take part in the recommendation of the changes in the structures of the institution for the improvement of their practices (Cohen' et al., 2013). This resonates with the lecturers' personal reflection on suggesting the improvement on the working environment, which in turn may assist the university. That is the reason why this study has observed this principle, because lecturers were meant to reflect on the issues of location, role, their accessibility, and others, in order to analyse their working conditions, system, and structures for change in order to improve their practices. This was done through data generation methods (reflective activity, one-on-one semi structured interview, and by drawing an artefact) used in this study.

In addition to the above, action theory and practice is intertwined, and this requires practitioners to major their practices in the institution (Christiansen et al., 2010; Cohen' et al., 2013). In other words this principle is driven by lecturers' formal reflection on their practices in order to improve their practices (Khoza & Mpungose, 2017). As a result, in this study lecturers were made to read theoretical underpinnings of using Moodle (constructivism and constructionism) by giving them relent documents to read for their own capacity building. Thus, lecturers were able to practice the use of Moodle being guided by a Moodle training guide (constructivism). This lead to the critique of their current actions or practices on the use of Moodle when teaching their modules and they were able to improve. This suggests that action research is done for emancipatory purposes of their normal practices. It was observed from the study that lecturers were greatly embedded in their traditional way of teaching (lecture method in a lecturer hall) but after critical action research lecturers were able to familiarise themselves of modern ways of teaching (online and blended learning) through the use of Moodle.

6.2.3 Philosophical underpinnings that reflects action research

Various studies assert that action research reflects some different philosophical viewpoints such as praxis, hermeneutics, existentialism, and phenomenology (Cohen' et al., 2013; Kemmis et al., 2013; McAteer, 2013; Susman & Evered, 1978). These studies further aver that phenomenology

occurs on the basis of human structures, subjective experiences, and consciousness, for knowledge production. The focus here is on the individual or a group of human experiences that can be used in order to construct reality (ontology) and knowledge (epistemology) (Creswell., 2014). In other words, humans action have phenomenological viewpoints or underpinnings (Cohen' et al., 2013). In support of this, Susman and Evered (1978, p. 596) further assert that all human's "ends, values, and norms have a phenomenological reality from the perspective of the person or groups taking action, and knowing them is essential to the action researcher in predicting and understanding the behaviour of the person or groups engaged." This suggests that understanding of the phenomenon, either epistemological or ontological, lies with human experiences and actions taken by participants in the society. As a result, this philosophical viewpoint resonates with personal reflection where participants' personal experiences about the phenomenon being studied are taken into consideration. As a result, this study did observe these philosophical underpinning since all values, norms, action, and experiences where given priority in understanding or unpacking their reflections (phenomenon) on the use of Moodle when teaching their modules.

In addition to the above, action research was also considered to hold the philosophical underpinning of critical praxis, and this is referred to as the manner of reacting upon the oppressive condition that is faced by human beings in order to change them (Cohen' et al., 2013; Freire, 1985). Further to this, Bernstein (1971, p. x), asserted that praxis philosophical viewpoint deals with "the disciplines and activities predominant in man's ethical and political life". In other words, praxis consists of two dimension namely, 'true human and free life' as articulated from the work of Aristotle (Bernstein, 1971). Further to this Marx (1963) extends that praxis requires humans to take action in order to change for empowerment and improvement in terms of alienation, society, and economy. This principle requires practitioners' ethical human action be taken under an oppressive situation in order to free their lives in their own natural settings, and this resonates with personal reflection. This philosophical underpinning was observed in such a manner that lecturers were given a chance to reflect on the use of Moodle which was made compulsory (oppressive condition) by the university.

Furthermore, hermeneutics is termed to be the art or a theory of interpreting textual data such as judicial, biblical, historical text, and others and the current hermeneutics comprises of both verbal and non-verbal communication of textual data (Cohen' et al., 2013; Susman & Evered, 1978). Further to this, textual data in action research assists the study to interpret the culture, language, and the history of participants in order to unpack the phenomenon (lecturers' reflections), and this is a most influential philosophy in social sciences (De Vos et al., 2014; McNiff, 2013). In support of this, hermeneutics action research cycles seek both study and the participants to possess the pre-knowledge about what is being studied in order to be able to identify the problem and follow all other stages of the action research (Cohen' et al., 2013; McAteer, 2013). This philosophical viewpoint propagates personal reflection since it sought me to be able interpret participants' personal culture, language, and history in all stages of action research. As a result, this philosophy was maintained in this study because I was able to involve lecturers in all stages of action research in order to understand the use of Moodle as the system of the university.

According to studies, one of the philosophical viewpoints of action research is existentialism (Barrett, 1958; Bernstein, 1971; Cohen' et al., 2013; De Vos et al., 2014). These studies further assert that existentialism believes that every choice an individual actions takes, is merely based on human interest to do that, which is embedded for thinking, acting, feeling, living human individual experiences. In other words, action research involves human action that are as a result of feelings, thinking and experiences on the matter being studied and this propagates personal reflection of undertaking action research by participants (lecturers) (Khoza, 2017). Thus, this study did observe this kind of philosophical viewpoint in such a way that lecturers were voluntarily requested to take part in the study through the use of consent letters that were signed by participants.

6.2.4 Reflecting on the use of action research

In the midst of understanding the use of action research some scholars use various terms to define it such as participatory research, critical research, collaborative enquiry emancipatory research, and others (Cohen' et al., 2013). According to Esau (2017, p. 446), the use of action is about “learning by doing, with a view to improving a particular practice... the problem is identified, something is done to improve the process, the outcome is evaluated, and if the outcome is not

satisfactory, further attempts are made”. This suggests that action research is embedded in the use of personal reflection where practitioners can be involved in the reflectivity process for self-introspection in case of oppressive conditions in the institution. Action research also involves informal reflection where practitioners are encouraged to work as team to share experiences and ideas towards solving a particular problem. Further to this, formal reflection is also taken into consideration in action research by undergoing systematic stages towards solving a particular problem to improve practices (Christiansen et al., 2010; Denzin' & Lincoln, 2011). In addition to this suggestion Cohen' et al. (2013) and McAteer (2013) articulate that the main objective of the use of action research is to identify a problem and make input into a practical problem of practitioners in their institutions in order to take the right direction towards improving their practices, and this requires both the study and participants to work collaboratively to attain the core-learning in the process of action research for improving the practices.

In addition to the above, the use of action differs from other research styles or methodologies because its focus is on the participant involved automatically becoming the researchers; both the research and the researched become active participants; it depends on the social experiences of both the researcher and the researched; it takes place in the real world setting in the context of participants in order to solve real problems (Esau, 2017; McNiff, 2013). All these attributes on the use of action is influenced by personal, informal reflections well as formal reflection since action research is the “a self-reflective enquiry undertaken by participants in a social situation in order to improve the rationality and justice of their own practices, their understanding of these practices and the situation in these practices are carried out” (Kemmis et al., 2013, p. 162).

Further to this, on the one hand McNiff' and Whitehead' (2002, p. 5) argues that the use of action research is not all about formal and informal reflection but is also about personal reflection because “action research is an enquiry conducted by self into the self”. This then suggests that the use of action research involves researchers where research is personally done by themselves and in their own settings in order to empower and improve their own personal practices. On the other hand, Esau (2017), advocates that use of action research also draws from informal reflection because the transformation or the change is attained through the process of collaboration, and active

participative among participants and the study which result to the adaptation of the oppressive conditions. For instance, in the context of this study I worked collaboratively with the lecturers involved in the process of unpacking the lecturers' reflection of the use of Moodle and this resulted in the improvement of their teaching practice when teaching modules. On the contrary, Carr and Kemmis (2003) is in line with Cohen' et al. (2013) in that the use of action research is also influenced by formal reflection in the manner that action research adopt the systematic way in which practitioners conduct research when teaching their subject or modules. This suggests that the use of action research involves the use of well-organised stages to be followed by lecturers in order to provide direction towards improving practices in their own teaching.

According to studies, the issue of action research is in three levels which is named as technical, practical, and emancipatory level (Cohen' et al., 2013; De Vos et al., 2014; Esau, 2017; McNiff, 2013). These studies further aver that technical action research is also called scientific-practical action research which is referred to as the type of action research that is more scientific; it continues the traditional ways of conducting research such as the use of survey, questionnaires and others, and it considers humans as objects. On the first hand, scientific-technical action research then leads to the less effective kind of situation where change and transformation is not taken as a priority, and it consists of one phase or a single loop learning (Denzin' & Lincoln, 2011). As a result, this definition of action reflection seems to take the direction of formal reflection where research is done by following particular drawn laws and the interest is not on the change or transformation of practitioners but on the end-product or the outcome of the research (Creswell., 2014; Khoza, 2017). In other words, the conduction of action research is not on the process but on the output (Esau, 2017). As a result, this study therefore adopts scientific-technical action research as the formal-scientific-technical action research (refer to Figure 5.3) which resonates the structure of formal curriculum (vertical curriculum) that is driven by the content and still holds to the traditional way of teaching which is teacher-centred (Bernstein, 1999; du Preez' & Reddy-, 2014). This further suggests that formal-scientific-technical action research is researcher-centred, and the research is not about the needs (change/emancipation) of participant but is about the needs (output) of a researcher. In support of this Cohen' et al. (2013) further asserts that this kind of research is too individualistic to the researcher which puts participants in a state of isolation.

On the contrary, action research can be regarded as practical action research which is also referred to practical-deliberative action research, and it is defined as the type of action research that considers the “experiences and viewpoints held by actors involved in the situation, but fails to contextualise this within the an understanding of power relations within the society” (Esau, 2017, p. 449). Further to this, practical-deliberative action holds the philosophical viewpoint of hermeneutics where the interpretation and understanding is as a result of human interaction and experiences held by humans in their own social and natural setting (Reason & Bradbury, 2001). In other words, this kind of action research seeks to unpack the phenomenon through the involvement or active participation of individuals or participants/practitioners in their own institutions. This definition seems to take a direction of informal reflection where the process of research is considered as more valuable than the end-product of a research. As a result, this study therefore employs practical-deliberative action research to be informal-practical-deliberative action research (Figure 5.3) since the main objective is to allow the process of unpacking the phenomenon through the active human’s interactions. Furthermore, this informal-practical-deliberative action research resonates with the essence of informal curriculum which is horizontal curriculum and it is learner-centred (Bernstein, 1999; Khoza, 2017). In other words, informal-practical-deliberative action research is more participant-centred rather researcher-centred.

Be that as it may, studies further assert that the third kind of action research is termed to be emancipatory action research, which is also referred to as critical-emancipatory action research (Bradbury-Huang, 2010; Christiansen et al., 2010; Cohen' et al., 2013; Creswell., 2014; Kemmis et al., 2013). These studies define critical-emancipatory action research as the kind of action research that is about both the process (participants experiences) of research and the end product (study needs) of research. Its’ keen interest is on the transformation, interaction, and emancipation of both the study and the participants, and it also retains a political agenda, especially in education. Additionally Reason and Bradbury (2001, p. 1) assert that critical-emancipatory action research is a “participatory, democratic process concerned with developing practical knowing in pursuit of worthwhile human purposes grounded in participatory world view... it seeks to bring together action and reflection, theory and practice, in participation with others, in pursuit of practical

solutions the issues of pressing concerns to people, and more generally, the flourishing of persons and their communities”. This definition of critical-emancipatory action research seems to be influenced by personal reflection which seeks personal talent development of each individual taking part in the research process in order to improve the personal and individual practices. Thus, this study prefers the name of critical-emancipatory action research to be called personal-critical-emancipatory action research (refer to Figure 6.3). This suggests that personal-critical-emancipatory is the type of action research that merges the two above-mentioned types of research, which is what this study is advocating for (see Figure 6.3). Personal-critical-emancipatory action research forms the diagonal line which connects the two other types of action research (informal and formal) and this resonates with the development of personal curriculum which is alluded by this study in order to enhance personal needs of both the student and the lecturer in the use of Moodle LMP (Bates*, 2016; Biggs', 2011; Msibi & Mchunu, 2013; Pinar, 2004). As a result, this study proposed the use of emancipatory research in the study as the most appropriate research style because it influences the development of personal curriculum that is aimed at improving, transforming and empowering lecturers to use Moodle to its maximum potential.

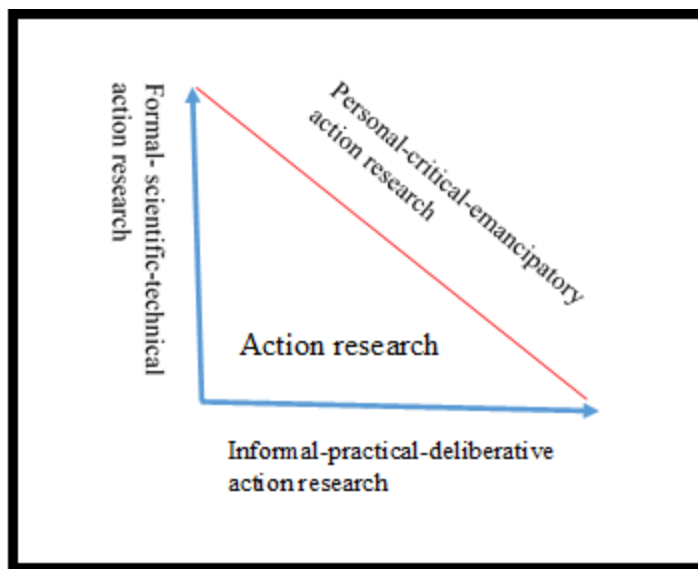


Figure 6.3: The use of action research

According to, M. L. Walker (1993), Carr and Kemmis (2003), Esau (2017) as well as Reason and Bradbury (2001), the effective use of emancipatory action research is made of several stages but

these studies allude to only on four stages (Figure 6.4) which must be systematically followed by both the researcher and the researched, namely: 1. Planning stage; 2. Acting stage; 3. Observation stage; and 4. The reflection stage. In the context of this study, the cycles of these stages had two phases, as according to the Figure below. According to Denzin' and Lincoln (2011), the stages of action and reaction, in some cases, may not be cyclical and proceed as planned due to some unforeseen circumstances but they are flexible and should be adjusted according the context.

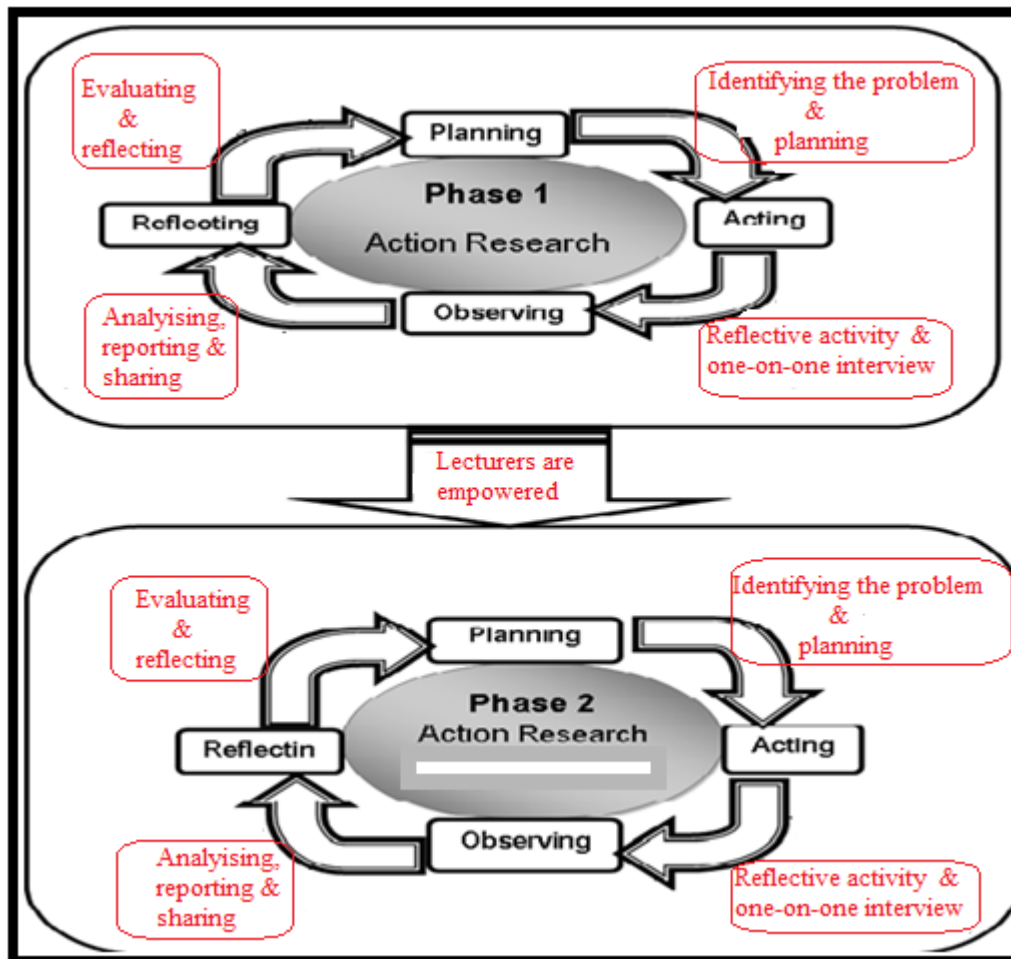


Figure 6.4: Reflecting the use of action research

The personal-critical-emancipatory action research of this study started by stage one in phase one as illustrated in Figure 6.4 above, and the phases/cycles shows the procedures followed in this study. As a result, at a planning stage (stage one) I and the participants (lecturers) began by identifying a plan based on the problems lecturers' experience with their daily use of Moodle in the teaching of science modules. I led this stage by providing lecturers with relevant information which led to the start of research and there were leading questions like: 'What is your take about the use of Moodle'; and 'What do you think you can do about this concern on the use of Moodle'. These questions were posed in order for the study and lecturers to be on the same page about the main purpose of the research, which is about exploring lectures reflection on the use of Moodle in the teaching of science modules. This stage provided the background and the context of the study for me and the lecturers in such a way that lecturers were aware that this research is also aimed at developing them in order to use Moodle to its maximum potential as stipulated in the university policy documents. This method involved the process of negotiating articles based on Moodle to be read by participants and time that would be spent in all research activities was negotiated collaboratively.

In support of the above assertion, Boomer (1987, p. 51), asserted that "if teachers set out to teach according to the a planned curriculum, without inviting first the interest of students, the quality of learning will suffer. Negotiating the curriculum means deliberately planning to invite students to contribute to, and to modify, the educational program, so that they will have a real investment both in the learning journey and the outcomes". Stage one assisted both the study and the lecturers to ensure that all necessary resources were present like laptops, Wi-Fi, and venues for regular meetings. Further to this, a timeframe was drawn up in order to manage time of each research activity; for instance it was agreed that the lecturers' reflective activity would be done and submitted with two weeks. The matter of data generation was discussed and it was made clear that data was going to be generated within lecturers own spare time in order to avoid disturbance of the lecture periods. Further to this, all questions based on data generation methods were developed, adopted and were made transparent to everyone, in order to explore lecturers' reflections in the use of Moodle in the teaching of science modules for emancipation and transformation. However, before embarking further on the next stage (the acting stage) it was confirmed that everyone was

invested in this action research and they all knew what was expected from them. This stage (the acting stage) was mostly influenced by formal reflection of making planning about the research, and informal reflection of collaboratively taking decision about the research. This therefore prepared everyone (the study and the participant) for the next stage.

According to Esau (2017, p. 452), this stage (the acting stage) seek the researcher “to carry out what she or he planned in a systematic and thoughtful way. The researcher should observe his or her action while implementing it, the researcher must also be prepared for unanticipated events, as plans do not always work out as initially planned or anticipated”. Further to this, based on actual action (acting stage) of the first phase of personal-critical-emancipatory action research, participants were given the reflective activity in order to reflect on their own use of Moodle LMP. This was done for lecturer to reflect on their teaching of science Modules. Note, that the reflective activity was based on the curriculum signals, namely, permission, justice/goals, content, character, resources, platform, time, location, and assessment. The reflectively activity sought that lecturers reflect on each concept as based on the module they were teaching. Seemingly, the three lecturers were familiar with the interrogated concepts because they were able to complete their activity with the set due date of two weeks for submission. On the contrary, one of the lecturers were failing to unpack the questions in the reflective activity and I was always available to bring clarity to all queries. Note that the lecturers were given more than one week to complete the reflective activity. Before the next stage I then administered a one-one semi-structured interview with each lecturer. I conducted this interview with an aim to dig deeper on their understanding of the curricular signals related to the use of Moodle.

According Cohen' et al. (2013) the observation stage involves the process of checking their reflection and discussing this with them in order to give them the space to critique themselves. As a result, in the context of this study, lecturers were given an opportunity to reflect and question the output of their reflective activity as based on their knowledge using Moodle to teach modules (curriculum signals). Thus, after unpacking of curriculum signals, lecturers were then sent an artefact activity via email in order for them to draw artefacts representing their observation or emotions about the use of Moodle. Moving further, it was evident from the reflecting activity,

interviews, and artefacts, that they were not knowledgeable about the use of Moodle since they were unable to fully unpack the questions on curriculum signals.

Moreover, the fourth stage “is the phase of the project where the researcher looks back on his or her efforts in order to look forward to the future”. This suggests that both the study and participants need a space where they will reflect about what transpired in each stage in order to improve where there are gaps. As a result, this study followed the plan of agreed upon meetings, and lecturers were able to voice out their concerns; it was evident that they were not all aware about curriculum concepts and that led to their reluctant use of Moodle. I then gave lecturers articles to read in order to assist them with comprehension of curriculum signals which in turn could assist them to implement the curriculum effectively. Articles and the training guides on the use of Moodle were also given to lecturers to read in order to understand how Moodle is used for teaching their Modules. Interestingly, lectures were eager to read the given reading since most of them were not aware of the impact of mastering curriculum signals in order to understand the use of Moodle for teaching modules at a university. As a result, it was necessary to revise our plan in order to start the second phase of action research. Moreover, the first phase of personal-critical-emancipatory action research seems to take a direction of personal reflection since me, and the lecturers, were willing to develop themselves in order to find their identity on the use of curriculum concepts to master the use of Moodle.

The planning stage of the second phase of personal-critical-emancipatory action research put more focus on the empowerment of lecturers on the use of Moodle. For the fact that the challenges were already identified in the first phase and lecturers were given relevant readings as the intervention. Thus, the planning in the second phase was done in order to ensure the change and the improvement. Lecturers were again given a chance to do the reflective activity for the second time after they had read the articles based on curriculum signals, the use of Moodle, and based on reflections. Lecturers were given two weeks to complete readings, and another two weeks to complete the reflectivity activity. I also emphasised the issue of reflecting during their teaching practice which acts as catalyst in changing or improving their practice on the use of Moodle.

In addition to the above, lecturers were made aware that after completing the reading and reflectivity activity which also gave them the opportunity to use Moodle in order to master curriculum signals they will proceed to the next step. As a results, this led to the observation stage of their own practices on the use of Moodle where they were given a chance to draw an artefact to indicate their current reflection on the use of Moodle during the second phase of action research. Moreover, after the completion of the observation stage, the one-on one semi structured interview was conducted with an aim to further explore lecturers' reflection on the use of Moodle in teaching their modules. It was observed that lecturers were able to respond positively, based on curriculums concepts, which assisted them to be familiar on the use of Moodle. Finally, during the last stage of action research (reflection), lecturers were given a chance to reflect on the overall process of the second stage. Lecturers had to critically reflect on their practices on the use of Moodle for teaching science Modules. They were also able to identify their challenges together with their necessary intervention on the reluctant use of Moodle. In support of this, during the reflection stage, we had a critical discussion, and it was evident that lecturers started to debate, question, and criticise the university status quo of compulsory usage of Moodle. Lecturers also criticise their ignorance of curriculum signals during the first stage and they noticed its importance for the use of Moodle during the second phase. According to Easer 2017, one's engagement in action research provides an intervention which makes all the difference in the practices. This becomes today's response to the current problem in order to shape the future. This suggests that action research possess a certain strength that is evident after participants have undergone all stages of action research.

6.3 The strength and weakness of action research

The strengths of action research relates to benefits and advantages of adopting and utilising this kind of research style, and the strengths played a major role in the conduction of this study. Moreover, the strengths represent the potentials of a an action research to unpack the lecturers reflection on the use of Moodle to teach Science modules, and further substantiate why action research was the most appropriate research style to use for this qualitative research. On the contrary, there are potential challenges that can affect the conducting of action research.

Challenges resonate with the disadvantages and limitations that can occur during the process of action research. Note that this study had measures in place to overcome those identified challenges or weakness.

6.3.1 Strength in conducting action research

According to various studies action research possesses several advantages, which are referred as the strengths of conducting action research (De Vos et al., 2014; Esau, 2017; Kemmis et al., 2013; McNiff, 2013). The first advantage of using action research is that it leads to a particular action since it motivates those who are directly involved in the process. This suggests that when practitioners like lecturers participate in action research they become motivated because they are the one who are expected to take action in order to improve their practices. This advantage seems to resonate with personal reflection where lecturers seek a personal drive or motivation that leads them to partake in the study. As a result, this study sampled lecturers in order to take action over their reluctance on the use of Moodle when teaching their modules, and this motivated them to transform themselves and also empower themselves in order to improve and move from the world of digital immigrants to the world of digital natives (Amory', 2010; Khoza-, 2016b).

The studies, further aver that, it is of advantage to use action research because it is hands-on, it is practice-driven, and it is relevant as well as flexible, as a team in the institution (De Vos et al., 2014; McAteer, 2013). This suggests that action research is good to be used in the context where practitioners are working as a team and are willing to change and improve their practices on the pressing matters in the institution. This then propagates informal reflection in the manner that participants in action research should be hands-on, and work together towards finding the relevant interventions on their practical problems faced in order to be flexible and adopt any suggested change. For instance, in the case of this study, four lecturers worked together and they were hands-on towards doing research activities (reflective activity). Interestingly, lecturers were flexible to read articles in order to shape their practice on the use of Moodle to teach modules.

Action research style change and transformation that is permanent, self-generating, and self-maintaining, and this leads to the rethinking of practices in order to maintain a good relation with those in management or power in the institution (De Vos et al., 2014; Kemmis et al., 2013). This then suggests that when taking part in action research, it is believed that one must sustain change and empowerment should prevail in order to maintain good human relation with those in power. In the context of this study, lecturers were able to question the status quo brought forward by the University of Compulsory use of Moodle, but that did not make bitter relation with the university management, instead lecturers found ways to advice the management on the use of Moodle. This strength of action is mostly influenced by personal reflection in the manner that lecturers were able to find their identities (weakness and strength) in order to improve their practice and they were strong enough to come up with strategies to the management.

Moving further, both Denzin' and Lincoln (2011) as well as Reason and Bradbury (2001) asserts that action research is good because it is a multidisciplinary process which provides the bridge between practice and research. In other words, action research can be used in various disciplines such as education, engineering health, business and others in order to bridge the gap between practice and research, and it allows the practice of intervention by practitioners following a certain sequence (Cohen' et al., 2013). This seems to take the direction of formal reflection where the systematic view (sequence of stages) of lecturers practicing the intervention is recommended in order to improve practices. Further to this, most of the advantages of action research, including those that were not discussed in the study, seem to be driven by personal reflection which advocates personal change, transformation, decolonisation, and empowerment of their practices in the field. Lastly, action research seeks to ensure that the following notion are addressed, namely straight forward cycles, reflective practice, political empowerment, underpinnings of critical theory, personal, informal and formal development in the field, and participatory research (Cohen' et al., 2013; De Vos et al., 2014).

6.3.2 Weakness in conducting action research

Both De Vos et al. (2014), and Christiansen et al. (2010), are in line with identifying some of the weaknesses of using action research in terms of resources, decision-making processes, power

relations, data generation methods, presentation of findings, and ethical issues. These studies further assert that, in terms of resources, action research is very demanding; particularity when it comes to funding, venues, and transport. For instance, practice and completion of activities may need higher costs including transport cost to venues for the set meetings in order to undergo stages of action research. This seems to be driven by informal reflection of financial stability in the conduction of research. As a result, in the case of this study challenges were easily dealt with because all stages of this action research was conducted in one campus of the university with the lecturers of the university. Note less funds spent for transport and venues, for instance booking of venues for conducting interviews and meeting were acquired free of charge.

Moving further, the researcher, generally, is well informed about the research being conducted and this gives the researcher the power to choose data generation methods that are suitable for the participants without consulting the participants (Kemmis et al., 2013; Leedy & Ormrod, 2014). This disadvantage seems to be influenced by the informal reflection of working collaboratively as a team. Moreover, in the context of this study, this was experienced and it was taken into consideration because participants were all involved in decision making in all activities of action research. As a result, lecturers were the ones who adopted the type of data generation methods proposed by me during planning.

The issues of power relations between the study and the participants is always quite challenging in action research. As a result, for the fact that I hold more knowledge about the research and Moodle I poses automatically biases in all stages of action research, this includes the essence of holding a certain political agenda (De Vos et al., 2014; Kemmis et al., 2013). This was well maintained in this study because I did not always lead discussions in meetings and during the planning processes. Thus I became neutral in the discussions of burning university issues. As a result, this weakness was influenced by personal reflection that sought me to know my position and not to undermine lecturers as participant who reflected on the practices on the use of Moodle LMP.

The presentation of findings from action research are not generalised (weakness) (De Vos et al., 2014; McNiff, 2013). In overcoming this weakness, this study did not generalise the findings of the study. Further to this, the findings and the presentation of findings of this study were qualitatively presented in such a way that the lecturers and other lecturers from other universities are able to have access. Note that the findings were presented using the official language of instruction to ensure easy comprehension by others who read it. This weakness seems to take the direction of informal reflection where another community should be made to access the finding of the study. The last disadvantage speaks to ethical issues in action research. It is outlined that action research contains the risk of disclosing the names of those who participated in the study, and this puts the lives of participants in danger in the institution in which research was conducted. Be that as it may, this disadvantage was therefore avoid in this study because lectures were made to sign consent letters which stipulated all the ethical rules and regulations to be followed. Moreover, the researcher ensured that during data analysis and presentation, their names were not disclosed. Furthermore, most of the weakness of action research seems to take the direction of informal reflection and this suggests that there is a need for personal and formal reflection to prevail in order to overcome this weakness.

6.4 The process of sampling the participants from the population

According to various studies, qualitative research is conducted in order to gain an in-depth understanding about a certain phenomenon, and this enhances to study people, animals, places as well as other things in their own natural settings (Babbie, 2010; Berg & Lune, 2004; Christiansen et al., 2010; Cohen' et al., 2013; Esau, 2017; Kemmis et al., 2013). Further to this, studies asserts that it is quite challenging and not user friendly to study the whole people or animals in their own population, and population is defined as the total number of people, groups or organisations, and other things, that can be included in a study. The reason of this challenge is as a result of time frame, money constraints and others. These studies further aver that the only solution to this challenge in the conduction of any research is sampling.

In support of the above, Christiansen et al. (2010, p. 54) explains that “sampling involves making decisions about which people, settings, events or behaviours to observe. Exactly what will be

studied in a particular study depends on the unit of analysis. The unit of analysis may be individuals, or groups (such as classes, or sports teams) or organisations (such as schools). So [the study] needs to decide how many individuals, or groups or schools will be observed". Similarly, Cohen' et al. (2013) further asserts that the quiet peace that is of paramount importance is not only the presence of methodology and data generations methods but is also about the appropriateness and consideration of the sampling. This is because, "collecting data from the entire population is nearly impossible because of the amount of people, animals, places and things within the population" (Nkohla, 2017, p. 95). Moreover, sample is termed to be the subgroup of a population, and it takes the ability of the study guided by the research purpose to be able to select a particular and relevant portion of the population that is definitely the truly representative of the entire population aimed to be studied. In the context of this study, sampling was taken as an important process in order to explore lecturers' reflection on the use of Moodle to teach their modules at a university.

In addition to the above, Kemmis et al. (2013), Denzin' and Lincoln (2011), as well as Creswell. (2014), further assert that sampling is the most important step taken in any kind of research design since there will be no findings and research output without the relevant sample of participants from a particular field. That is the reason why both De Vos et al. (2014) and Creswell. (2014) further assert that in qualitative studies the ways of constructing samples is not guided by statistical probability of selection, but is guided on the basis of purposive or theoretical procedures. These studies further allude that samples studied produces a different and unique accounts when unpack the phenomenon. The process of selecting the samples from the population is sequential and purposive, and not entirely pre-determined. Lastly, these studies outlines that for the fact that qualitative researchers are working with participants who have rights, sampling may have ethical implications that can influence the choices of samples from the population. In other words, sampling in qualitative research seeks researchers to be cognisant of the personal, informal, and formal reflection in order to select the relevant participants for the study who will serve the purpose of the study (Khoza & Mpungose, 2017). This suggests that they should personally decide the number of participants to be included in the study in order to meet the project or study plan and

time frame so that the purpose, objectives, findings and other activities/tasks of the study can be attained by the end of the study.

6.4.1 Sampling in qualitative research

Note that sampling means “taking a portion or a small number of units of the population as a representative or having the a particular characteristics of that total population” (De Vos et al., 2014, p. 223). Be that as it may, sampling in a qualitative research is vital because without it being considered, the study of the phenomenon in its limits would be tedious and time consuming. Thus, I would consider the large amount of data that cannot easily be interpreted (Cohen' et al., 2013). This suggests, that sampling seeks qualitative researchers to only consider entities that represent the entire population in order to save time and be able to attain the study’s objectives and purpose. Be that as it may, studies further assert that the choice of sampling is guided by the approach (quantitative and qualitative) the study is taking (Cohen' et al., 2013; Creswell* & Poth, 2017; Esau, 2017; Kemmis et al., 2013). Based on this assertion, there are two main types of sampling in education research, namely probability and non-probability sampling. Studies further explain that probability samples are also called random sampling; it is assumed to be the most accurate and simple of all sampling types of sampling in quantitative research, and the purpose of utilising probability sampling is as a result of its ability to generalise the findings drawn from the sample to the entire population. Moreover, known for its neutrality that everyone in the population stands a chance to be selected irrespective of whether he or she possess the qualities and the potential of fulfilling the research objectives. For this reason, there are several examples of or types of probability sampling which includes simple random sampling, stratified random sampling, systematic random sampling, and cluster sampling (De Vos et al., 2014; Leedy & Ormrod, 2014). This kind of sampling seems to propagate a formal reflection that addresses a quantitative approach in research. As a result, this sampling is more relevant for quantitative researchers, and is not relevant in the context of this study towards exploring lecturers’ reflection in the use of Moodle.

On the contrary, studies further affirm that qualitative researchers uses non-probability sampling for the rationale that the sample is selected in order to provide illumination into the thoughts, practices as well as behaviours of participants holding certain specific qualities of the study

(Babbie, 2010; Cohen' et al., 2013; Creswell* & Poth, 2017; Creswell., 2014; Denzin' & Lincoln, 2011). Studies further assert that, in non-probability sampling, the study does not aim to generalise the findings but they can be transferred to others in a same context. This is because the interest is more on the in-depth, rich, and the detailed information gained from a small sample from the population which can lead or attain the understanding of the phenomenon being studied. Note that non-probability sampling is mostly influenced by personal and informal reflection of choosing the relevant and specific participant holding the attributes or experiences relevant to the study. That is the reason why non-probability sampling was the best option to select samples of lectures from the university community. Moreover, non-probability sampling is subject to the small number of samples and this tries to avoid any unforeseen circumstances such as additional biases and errors in the study (Christiansen et al., 2010; Cohen' et al., 2013). Most importantly, studies affirm that there are several types of non-probability sampling which includes convenient sampling, purposive sampling, quota sampling as well as snowball sampling. Further to this, both Creswell* and Poth (2017), Creswell. (2014), as well as Christiansen et al. (2010), further assert that purposive sampling is used mostly in conjunction with convenient sampling in qualitative research because it allows the study to select participants and the location of the study that will inform the research purpose, research questions, and research phenomenon. Moreover these studies describe purposive sampling as the type of qualitative sampling method use to select units, groups, or individuals to serve the specific purpose in the study, and convenience sampling referred to as the type of qualitative sampling that assists the study to select participants who are readily available or easily accessible and willing to contribute to the study. Therefore, this study saw the need to adopt these two above-described samplings in order to serve the purpose of this study of exploring lecturers' reflection on the use of Moodle to teach science modules.

6.4.1.1 The need for purposive sampling

According to De Vos et al. (2014), purposive sampling is also called judgmental sampling because this sampling allows the study to use judgement in order to select participants that contains characteristic, attributes, and representatives that serves the purpose of the study is more of informal reflection. It support of this, Maxwell (1997 p87) defines purposive sampling as the “particular settings, persons, or events that are deliberately selected for the important information

they can provide that cannot be gotten as well from other choices’’. Further to this, Christiansen et al. (2010, p. 60) further affirm that purposive sampling “means that the [study] makes specific choices about which people to include in the sample. The [study] targets a specific group, knowing that the group does not represent the wider population; it simply represents itself. This is fine if the [study] does not wish to generalise the results beyond the group sampled’’. That is the reason why Cohen' et al. (2013) is in line with Creswell. (2014) in that purposive sampling enhances the study to choose participants that possess a certain experience about the phenomenon in order to provide an insight and in depth explanation so that the research purpose can be attained. This assists the study to have several number of the participants’ experiences from the social settings in order to have a deep understanding of the phenomenon.

Furthermore, this sampling seems to take the direction of informal reflection in the manner that it is done in order to select participants for a specific purpose in order to meet the needs of the study. Cohen' et al. (2013) further affirms that informal reflection allowed the researcher to use purposive sampling in order to access and select the knowledgeable people about the phenomenon, in particular those who have an in-depth information of the phenomenon. Thus, participants may be chosen because of the profession, power, hold certain expertise or skills and have access to certain networks. Further to this, in the context of this study, there only four lecturers who were selected purposively in order to partake in this study, and they were all from the same science department at a university. For the fact that purposive sampling is utilised based on the consideration of resources, time available, and the purpose of the study (Cohen' et al., 2013; Creswell* & Poth, 2017), I therefore had to choose lecturers who were directly involved in the process of teaching and learning of science modules using Moodle in order to openly and thoroughly explore the lecturers’ reflection on the use of Moodle to teach science modules in the School of Education. In support of this, Creswell* and Poth (2017) posit that purposive sampling has the power to explore the basic knowledge, opinions, histories, and experiences of participants. This assisted me in this study to note the most important issues that would unpack the phenomenon. As a result, I was given powers by purposive sampling to select the variation of lecturers in terms of their own social experience, working status. The three out of four lecturers were permanent and one of them one was a contract staff. Note that out of these four lecturers, one of them possessed

the Doctoral degree in education. What was common among all of them is that they were teaching science modules from the science discipline at a university. Be that as it may, convenience sampling was also used in this study to select participants.

6.4.1.2 The need for convenience sampling

According to Cohen' et al. (2013) convenience sampling “is sometimes called, accidental or opportunity sampling... involves choosing the nearest individuals to serve as respondents and continuing that process until the required sample size has been obtained or those who happen to be available and accessible at the time”. In addition to this, this sampling is also known as the kind of sampling that includes participants who are voluntarily agree to be available to participate in a specific study, and this affirms that this sampling relies on available participants (Babbie, 2010; Denzin' & Lincoln, 2011).

In addition to the above, purposive sampling seems to take the direction of personal reflection since participants can be selected based on their personal availability irrespective of the specific attribute to the study. As a result, I had used this sampling as the second most suitable to select participants that were most accessible and with whom it was easy to conduct data generation. Moving further, even though there were a number of lecturers from the Science Department, most of them holding doctoral degrees, not all them were interested in participating in the study, despite sending them consent letters requesting them to partake in the study. Even if I went physically to their offices, they still declined to participate in the study due to understandable reasons. Note that some of the reason given was that they had busy schedules of teaching and supervision postgraduate students. Therefore, the study was in a state of reaching the participation of four lecturers teaching science modules. What was interesting is that these four lecturers were teaching science modules using Moodle and they voluntarily agreed to participate in the study. The four lecturers were able to participate in the study and they gave a valuable reflection through their experiences for in-depth understanding of the use of Moodle for teaching science modules. Thus, the selection of the four readily available lecturers made convenience sampling affordable. (Creswell* & Poth, 2017; De Vos et al., 2014). Using these two kinds of sampling method indicated a noticeable strength in the conduction of this study.

6.4.1.3 Reflecting the strength of sampling (purposive and convenience)

According to Cohen' et al. (2013), sampling in qualitative research has no stipulated number of participants to be included in a sample from the population, but it is well informed by the rule of 'the fitness for purpose'. This strengths resonates personal and informal reflection because the study need did not strive to find the specific number of participants that can take part. This is attained in this study because lecturers were selected with the specific purpose of reflecting on the use of Moodle LMP to teach science modules. Furthermore, these sampling methods serve time and money in order to attain the outcomes of the study (Cohen* et al., 2011; Creswell., 2014). This suggests that selecting and using both purposive and convenience is free of charge, and it is influenced by both informal and personal reflection. In the context of this, I did not spent any funds to do selection of participant, but it was a matter of sending the emails to the participants and to do physically consultation with them. Thus, this resonates with informal and personal reflection in the manner that participants were asked and made to invest in an idea of participating in the study. Most importantly, findings as a result of selected participant were not generalised and comparable but were made available for access by others of the same context of teaching using Moodle.

6.4.1.4 Overcoming the challenges of sampling

Studies are of the view that sampling sometimes lacks credibility in such a way that it can lead to the poor state of data generated (Cohen' et al., 2013; Creswell* & Poth, 2017; Edwards & Skinner, 2010; Leedy & Ormrod, 2014). Studies further assert that it is possible for the study to hold biases during the selection of participants, and this may result in biased findings. In overcoming these challenges, I have selected lecturers who had potential to partake in the study due to their unique experiences and expertise. This was done in order to generate data of good quality via semi-strutted interview, reflective activity, and an artefact. I made sure that all participants in the science department were sent emails with the attached consent lecturers requesting their participation in order to avoid bias during the selection process. In addition to this, the participants' profiles were also considered in an attempt to overcome the challenges as depicted in Table 6.2 below.

Table 6.2: Participants profile

Lecturer	School	Teaching modules name	Qualification	Gender	Race
1	Education	Teaching and learning methods	PhD.	Male	Indian
2	Education	Physical Science 320	M.Ed.	Male	African
3	Education	Biological science 210	M.Ed.	Female	African
4	Education	Chemistry 210	M.Ed.	Male	African

6.5 Reflecting on the procedures of generating data

Esau (2017) and Ramathan (2017) assert that in any research, the exploration of the phenomenon depends on the process of engaging participants in order to generate data which is aimed to give understanding in the process of unpacking the research objective, purpose, and research questions of the study. Note that procedures/ways in which data is generated is termed to be research methods. In support of this, (Christiansen et al., 2010, p. 71) define data as “the evidence or information that a researcher [generates] in order to find answers to the particular question he or she is asking”, and this is done through adopting a particular research method in a study. Further to this, (Cohen' et al., 2013) asserts that research methods are termed to be procedures, tools, or instruments used to generate data through the responses given by participants based on the phenomenon. Various studies further aver that qualitative research studies are concerned mostly with the issues of credibility and trustworthiness of the findings in the study, and this seeks the processes of triangulation which incorporates multiples procedure or methods of generating data (Creswell., 2014; De Vos et al., 2014; Denzin' & Lincoln, 2011; Esau, 2017; Patton, 1990; Yin, 2013). These studies further outline that there are various procedures of generating data which includes reflective activity (questionnaires), document analysis, artefacts, observation, interviews. These are not the only research methods that can be used but they are most frequently used in

educational research. These studies outline that such methods are chosen with reference to the research questions in order to attain the purpose of the study. With the purpose of this study in mind, which is to explore lecturer's reflection on the use of Moodle to teach science modules, this study then has adopted three procedures for generating or producing data, namely: reflective activity in the form of open-ended questionnaires (formal), artefacts (informal), as well as one-on-one semi-structured interviews (personal).

6.5.1 The use of reflective activity in a form of open-ended questionnaires

According to various studies, reflective activity is defined as the methods or techniques that assist practitioners to reflect on their experiences and actions in order to interrogate their practices with the aim of changing and improving them (Brookfield', 2017; Dewey', 1933; Hennissen, Beckers, & Moerkerke, 2017; Penso, Shoham, & Shiloah, 2001; Schön, 1983). In support of this, “reflective practice is an approach widely adopted by professionals in evaluating their practices” Diezmann and Watters (p. 1). The above-mentioned studies further assert that reflective activity is also termed as reflective practice and it is widely used in higher education institutions in order to ensure effective teaching and learning of modules. These studies further allude that reflective activity assists lecturers to be thoughtful and analytical about their behaviour and practices.

The study conducted by Nkohla (2016) indicated that reflective activity is one of the most vital research methods which seek the transformation of participants since it allows participants to independently think and reflect back on their action as based on their experiences. Note that the reflection requires practitioners to look back on what they did in order to change the present for the future, it is also “described as a written task that requires a participant to answer a series of questions about the research phenomenon” (Nkohla, 2017, p. 98). In addition to this, Penso et al. (2001) posits that reflective active is about deliberate thinking about actions with an aim to improve, and it is an on-going process that involves the process of reflection. The reflective activity is the kind of activity that involves integration, and this means that in involves the kinds of questions that trigger lecturers to reflect on the phenomenon (Cohen' et al., 2013; Creswell* & Poth, 2017; Creswell., 2014; Ramrathan, 2017). These studies further conclude that reflective active is made up of open-ended questionnaires which consist of questions that ask participants but it does not pre-suppose the kind of the response that is expected. In other words, participants

are bound to formally give responses to the set of question in the reflective activity. This suggests that reflective activity seem to take a move to the formal reflection because it consists of formal set questions ask participants to reflect. Moreover, questions in this activity are put in a written and formal format, participants are expected to respond and give more details in writing, explaining their experience about the phenomenon (du Preez' & Reddy-, 2014; Ramrathan, 2017).

In addition of the above, in this study, reflectivity activity was the first and most suitable data generating method before artefacts and semi-structured interview, because it was mostly influenced by formal reflection which resembles the attributes of the vertical curriculum in order to address the needs of the module in the use of Moodle. As a result, I sought the lecturers' reflection through the use of this activity which consists of nine questions to reflect on. These questions were based and driven by curriculum signals such as goals, resources, assessment, time, location, and others. In other words, this was the great opportunity given to lecturers to reflect on their experiences on the use of Moodle when teaching their modules. That is, the lecturers were given a period of two weeks to complete the activity for themselves in their own space without any interference from me. Moreover, this activity was attached and sent through their emails as a softcopy, and this enhance flexibility to write and edit their responses in order to elaborate on their experiences on the use of Moodle. This data generations process was done in their own campus where they teach science modules. Table 6.3 shows the questions on which the lecturers were expected to reflect.

Table 6.3: Reflective activity questions framed with curriculum signal propositions and reflections

Curriculum signal	Question	Proposition	Reflection
<u>Question 1</u> Resources	<i>What resources do you use when teaching a module using Moodle (resources)</i>	Hardware	Formal
		Software	Informal
		Ideological-ware	Personal
<u>Question 2</u>		Physical	Formal

Permission	<i>Are you permitted to use Moodle and how do you gain access to use Moodle to teach your modules (accessibility)</i>	Financial	Informal
		Cultural	Personal
Question 3 Justice/Goals	<i>How do you ensure justice when teaching your module using Moodle (goals to be achieved)</i>	Objectives	Formal
		Learning outcomes	Informal
		Aims	Personal
Question 4 Activities and content	<i>What are Moodle teaching activities do you use when teaching your module content (Moodle activities and content)</i>	Formal activities	Formal
		Informal activities	Informal
		Personal activities	Personal
Question 5 Character/role	<i>How do you perceive your character when using Moodle? (lecturers' role)</i>	Assessor	Formal
		Facilitator	Informal
		Instructor	Personal
Question 6 Platform	<i>Where do you use Moodle when teaching your module? (location/environment)</i>	Formal/Face-to-face	Formal
		Informal/Online	Informal
		Personal/Blended	Personal
Question 7 Time	<i>When do you use Moodle when teaching your module? (time)</i>	During Work	Formal
		Spare time	Informal
		After work	Personal
Question 8 Assessment	<i>How do you assess your module using Moodle?(assessment)</i>	Of learning	Formal
		As learning	Informal
		For learning	Personal

Based on Table 6.3, the first question, interrogated lecturers about resources they use when teaching their modules. Their responses were expected to address the hard-ware resources influenced by formal reflection, soft-ware resource influenced by informal reflection, and ideological-ware resource by personal reflection. The second question sought lecturers' reflection on the permission required in order to access the use of Moodle; their responses had to be on the

bases of physical permission, financial permission as well as cultural permission, and this responses were framed by formal, informal, and personal reflection respectively. The third question sought lecturers to articulate on the goals that direct them to ensure justice in their teaching and their goals were expected to be on bases of long term goals (aims) framed by personal reflection, short term goal (objectives) framed by formal reflection, and learning outcomes (learners' goals) framed by informal reflection. The fourth question sought lecturers to reflect on the Moodle activities used to teach the module content (as it was explained in detail in Chapter Three), this included formal activities (content-centred), informal activities (learner-centred), personal activities (lecturer-centred).

In addition to the above, question five asked the lecturers how they perceived their role on the use of Moodle when teaching their modules which included being an instructor, facilitator, and assessor. This question was framed by reflections (personal, informal, and formal) in order to guide and encourage lecturers to reflect on their roles or characters before, during, and after the process of teaching and learning the modules. Further to this, the sixth question sought lecturers to articulate on their preferable Moodle platform that they use when teaching modules, and this question expected lecturers' responses on the bases of formal/face-to-face platform, informal/online platform, and personal/blended platform. This question was mainly developed to seek the location used by lecturers when teaching using Moodle such as lecture hall, office, online and others. The question of time (question 7) was also posed with an aim to ask lecturers to reflect on the time they use to use Moodle to teach their modules. Lecturers were expected to give their personal, informal, and formal reflection while addressing time in terms of during the work, after work, and during their own spare time. The last question asked how lecturers use Moodle to assess their modules, and they were expected to respond on the bases of assessment for learning (formative assessment), assessment of learning (summative assessment), and assessment through learning (continuous/peer assessment). These propositions were framed by personal, formal, and informal reflection. Furthermore, the use of this reflectivity activity had much strength in this study because lecturers' reflection brought light towards the attainment of the study purpose, objectives and research questions.

6.5.1.1 Reflecting the strength of reflectivity activity

Remember that reflective activity is all about “what enables us to escape delusions by uncovering the social at the heart of the individual, the impersonal beneath the intimate, the universal buried deep within the particular” (Bourdieu & Wacquant, 1992, p. 44). This suggest reflective activity is all about embracing informal, formal, and personal reflection in order to ask or interrogate practitioners’ practices based on question like ‘How do I improve my practice?’, and this is questioning what practitioners do, how practitioners currently do things in order to value what they are doing (Brookfield', 2017; Dymoke & Harrison, 2008). Studies further assert that the use of reflective activity has its strength in the study in order to unpack the phenomenon (Brookfield', 2017; Hennissen et al., 2017; Khoza & Mpungose, 2017; Penso et al., 2001). This includes strengths like the reflective activity which promotes deep learning about the phenomenon, identification of practitioner’s strength and weakness, attainment of new attitudes knowledge and skills; it becomes a source of feedback, and provides room for improvement.

In addition to the above, the use of reflective activity in this study, in fact, did promote deep learning about the lecturers’ reflection on the use of Moodle LMP when teaching modules in the university context. Lectures were able use their reflections, which were mostly influenced by formal reflection from the activities given to them with open-ended questions. For instance, lecturers were able to reflect on the type of Moodle resources they use when teaching, and this promoted clarity in terms of Moodle resources which includes hard-ware, soft-ware, and ideological-ware Moodle resources. Moving further, the reflective activity assisted both the study and the lecturers as participants to identify the weakness (problem) on the use of Moodle in order to develop themselves to find their personal identities (strength). That is, lecturers were able to identify areas of development or empowerment when it comes to the use of Moodle through the use of reflective activity, and lecturers were sent readings related Moodle and content of their subject in order to read and understand their practices for improvement. This strength also propagated formal reflection because participant had to read documents after finding their weakness and strengths.

In addition to the above, the reflective activity sought lecturers to attain new attitudes, knowledge, and skills about the use of Moodle in such a way that various Moodle activities like Assignment, quiz, and discussion forum were made available to lecturers' in order to use them in order to do away with the reluctance of the use of Moodle. As a result, formal reflection influenced this strength more than personal, and informal reflection, and this sought the development of the lecturers' attitudes, skills, and knowledge on the use of Moodle. Moreover, the use of reflective activity enabled the study to provide feedback to lectures they did not understand concepts asked in the reflective activity. For instance, most of the lectures were not familiar with the issue of goals that drive the use of Moodle to teach modules. Therefore I sent them readings that speaks to goals and this was influenced by formal reflection. Most importantly, reflective activity provided the room for improvement because during the second session of action research, lecturers were given another opportunity to reflect on the same reflective activity questions in order to attain the improvement on the use of Moodle. Be that as it may, there were some limitations or weaknesses that seemed to prevail in this study.

6.5.1.2 Reflecting the limitations of reflectivity activity

According to Brookfield' (2017) and Cohen' et al. (2013) the use of reflective activity comes with its own limitations like all other data generating methods, which includes that not all participants may understand the reflectivity activity; participants may feel uncomfortable to assess their own practices; and that it can be time consuming. Further to this, it was evident that some lecturers did not understand the activity. In overcoming this approach the formal reflection had to prevail in such a way that I provided all my contacts (email, cell number, and telephone number) to lecturers to contact me in case of misunderstanding or confusion based on questions posed from the activity. I was contacted by lecturers for clarity, and clarity was provided as requested. One the one hand, it was quite challenging to request that lecturers reflect on their own practices because it was like I was exposing their weaknesses on the use of Moodle. On the other hand, I was able to overcome this challenge through the use of formal reflection because the issue of ethics (anonymity and confidentiality) was made clear to the participants and they requested honesty in responding to this activity. For instance, I instructed lecturers that their reflections from the activity would not be used against them, and explained that the aim was to unpack the phenomenon (lecturers'

reflections) in order to understand the use of Moodle to teach modules. Interestingly, completing the reflective activity can be time consuming; this was evident because the majority of lecturers were not able to finish the activity within the established two week period of time due to their busy schedules. As a result, I was flexible enough to extend due dates by one week, and all of them were able to submit the activity. Working and solving such above-mentioned challenges enhanced me to proceed to generate data using artefacts.

6.5.2 The use of Artefacts

Studies conducted on the use of artefacts in conducting research affirm the etymological definition of an artefact (Butler-Kisber & Poldma, 2011; Friedman, 2007; Silverman, 2001, 2017; Smith', 2007; Spillers, 2004). In support of this affirmation, the term artefact was used long time before the eighteenth century by the anthropologist, historian and others. The etymological definition of “the word artefact comes from two Latin words. The first, ‘arte’, means ‘by skill’, from ‘ars’, skill. The second, ‘factum’, is the past participle of ‘facere’, to do or to make”. This suggests that artefacts refer to something crafted, designed, or drawn in order to be used for a particular purpose. That is the reason why these studies further assert that artefacts are referred to as things that are manufactured or made by humans beings, and in short, Bunge (1999, p. 23), defines an artefact “as man-made object... including symbols, machines, industrial processes, social organisations, social movements”.

In addition of the above, artefacts was taken as the second method of data generation in this study because it is influenced by informal reflection in order to unpack the phenomenon. In support of this, both Silverman (2017) and Smith' (2007) affirm that the nature of artefact seeks humans ideas, emotions, and feelings in order be produced; it is based on what people are experiencing and observing in relation to their life. Interestingly, artefacts are referred to as “both a residue of making an object such as a dish, and the process by which humans make the world. Our artefacts and tools are more than just those objects that we use to perform certain tasks. In the end, they are change agents” (Smith', 2007, p. 5). This suggests that artefacts are kinds of objects that represents human knowledge or human feeling which may include object such as books, desk or a pictures, drawings, concretes or abstracts and others, and artefacts may indicate strengths or limitations on

certain practice (Silverman, 2017). Further to this, after the reflective activities were completed and submitted through emails, the artefacts were then administered and it was more driven by informal reflection. In support of this, I sent the artefacts activity to the lecturers. This activity sought lecturers to display two artefacts, the first activity asked lecturers to reflect on their bad feelings or the emotions that each of them once had had or had when using Moodle. While the second activity asked lecturers to draw or display the artefacts indicating their good feeling and emotions about the use of Moodle.

According to Cohen' et al. (2013), it is not easy to interpret artefacts (materials, equipment, drawings, and others) because it represents someone's feelings, and may symbolise different meanings. As a result, I ensured that the space was provided for lecturers to do a brief description after the artefacts is been drawn or displayed. This brief description was drawn from the informal reflection based on the particular selected artefacts. Even though half of the lecturers did understand the essence of an artefacts but the other half did not understand. As a result, I was available to make them understand what is an artefacts including all its activities/tasks. Thus, I arranged time with them in order to provide more clarity, and also send them examples of readings through emails about artefacts. This was influenced by informal reflections since their reflections were mostly dependent on the artefacts. This was useful in this study because addressed the research question of this study as mentioned in the first part of this chapter.

Moving further, according to Smith' (2007), artefacts give meanings to the participants experiences and what they perceive in their practice. As a result, lecturers were given enough time (two weeks) to complete this activity, and two of them were able complete within specified period of time while other two who were struggling were given another week to complete the activity. Lecturers showed a lot of creativity embedded in the artefacts, but one displayed artefacts without giving a brief write up. In this case I sent back the artefacts, and I requested the lecturer provide a brief write up. Moreover the use of artefacts to support reflectivity activity enhanced lecturers to provide artefacts that trace their attitudes, mindsets, and beliefs about the use of Moodle. This was influenced by informal reflection to be able to interpret their reflections using pictures (artefacts). Be that as it may, the strength of using artefacts was also observed in this study.

6.5.2.1 Reflecting the strength of reflectivity activity

Interestingly, the use of artefacts helps human beings to think out of the box about their experiences as based on the phenomenon (Butler-Kisber & Poldma, 2011; Cohen' et al., 2013). As a result, this strength was influenced by informal reflection because it was observed in this study that lecturers were able to generate different artefacts indicating their reflections in terms of emotions and feelings when using Moodle. This provides the study a chance of having diverse generated data in order to attain the purpose of this study which is to explore lecturers' reflections on the use of Moodle to teach science modules. In addition to that, Butler-Kisber and Poldma (2011), as well as Friedman (2007), assert that one of the good things about the use of artefacts is that it provides freedom to participants to explain or give a brief explanation, or details, about artefacts. This assertion was observed and I was able to provide space for lecturers to provide a brief explanation about the artefacts. These explanations provided clarity on the lecturers' reflections to their experiences, and this catalysed the process of data analysis (guided analysis). Be that as it may, there were some challenges which were observed and I was able to deal with them accordingly. According to Cohen' et al. (2013), artefacts are used to stimulate understanding about the past, present, and future experiences of participants about the phenomenon. As a result, lecturers were able to use informal reflection in order to give different kinds of artefacts indicating their past, present, as well as future experiences about the use of Moodle.

6.5.2.2 Dealing challenges of artefacts

One of the weakness on the use of artefacts (drawing or pictures) is that it can be misinterpreted in the study, and this can cause ambiguity of generated data during data analysis (Cohen' et al., 2013; Cohen* et al., 2011). As a result, this study was able to overcome this challenge because in the activity I requested lecturers provide a brief writing in the space provided. Thus, the chances of attaining ambiguity in the interpretations of artefacts were reduced. Moving further, the presence of the researcher while the participant is completing an artefact can have an influence, or bias, the type of the artefact chosen by the participant (Brennen, 2017; Butler-Kisber & Poldma, 2011; Friedman, 2007). Informal reflection prevailed in overcoming this limitation of artefacts because lecturers were given freedom to use picture or drawing of their own choice without my presence. In fact, I did not even have a single influence on the artefacts selected by lecturers

towards reflecting their emotions and feeling about the use of Moodle. As a result, the chances of bringing in bias during this period of generating data were taken care of. Moving further, the issue of ensuring ethics or seeking permission from sources of artefacts was also observed because I sent a clear message to the lecturers that should there be a picture from any source, the sources should be indicated in order to avoid plagiarism or duplication of authors work. Indeed this was administered and some of the sources of the artefact were indicated.

6.5.3 The use of one-on-one semi-structured interviews

According to various studies, one-on-one semi-structured interview is one of the types of interviews that is widely used for data generation in research. It is one of the ways in which a research ask the participants in order to dig deeper with an aim to understand the phenomenon (Cohen' et al., 2013; Creswell* & Poth, 2017; De Vos et al., 2014; Denzin' & Lincoln, 2011; Ramrathan, 2017; Spencer et al., 2003; Yin, 2013). These studies further describe one-on-one semi-structured interviews as the research method that is guided by personal reflection because the researcher talks and listens to the participants in order to generate data during the conversation about the phenomenon. It also asserted from the studies that one-on-one semi-structured interviews are all about the personal conversation between the researcher and the participant, where participants are sought to share their personal experiences about the phenomenon It is driven by a set of questions addressing certain concepts of the phenomenon. That is the reason why Ramrathan (2017, p. 416) further asserts that one-on-one semi-structured interviews, “allow for a set of leading questions to be asked of all participants, with the possibility of including unplanned questions that will allow the researcher (interviewer) to further ask questions based on the responses of the participants (interviewee) to gain more information and clarity”.

In addition to the above, one-on-one semi-structured interviews were adopted and used in this study for the fact that it is driven by personal reflection which addresses the personal needs of lecturers as participants in order to unpack the phenomenon (reflections) of this study. As a result, this data generation method was termed to be the connecting research method between the two research methods (reflective activity and artefacts). This is because reflective activity takes the vertical direction informed by formal reflection and artefacts takes the horizontal direction

informed by informal reflection. In other words, one-on-one semi-structured interview was adopted in order to take the diagonal direction which connects the other two methods via personal reflection as depicted in Figure 6.5 below.

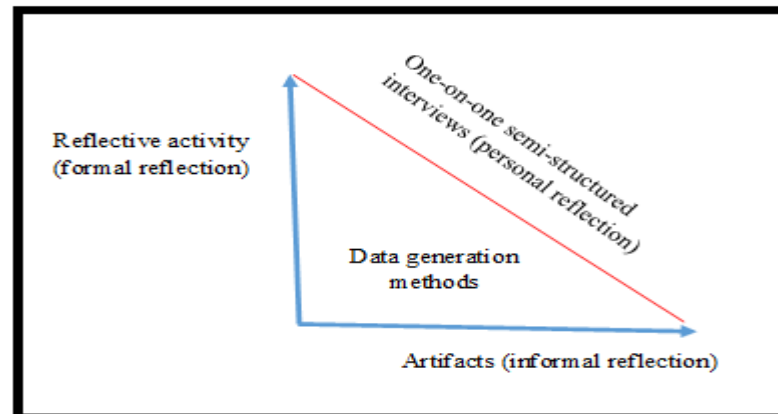


Figure 6.5: Data generations methods with reflections

Moving further, Ramrathan (2017), Lincoln and Guba (1985), Creswell. (2014), as well as Denzin' and Lincoln (2011), further assert that that there are few key futures that the study should take into consideration when conducting one-on-one semi-structured interviews, and this includes that participants must be well versed or contain a particular knowledge about the phenomenon; interview schedules with set questions must be in place, including: the suitable venue; the start of the interview must be participant friendly; the interview must be able to probe to find in-depth understanding; the end of the interview should be smooth; and finally and the research should appreciate the participation of the participants. This was all observed in this study as detailed in the following paragraphs.

First of all, I had to make sure that all participants were present and were willing to undergo the process of one-on-one semi-structured interviews. Note that purposive and convenience samplings were used to select participants who were using Moodle to teach modules and those who were

mostly accessible to participate in the study. In other words, four lecturers were available in this process of generating data based on their reflections on the use of Moodle LMS. Note that, some of lecturers declined my invitation to participate in the study even though I did go to their offices to recruit them to participate. They indicated that they were busy with their own schedules. This did not stop me to find the other four lecturers who were willing to participate in this study.

Moving further, I negotiated with each lecturer about the suitable venue and time for the interview. The three lecturers (Lecturer L1, Lecturer L3, and Lecturer L4) indicated that they are available for the interview in their own offices during their lunch time between 13h00 and 14h00. On the contrary, the other lecturer (Lecturer 2) preferred to undertake the interview during the weekend in a restaurant since this participant was a contract staff, and there was no quiet and convenient place for conducting the interview. Fortunately, lecturers' offices were well-ventilated with air-conditioning and this created a suitable environment for me and participants. The interviews were conducted over the space of two weeks at times that were negotiated with the lecturers. The interviews took about forty to forty five minutes. According to Creswell. (2014), the use of recording devices to record data from the actual interview assists the study to easily engage in the process of transcribing the data. As a result, I used an audio recording device to record lecturer's responses about their reflections on the use of Moodle. I was capable to check if the batteries of the recording device are still operating before each interview starts in order to avoid disturbances. As a result, all interviews were effectively recorded, and note that this interview generated more data because I was able to send the interview schedule to lecturers three days before the interview took place. As a result, lecturers were able to respond quicker with understandings to the question posed, all the questions were the same as the ones administered in the reflecting activity except that I was able to probe further on each concept asked.

In addition to the above, Creswell* and Poht (2017), and Cohen' et al. (2013), are in line that the essence of ethics during the process of one-on-one semi-structured interviews should be ensured. As a result, this was catered for and was influenced by personal reflection in order to protect the personal dignity of lecturers. The research had to make sure that before each interview starts the issues of anonymity, confidentiality, as well as voluntary participation, were fully unpacked and

made clear to lecturers. For instance, I explained to the lecturer that should they wish to withdraw, they could do so at any time. Lecturers were also notified that they were permitted to come and witness the transcriptions of data and they were allowed to access the findings this study after completion.

Moreover, the interviewer must have interview schedule to be followed and this assist the study to be logical and to save time (Christiansen et al., 2010; Creswell., 2014). As a result, I had already sent the interview schedule to participants which had the same eight, main, questions, but was different is that my schedule had probing questions as the guiding questions towards the process of unpacking the phenomenon. Further to this, I had showed professional behaviour before, during, and after the interview process. As a result, I had to ensure that I was always on time, I availed myself five minutes before the interview starts. During the interview, I requested lecturers to put our phones on silent mode in order to avoid hindrances. After interview, I thanked each participants and assure them that their identities would be highly protected. In addition to this, I also sent emails of appreciation and acknowledgement of their participation in the process of the one-on-one-interview. Note that, there were some strengths that were observed in this data generation method which took the direction of a personal interview.

6.5.3.1 Indicating the strength of one-on-one semi-structured interviews

Various studies affirm that one-on-one semi-structured interviews are a good research method to be adopted because it gives a chance to the participants to personally explore the phenomenon (Christiansen et al., 2010; Cohen' et al., 2013; Creswell* & Poth, 2017; De Vos et al., 2014). In support of this affirmation, I did observe this because time and venue were made available in order to question each lecturer about perceptions and opinions. The use of one-on-one semi-structured interviews allows and creates a democratic state where both the participants and researcher should become free and have no fear towards the exploration of the phenomenon. As a result, condition in this study was maintained in such a way that lecturers felt free to share and express their feelings and views (generation of data) about the use of Moodle. This resulted in the generation of data which also deductively generated themes for the analysis of data. This strength propagated the essence of personal reflection in this study.

In addition to the above, one-on-one semi-structured interviews are influenced by personal reflection, and this allows participants to tell their emotional and experiential stories about the phenomenon in order to gain an in-depth understanding of the phenomenon. This strength was observed in this study because I used probing questions seeking lecturers to tell their stories about the use of Moodle. This played a huge role in providing more details. Thus, data analysis would be made simple and easily presented. This was attained because, I posed questions that were the same as questions used during the process of completing of reflective activity. Be that as it may, there were few limitations of one-on-one semi-structured interviews which was maintained in this study.

6.5.3.2 Dealing with weakness of one-on-one semi-structured interviews

One-on-one semi-structured interviews could be time consuming and questions may be confusing to participants at times (Creswell* & Poth, 2017; De Vos et al., 2014). This was catered for in this study because I planned the time for interview and it was made clear to the lecturers that the interview would last about forty-five minutes but the first five minutes would be used for introduction of the process in order to calm down the nerves of each lecturer. In addition to this, lecturers were given a very clear instruction that they should feel free to ask for more clarity should they not understand the question, and I was able to articulate further on this case which was driven by personal reflection.

According to Cohen' et al. (2013), interviews with different questions posed to different people could result in the difficulty of analysis. In overcoming this weakness, all questions were systematically set prior to the interview, but that did not stop me from diverting while probing for more information about the phenomenon. Thus, the same pool of four participants who undergone reflective activity and artefact was the same participants or lecturers who partake in this interview. The maintenance of this weakness invoked the process of triangulation (use of one-on-one semi-structured interviews, artefact, and reflective activity) because the three methods of data generation were all administered equally and fruitfully in the process of generating data.

6.6 Data analysis

This section is all about indicating ways of deeply understanding (analysis) the generated data produced during the process of generating data using three data generation methods namely: reflective activity (formal), artefacts (informal) and one-on-one semi-structured interview (personal) with the purpose of triangulation. Thus, this study has adopted qualitative data analysis, which according to Creswell. (2014, p. 180), “ consists of preparing and organising the data (i.e., text data as in transcripts, or image as in photographs) for analysis, then reducing the data into themes through the process of coding and condensing the code, and finally representing the data into figures, tables or a discussion”. This is in line with Cohen' et al. (2013) when describe data analysis as organising; accounting for, and clarifying the generated data with reference to how participants understood and experienced the phenomenon, and this includes the process of detecting patterns, themes, and categories. Moreover, that is the reason why Marshall and Rossman (1999, p. 150) affirmed that qualitative data analysis is all about “...bringing order, structure, and interpretation to the mass of [generated] data... It is the search for general statements about relationships among categories of data”. In other words, data analysis is referred to as a systematic way of understanding generated data, or the separation of the large amount of generated data into its small manageable and understandable parts, in order to attain the purpose of the study (Christiansen et al., 2010). These definitions propagate the process of informal reflection and formal reflection because data analysis depends on generated data from the participants (informal) and this data should be made understandable using a certain framework (formal) so that findings can be easily interpreted.

In addition to the above, these studies (Christiansen et al., 2010; Cohen' et al., 2013; Creswell* & Poth, 2017; Ritchie et al., 2013; Spencer et al., 2003), further assert that data analysis is intended to describe concepts, unpack the phenomenon, and maintain relations within the generated data. Studies outline that qualitative data analysis deals with data generated from different people holding different social realities from their own social context in order to unpack the phenomenon. As a result, this study had generated data from different lecturers holding different reflections on the use of Moodle in their own university context of teaching modules using Moodle. For this reason, these studies further outline that, qualitative data analysis comes with different strategies

of analysis data in qualitative research, and this includes none other than guided analysis, content analysis, discourse analysis, grounded analysis and others as well. This study was derived from semi-structured interviews (personal), reflective activity (formal) and artefacts (informal) in order to address the research questions, purpose and objectives including the phenomenon of this study. Thus, I made sure that during data generation methods all questions asked addressed the research questions, objectives, and the purpose of the study which is to explore lecturer' reflections on the use of Moodle to teach science modules. Therefore, the use of guided analysis in this study was most appropriate because it was influenced by formal and informal reflection towards analysing data generated from lecturers as participants in this study.

6.6.1 Guided analysis

According to Dhunpath and Samuel (2009), and Christiansen et al. (2010), guided analysis seeks interaction with generated data in order to ensure judgements for the interpretation of data. This studies further outline that guided analysis is used to clarify and present themes from generated data and it is sometimes called thematic analysis. I was assisted by guided analysis in this study to gain an in-depth understanding of lectures' reflections, feelings, experiences, emotions, and beliefs towards the attainment of the rich information or data. According to the two studies mentioned above, the process of analysing data into its full meaning is mainly based on analysis of units from the generated data. It also involves the one from the theoretical framework which emerged from the literature. As a result, the process of guided analysis is driven by informal reflection including formal reflection. That is the reason why Christiansen et al. (2010) affirms that the use of guided analyses is characterised by two process namely, deductive process (formal), and inductive process (informal). As a result, data generated in this study was because of qualitative approaches and different data generation methods influenced by the lens of critical paradigm in order to unpack the lecturers' reflections on the use Moodle. Thus, much data was generated and it took me two months to analyse the data using deductive process (formal) and inductive process (informal).

Moreover, Christiansen et al. (2010) assert that the process of deductive process starts from too general to more specific analysis of data and this is attained through having the theoretical framework or concepts in place in which themes and categories is developed in order to organise,

classify, and interpret generated data, and I was able to identify patterns and relationships among generated data. This assertion on data analysis seems to take a move to formal reflection because the analysis of data is framed according to the available structure such as a theoretical framework or conceptual framework in place in which themes emerged. As a results, I started by administering deductive process, and this was done by first considering the frames of themes generated from the literature and theoretical framework before considering data that was generated from one-on-one semi-structured interviews, reflective activities, and artefacts. The analysis of this data was framed by the curriculum signals or concepts from the literature ranging from permissions and goals until the assessment signal in order to make meaning. On the contrary, the inductive process starts from specific observation and moves to a general observation of data. I started by considering the raw generated data, detecting patterns, categorising themes (Christiansen et al., 2010; Creswell., 2014). In other words, the analysis of data moves from data to a particular structured frame (theory/concepts). As a result, this was also observed in this study where some of the categories emerged from generated data and were grouped to form themes (structure).

Furthermore, following the two above-mentioned processes of data analysis in this study, I deviated from the traditional method of transcribing data during the process of data generation, and moved to the alternative method of transcribing data by writing analysis of data directly from the recorded device, and this assisted me to select the necessary data from the raw data in the recorded device in order to save time and avoid distortion of data. As a result, both inductive and deductive process/processes alluded for formal and informal reflection to prevail. This is because I was able to listen carefully to all the recorded interviews, I scrutinised responses from reflective activity, and also read the interpretation of artefacts in order to get an in-depth understanding of lecturers' reflection on the use of Moodle. Thereafter, the process of selecting and reducing generated data also prevailed through the use of two processes of guided analysis (inductive and deductive) and this was also termed to be the data reduction phase (Cohen' et al., 2013; Creswell* & Poth, 2017; Creswell., 2014). Thus, I came to a point were codes or categories were brought in and some emerged from the data in order to reduce the data. Note that I discovered that there were some unique explorations that brought an in-depth understanding of lecturers' reflections. For this

reason, these categories or codes were grouped together to form particular ideas or themes, and all these processes were guided by informal and formal reflection.

In addition to the above, the process of sorting the categories or patterns into themes also prevailed in this study. Thus, I was able to group together the categories that share the same ideas of curriculum signals which emerged from generated data (inductive process), but some were placed under the themes that were already structured or in place according to the literature (TPACK/RRPAMS) (deductive process). As a result, I sorted the themes according their respective levels which include, main themes and sub-themes, and finally I sorted themes according to the theoretical framework informing this study, namely TPACK framework expressing the technological knowledge, pedagogical knowledge including content knowledge (TPACK/RRPAMS). Moving further, framing the themes according to the theoretical framework created the overlapping of themes, and this led to the state where some themes or sub-themes had to be intertwined to form one theme in order to ensure consistency and clarity. I noticed that there were some themes that were required to be merged, and they were merged accordingly in order to fit the context of this study.

Moreover, I further followed the inductive and deductive process process of guided analysis to define and give names to the themes based on the ideas they carried. As a result, “each theme should tell a ‘story’ divulging what it is about, whilst simultaneously harmonising with the other themes in the broader frame of the phenomenon” (Budden, 2017, p. 215). As a result, I was able to gives names to the themes such as content theme, technology theme, and pedagogy theme; and the explanations were provided respectively. Further to this, Christiansen et al. (2010) and Cohen' et al. (2013) assert that the last state of analysis requires the study to provide the detailed report or discussions based on each theme identified. Thus, in support of this assertion, it came to mind that the story must be told which can provide a true reflection of data generated from lecturers. For this reason, I narrated narrative stories which provided a brief, logical, and non-repetitive account of the selected data under each specific theme. I selected accounts taken from the recorded devices, interpreted artefacts and also considered reflection from reflective activity. This assisted me to present the analysis report in the manner that reflects the true responses of participant. This was

done in order to attain the main purpose of this study which is to explore lecturers reflection on the teaching of science modules. Moreover, tables, and figures were also used to provide more details on the report. Be that as it may, there were some strengths and weaknesses that I observed during guided analysis.

6.6.2 Strength and weakness of guided data analysis

Based on the phenomenon of this study which seeks for informal, formal, and personal reflection to prevail in all areas of research, it was then observed that through guided data analysis was preferred. This was prominent when I opted to use guided analysis which had deductive process informed by formal reflection, and inductive process informed by informal reflection. This then suggests that the move taken by guided analysis informed the vertical curriculum (addresses module need) of formal reflection and horizontal curriculum (addresses student need) of informal reflection. On the other hand, it was observed that guided analysis was missing the diagonal line which connects the two process (deductive and inductive). That is, one of the weaknesses I observed in the use of guided analysis is the missing link of the personal reflection which addresses the personal need of the study during data analysis. . In other words, guided analysis was limited to the issues of personal curriculum which address the personal needs of the lecturer when it comes to teaching and learning of the module using Moodle.

In addition to the above, Cohen' et al. (2013), Creswell* and Poth (2017), as well as De Vos et al. (2014) further assert that the cost of the process of data transcription can be challenging during data analysis. It is also expensive and time consuming to employ the transcriber to transcribe data for analysis. Thus there are possibilities that data may be distorted in the process of transcription. This weakness was observed and dealt with accordingly in this study in such a way that I had to use the recording device and transcribe data directly from the device by selecting the most relevant data from the participants that fit into each theme. This was useful because I avoided the distortion of data which could lose the meaning of degenerated data. Thus, through all these processes, the issues of trustworthiness and rigour also prevailed in order to ensure consistency of the data analysis.

6.7 Trustworthiness

According to various studies, ontological and epistemological principles in a qualitative study seeks that issues of trustworthiness prevail in order to attain the purpose of the study and to unpack the phenomenon (lecturer' reflections) (Christiansen et al., 2010; Cohen' et al., 2013; Creswell', 2013; Creswell* & Poth, 2017; De Vos et al., 2014; Denzin' & Lincoln, 2011; Guba & Lincoln, 1994; Lincoln & Guba, 1985). Further to this, studies assert that issues of trustworthiness work hand in hand with principles of truth and facts in order to bring neutrality in the study. Further ti this, trustworthiness is defined as the manner in which a study can be able to ascertain to the readers that the findings of the conducted study are on the basis of high value and quality, and they deserve to pay attention to.

In addition to the above, on the first hand, the traditional evaluation criteria of ensuring trustworthiness of findings is through objectivity (subjectivity or biases in findings), reliability (consistence of findings), and validity (do findings match the reality); and these are commonly used in quantitative research studies where the scientific and standardised research methods with the same concrete instruments of conducting research is followed or done (Denzin' & Lincoln, 2011; Guba & Lincoln, 1994). On the other hand, both De Vos et al. (2014), Creswell* and Poth (2017), share the same sentiment that because of the fact that qualitative research seeks to understand the phenomenon through the interpretations of participants' social experiences in their own context, the objectivity, reliability, and validity is not applicable in qualitative research because it is missing the values, quality, and sustainability in findings of the study. This suggests that this evaluation criteria is not suitable to ensure trustworthiness in qualitative research, and that is the reason why Budden (2017) and Nkohla (2017) referred to the manner used to measure the quality of findings in the study to the extent that generated data, data analysis, discussion of findings are true.

Furthermore, Denzin' and Lincoln (2011) assert that ensuring trustworthiness in qualitative studies is not an easy task. However, Cohen' et al. (2013, p. 181) assert that evaluation criteria can be used

to ensure trustworthiness in a qualitative study includes the following: “1. Credibility (replacing the quantitative concept of internal validity); 2. Transferability (replacing the quantitative concept of external validity); 3. Dependability (replacing the quantitative concept of reliability); and 4. Confirmability (replacing the quantitative concept of objectivity)”. As a result, this study has adopted these four evaluation criterion in order to ensure trustworthiness in this study.

According to Anney (2014, p. 276) credibility is defined as, “the confidence that can be placed in the truth of the research findings”. In support of this definition Khoza and Mpungose (2017), as well as Budden (2017) further affirm that credibility is all about making sure that there is accuracy of generated data on the representation of findings in order to bring the understanding to the phenomenon being studied. These studies further assert that credibility seek the study to indicate ways to the readers that analysed data is true and trustworthy. Credibility is similar to the concepts of internal validity (how findings of from the study match reality) in quantitative research approach. Interestingly, Cohen' et al. (2013) and Anney (2014) outline common ways of ensuring credibility in the study which includes, triangulation, member checking, and peer examination as well as prolonged engagement in the research space. This is informed by informal reflection.

Moving further, I was influenced by informal reflection to administer the essence of member checking into the findings after generated data had been analysed. As a results, I provided a chance to be used by lecturers to get feedback from findings of the study. In other words, I considered the voices of participants towards the understanding and interpretation of data by sending data to participants in order to check direct quotes it is their true reflection. Moving further, triangulation is termed to be the process of using multiple and different methods of data generation methods in order to ensure trustworthiness of findings. In support of this, I had used three different data generation methods which include reflective activity, artefacts, and one-on-one semi-structured interview. Moreover, I had observed peer examination in such a way that I was influenced by informal reflection to use it. I only consulted researchers in the Curriculum Studies field in the School of Education who are familiar with the qualitative research approach and critical paradigm. Most importantly, I spent a lot of time with participants in their own context in order to ensure that any unforeseen circumstances based on findings were attended to. I ensured this by making an

appointment to pay visit to their office to engage in general conversation which also included issues of findings.

Studies further assert that transferability is described as a state where the findings of the study can be transferred to other contexts with similar participants, and it is similar to issues of external validity in quantitative approach focusing on the question of whether findings can be generalised (Houghton, Casey, Shaw, & Murphy, 2013; Pacho, 2015; Wahyuni, 2012). Thus, these studies outline that, transferability is also known as generalisability which is defined as the extent to which one can spread the account of particular circumstances to other people, times, or context. In other words, this suggests that, based on informal reflection, findings can be transferred on the basis that they only fit into the new situation outside the context of the actual study. In affirming this in this study, I had considered that this study had a small number of lecturers teaching science modules at a university using Moodle. Thus, I affirmed the findings cannot be generalised to all universities around the world but they can be transferred to other lecturers of the same context who use Moodle to teach science modules. This process propagates informal reflection. Furthermore, studies mentioned above further assert that the use of purposive sampling and the provision of thick description in the study enhance transferability. For this reason, I therefore considered the use of purposive sampling in order to select lecturers who were teaching science modules, employed, and compelled by the university (contract and permanent) to use Moodle after it was adopted. Further to this, I also provided a thick and detailed description of the phenomenon (lecturer' reflection) in terms of the process of data generation, process of research design, and process of data analysis including the discussion of findings.

Houghton et al. (2013) and Anney (2014) parallel each other in that dependability is one of the ways used in qualitative research to ensure trustworthiness. It is defined as the degree to which consistency of getting similar findings can be assured if the study can again be conducted in a similar context. Studies affirm that dependability is similar to the issue of reliability in the quantitative study. Dependability checks if the findings can be replicated in another context if the same the subjects/findings can be conducted. Moreover, according to Budden (2017, p. 217), "Dependability inclines to participants checking the findings, interpretations, and

recommendations to ensure they correlate with what was actually said and given to mean in accordance with the phenomenon of a study”. As a result, I had enough opportunity to give the study to the participants to read for themselves in order to check if what is reflected in data analysis and discussion of findings reflects their responses during the process of data generation. Lecturers were also motivated to read recommendations that was proposed with the purpose of empowering them. They also had to make sure that all documents, like data generation instrument, consent letters, gate keeping letters, and other document related to this study was stored for a period of five years before it is discarded. This then was informed by formal reflection since it involves reading and the process of keeping written records which resonates with vertical curriculum.

Furthermore, confirmability relates to objectivity in quantitative research, and it is defined as the manner in which a study can provide the means to confirm research findings. It requires the study to make self-critical account in order to eliminate biases in the study (Anney, 2014; Cohen' et al., 2013). This propagates personal reflection because I had to read and confirm if justice is done in the study, errors such as technical errors were found and rectified. The researcher sent the study to be confirmed by participants before it was submitted to the supervisor for scrutiny. After confirmation by the supervisor, I took the study to an external editor in order to check for any biases, grammatical errors, and if the research questions and objectives are unpacked in such a way that they answer the research purpose. Further to this, ethical consideration was always in my mind during the trustworthiness process.

6.8 Reflecting the ethical issues of the study

Various studies remind the researchers that qualitative research is all about unpacking the phenomenon through understanding of the social experiences of participants in their own natural settings or institutions (Babbie, 2010; Christiansen et al., 2010; Creswell* & Poth, 2017; Ritchie et al., 2013; Silverman, 2001; Spencer et al., 2003). This then involves interaction between the researcher and the participants where private spaces of participants can be invaded in order to generate data. Studies state that this seeks the researchers to take into consideration the issues of respecting the rights, desires, and values of participants in their own institutions. This is expected to take place before, during, and after the research begins in order to ensure their privacy, safety, and wellbeing. Studies referred to this as research ethics which are defined as act of doing no harm

to participants but only do good in order to protect them. These studies further suggest several strategies in which ethics in qualitative research can be maintained which includes none other than informed consent; harm and risk; honesty and trust; privacy, confidentiality, and anonymity; and voluntary participation.

In addition to the above, research ethics (informed consent) in this study was observed because after the participants had been recruited, I had an opportunity to meet the lecturers (participants). Thus, they were made aware about the activities/tasks of the study. As a result, I gave details on the purpose and nature (research design, paradigm and style) of the study, data generation methods (artefacts, reflective activity and one-on-one semi-structured interview). Moreover, their choice of being video recorded or audio recorded were also given to participants. I explained their expected roles in the study. As a result, I was able to get the four lecturers' informed consent in writing as depicted in appendix A. Thereafter, I applied and received the gate keeping letter from the registrar to conduct this study, with the lecturers, at a university (appendix C). I also applied to get an ethical clearance letter from the university research office, and it was granted with immediate effect because the study met all ethical issues, see appendix B.

Furthermore, harm and risk in this study was also observed, and this is also referred to as Non-Maleficence which seeks the study to ensure it does not cause any injuries, harm, or any emotional offences (Christiansen et al., 2010; Cohen' et al., 2013). As a result, I made sure that the participants were well protected because there was no physical or emotional harm which occurred. This was because I was able to negotiate every process with participants such as venues and time of conducting interviews. I also communicated with the university security to be available next to each venue where data generation occurred in order to ensure that there is no harm and risk. This was influenced by the process of informal reflection.

Moving further, I alerted the participants (lecturers) of issues of honesty and trust in such a way that participants were requested to share their truthful experiences about the phenomenon. This assisted me to observe all issues of trustworthiness (credibility, transferability, dependability,

confirmability) which played a huge role during data analysis and discussion of findings. This was driven by the process of personal reflection.

Further to this, I was observant when it comes to issues of ensuring anonymity, privacy, and confidentiality. As a result, I avoided any kind of exploitation to participants in terms of their backgrounds, religion, age, gender, and culture amongst others. Confidentiality and anonymity of the lecturers was administered through the use of acronym (Lecturer 1, Lecturer 2, Lecturer 3, and Lecturer 4) instead of their real names. I also confirmed that lecturer's names will not be revealed under any condition. This ethical issue seem to propagate personal reflection because it address each need of the lecturer. Finally, I was also cognisant of the ethical principle called voluntary participation of participants. Thus, the researchers were able to alert the lecturers that the study was only influenced by an academic purpose, and that they were not compelled to participate but that they were asked to volunteer to partake in the study. As a result, lecturers were made aware that this study is not done for beneficiary purpose. In other words, this indicates that the study did not have any benefits in terms of money or salary but if was for empowerment of lecturers' practices, and this was influenced by personal reflection.

6.9 Rationale behind the limitation of the study

According to various studies, it is normal for each qualitative research that there is the possibility of experiencing certain limitations since it deals with an in-depth understanding and discretion of the phenomenon (Avineri, 2017; Creswell* & Poth, 2017; Esau, 2017; Patten, 2017). Studies further outline that these limitations are often observed mainly during research design and methodology where there is much interaction with participants and data. As a result, studies further outline that it is the duty of the researcher to acknowledge the limitations identified in the study by accepting and declaring them openly using personal, informal, and formal reflections. This suggests that there is no study that is free of shortcomings, and this seeks personal reflection to indicate how the study has dealt with them accordingly.

In addition to the above, in the context of this study, using the lens of formal reflection, it was not easy to adopt the relevant theoretical frame work for this study among these four namely TPACK/

RRPAMS, five stage model, connectivism, and CHAT. In dealing with this shortcoming, I had to dig deeper from the relevant literature that unpacks the phenomenon (reflections) of this study as well as curriculum concepts. This assisted me to adopt TPACK/ RRPAMS. Moving further, I used the lens of informal reflection from the research design and methodology in conducting this study. Note that this study was an emancipatory action research under critical paradigm. Further to this, both the convenience and purposive sampling were used. Therefore, I used only four lecturers (small sample size) as participants. This brings limits in this study's findings not to be generalised to a wider population or to all universities using Moodle. Be that as it may, I had used the process of transferability/applicability of the study so that the findings can be applicable or lecturers of similar context can referred to the findings.

In addition to the above, through the lens of personal reflection, I observed that there is an exhibition of holding possible biases in conduction this study. This is because I was well versed with issues of curriculum, educational technology (Moodle) and reflections but wanted to know more through studying lecturer's reflections. This then automatically inflicted the issue of researchers' biases in conducting the study. In order to curb this limitation, I did not indicate that I was aware of some of the issues, and I did not use the privilege that the participants were lecturers with whom I was working in order to infringe their rights.

6.10 Conclusion

In concluding this chapter, it is vital to note that Chapter Six was unpacking the second section of research design and methodology which is research methodology. Interestingly, the discussion on this chapter was framed around personal, formal, and informal reflection. The chapters showed that even though the formal and informal reflection was allude to in each section, this chapter sought to take the direction of personal reflection. As a result, Chapter Six articulated much on action research by indicating its etymological definition and types (technical, practical, and emancipatory) including the strengths and weaknesses. Thus, I put emancipatory action research to be preferred because of personal reflection which did prevail. This assertion led to the organisation of the next chapter

CHAPTER SEVEN

Exploring the reflections that enrich RRPAMS theory in curriculum

7.1 Introduction

This chapter exists because of the accounts that were presented in the previous chapter (Chapter Six) which highlighted the second part of research design and methodological paradigm, which is methodology. Based on Chapter Five (research design), qualitative approach was used as the umbrella of this study under the critical paradigm, and Chapter Five lead to the discussion of Chapter Six (methodology). Thus, emancipatory action research became the most suitable research style for this study because it is driven by personal reflection. Further to this, issues of sampling (convenience and purposive sampling), data generation methods (reflective activity, artefacts, and one-on-one semi-structured interview), data analysis (guided analysis), trustworthiness (dependability, credibility, confirmability and transferability), and ethical issues including limitations of the study, were unpacked in the previous chapter in order to explore lecturers reflections on the use of Moodle to teach science modules. This therefore led to the need of the next chapter on the analysis of the generated data as it occurred in the previous chapter. As a result, this chapter presents the analysis of generated data in order to explore lecturers' reflections.

In addition to the above, remember that the literature (Creswell* & Poth, 2017; De Vos et al., 2014; Ramrathan, 2017; Ritchie et al., 2013) outlines that data analysis seeks give meaning or relations to the generated data from participants via intensifying themes and categories. Further to this, guided analysis was used as a mechanism that sought to group similar concepts so that they can be put together into themes in order to produce categories or patterns. Moving further, this chapter seek to give answers to the study's research questions, namely: 1. What are the lecturers' reflections on the use of Moodle in teaching Physical Science module? 2. How do lecturers reflect on the use of Moodle to teach Physical Science module? 3. Why do lecturers' reflect in a particular ways on the use of Moodle when teaching Physical Science module? For this reason, Table 7.1 overleaf displays how data analysis is structured in this chapter by indicating the signals, themes, and categories. This is framed around Reflections, Resources, Procedures, and Module Signal (RRPAMS) theory in curriculum (refer to Chapter Four).

Table 7.1 signals, themes and categories

RRPAMS theory	Themes	Categories
Reflections signal	Lecturers' reflections	Informal reflection
		Formal reflection
		Personal reflections
Resources signal	Resources	Software resources
		Hardware resources
		Ideological-ware resources
Pedagogy signal	Assessment	Assessment as learning
		Assessment of learning
		Assessment for learning
	Permission	Financial permission
		Physical permission
		Cultural permission
	Justice	Aims
		Objectives
		Learning Outcomes
	Activities	Personal activities
		Formal activities
		Informal activities
	Character	Instructor
		assessor
		Facilitator
Platform and time		Personal platform (spare time)
		Formal platform (working hours)
		Informal platform (after work)
Module signal	Content	Physical Science
		Chemistry
		Teaching methods

7.2 Discussions of findings

According to Creswell* and Poth (2017) and De Vos et al. (2014), the discussion of findings is aimed at exploring the phenomenon through identifying relationships and providing relevant explanations among generated data. Thus, discussion of findings is drawn from generated data, RRMAPS theory, and literature. Note that generated data is acquired through reflective activity, one-on-one semi-structured interview which were administered in two phases or stages, and lastly participants were then required to draw artefacts. This is discussed in terms of themes guided by a specific question in each theme.

7.2.1 Lecturers' reflections

- Why do you use Moodle to teach your module/ why do you have an interest in the use of Moodle (reasons)

- **Phase 1**

Participants during phase 1 of action research responded to the question that was seeking their reflection based on the reasons why they are using Moodle. All lecturers (L1, L2, L3, L4, and L5) responded according to their own unique experiences.

L1 responded by saying:

“...well, I am recently employed by the university and I found that Moodle has been used and still used as a learning management platform... Moodle is a good resource that one can use to teach a module and communicate with students... I use it because I have much interest in it, as it reduces paperwork and stores (academic and personal) information for both student and myself as a lecturer.” Interestingly, L2 also indicated much interest on the use of Moodle and said, *“...the reason that drives me to use Moodle is for the fact that it supplements what I could not explain fully in class. In other words, it helps me to unpack the content. Thus, I could send notes any time after the lecture so that students can extend and enrich the lecture”*. In addition to that, L3 said, *“I have been here for the past three years as contract staff and I can hardly Moodle use because, usually the module coordinators have access to it... but us as contract staff lecturers do not have full access*

to it and if we have anything we want to post it goes through them. Be that as it may, I can use Moodle because it is a platform that provides a faster way of reaching out to students especially when you want to give an announcement, post assignments, new instructions or resources for the module such as the prescribed articles and course outlines...” Moreover, L4 outlines that, *“...All students will have the material to study immediately and be able to use it for class and studying... it saves time, paper, and effort...”* Interestingly, L5 further said that, *“I can record marks, find average and student’s access immediately and query it also provides evidence. All the above can happen wherever you are in the world. Need not be physically present. Most importantly I use Moodle to communicate or chat with single or all students on their work (classwork/exams/tests/meetings) especially during protests time or on emergency sick leave etc.”*

○ **Phase 2**

During phase 2 the five lecturers responded as detailed below:

L1 said: *“I use Moodle because the university requires me to do so... I also use as a mode of communication with students in order to address any queries related to the module, Moodle makes things easy for me to post notes and paste links to certain videos for student.”*

L2 quoted: *I use Moodle to make a follow up after the lecturer in order to catch up what I have not done in class... I post assignment, and communicate with students using Moodle.”*

L3 affirmed: *“It makes my life easy because it reduces paper work, it is mode of storing resources of a module... I am also bound by the university management and policy to use Moodle to keep up with technological developments. I use Moodle to equip myself with LMP skills that are applicable international.”*

L4 conveyed: *“My use of Moodle is guided by university policy, and this assist me to handle large number of students per lecture.”*

L5 asserted: *“I use Moodle because I have got love of technology... I am always willing to see students advancing their skills, especially in the use of Moodle.”*

The lecturers' accounts from phase 1 of the action research simply outline that the rationale of using Moodle is predominately influenced by societal need (informal reflection) before any other need (module or personal need). For instance, all lecturers (L1, L2, L3, L4, and L5) indicated that the Moodle resources were mainly used by lecturers for communicating with students via sending announcements or emails to students. The accounts assert that lecturers' usage of Moodle addresses the needs of students in such a way that lecturers use Moodle to assist students to get the teaching and learning material wherever they are, irrespective of their environment. These accounts suggests that the use of Moodle was mostly influenced by informal reflection where the needs of the students is always at the centre (Khoza & Mpungose, 2017). Moving further, one out of five lecturers indicated that the rationale of using Moodle is driven by the module need. For instance L5 outlined that Moodle is used to upload all content-driven activities such as class activities, tests, and examination, which are to be accessed by students. Thus the use of Moodle by L5 addressed the module need since the assessment of learning activities were catered for. As a result, the minority of lecturers were influenced by using Moodle via formal reflection. Be that as it may, two lecturers (L1 and L5) indicated that their usage of Moodle was influenced by personal reflection since their accounts indicate the concerns on their personal needs. For instance L1 indicated that the use of Moodle is driven by personal interest whereas L5 outlined that the use of Moodle does not demand the physical presence of the student nor the lecturer (blended learning) but that it suites any personal space or environment.

In addition to the above, studies asserted that informal reflection enhances lecturers to address the societal needs which includes students' needs and it is also guided by horizontal curriculum which includes learning outcomes, soft-ware, and assessment as learning, physical space, facilitator, student-centred activities, and others (Bernstein, 1999; Biggs', 2011; Khoza, 2017; Schoenfeld, 2016; Schön, 1983). As a result, lectures were much more knowledgeable about most of these signals. Furthermore, these studies assert that for formal reflection to occur, lecturers should interrogate vertical curriculum signals such as objectives, hard-ware, assessment of learning, content-centred activities, and others. In support of this, few lecturers were asked based on vertical signals and this indicate that formal reflection was minimal from their accounts. Interestingly, these studies affirm that personal curriculum is influenced by personal curriculum signals with

strives for personal development and motivation which includes aims, ideological-ware resources, blended learning, and others. As a result, phase 1 also outlined the minimal accounts on personal signals and this means that much attention was influenced by both personal and formal reflection.

Based on phase 2 of the action research, Boud[^] et al. (2013)'s constructs of transformation and empowerment comes after the initiated intervention has been embraced. After the readings based on reflections phenomenon from different authors has been given to the lecturers, lecturers indicated great improvement on their rationale which are influenced by the type of reflection (personal, informal, and formal). As a result, it is quite interesting to note that most of these lecturers' accounts have shown much improvement in terms of balancing between the reflections. Thus, the majority of the lecturers' use of Moodle is dominated by their personal reflection. For instance, all lecturers affirmed the influence of personal reflection since it was indicated that Moodle is used out of passion, Moodle makes their lives easier (less paper work), and it assists them to catch up with students after a lesson. According to Khoza and Mpungose (2017), personal reflection places the lecturer's needs and personal identify at the centre of any activity in Moodle usage, and this enhances personal development of each lecturer. This is in line with the above lecturers' account because lecturers have seen Moodle as the platform to address their needs. Be that as it may, formal reflection was also another dominating level of reflection to address the module need. For instance, L4 asserted that the use of Moodle is driven by university policy, and L1 indicated that links and assignments addressing the module content were posted on the Moodle platform; other lecturers also shared the same sentiment. This suggests that lecturers' usage of Moodle were driven by formal reflection to address the module need (Boud[^] et al., 2013; Schubert, 2009). Thus, formal reflection is influenced by performance curriculum in such a way that lecturers are required to be experts in their module content (Bernstein, 1999; Hoadley & Jansen, 2013). This is in line with lecturers' account because most of them were able to select relevant notes and post them to Moodle platform in order to address the module need. Furthermore, there was a bit of informal reflection to address student need (societal need) since it was well articulated during phase 1. Note that L5 highlighted that Moodle was used to assist students to become well advanced in the use of learning management platforms like Moodle. Phase 2 accounts indicated the move from informal reflection to formal reflection but most importantly to personal reflection after

lecturers have been engaged with the intervention (readings on reflective practice and reflection phenomenon). This was done with the purpose of improving their perception (reluctance) about Moodle which in turn improved their practices.

7.2.2 Resources

- What resources do you use when teaching a module using Moodle (resources)

- **Phase 1**

L1 reflected that:

“I add my own (collected) teaching sources, such as articles, links to videos, Worksheets, assignment questions, marks, and I also use it to send out important information via its email system,” and this reflection showed similarity with that of L2 who articulated that, *“Normally I prefer using slides, web links and site links to information and videos for learners to engage...”* Further to this L3, outlined that, *“I use Moodle as a tool to make announcements of key dates and venues especially for tests and exams and assignments due dates, assignments, new instructions or resources for the module such as the prescribed articles and course/module outline, and sometimes books... I also use diagrams, maps, concepts maps for assignment writing, videos, power points for the previous lectures and past exam papers for students to revise.”* These reflections are in line with that of L4 who asserted that: *“I prefer using Internet together with computers with MS word, MS PowerPoint and MS excel; scanner and photocopier...”* L5 asserted that, *“I use discussion forums, recently using quizzes that students take them up online and the system marks for them. I also use it to upload PowerPoint notes, assessment tasks and chat app...”*

- **Phase 2**

The following accounts shows lecturers reflections during the second phase of action research

L1 Said: *“I always prefer to involve student in in discussion in order to unpack the content... but I only use my laptop to post notes on Moodle for students to download... I use data projector in*

lecturer venues as well as USB to store my data... use PowerPoint, links to videos, emails articles.”

L2 indicated: *“My teaching is more interactive and I will want to engage student during my teaching... I do upload word, presentation, excel documents... I normally use my laptop.”*

L3 conveyed: *“I use MS word, I use PDF files to gives to students files that are not editable... computer monitors, external hard drive, flash disk and others... I am guided community of practices theory which assists me to mediate learning between students and he content.”*

L4 quoted: *“I use laptop to upload slides, notes, and assignment in a PDF format, MS word document, and MS excel. My teaching is guided by participatory teaching methods.”*

L5 outlined: *“I don’t use Moodle for teaching but it is used as platform for uploading notes and a mode of communication which allow active interaction with students. I need a laptop, cellphone and a tab... since students are highly influenced by plagiarism I normally use PDF application, MS word including MS PowerPoint.”*

These studies (Amory*, 2010; Anderson, 2016; Bates*, 2016; Downes, 2010; Khoza, 2017) further asserte that Moodle as a resources is based technology of education and technology in education. Studies further assert that Technology of education is as a result of teaching and learning theories used for guiding the teaching and learning process, whereas technology in education is made up of hard-ware resources such as computers and others, as well as soft-ware resources such as MS PowerPoint and others. As a result, the use of these resources are influenced by a particular level of reflections. Further to this, Govender and Khoza (2017) remind us that hard-ware resource are any physical resources that can assist lecturers during the teaching and learning process; Soft-ware resources assists the Hard-ware resources to display information; and ideological-ware resource are believed to be the drivers of the lesson such as theories. In support of this, the use of hard-ware resources is driven by formal reflection while the use of soft-ware is driven by informal reflection (Bitzer & Botha, 2011; Govender & Khoza, 2017). On the contrary, the use of ideological-ware is influenced by personal reflection (Khoza & Mpungose, 2017).

During the first phase of action research, lecturers reflected only on soft-ware resources and hard-ware resources, and most of the lecturers showed more interest on the use of soft-ware resources than hard-ware resources. Most interestingly, all lecturers (L1, L2, L3, L4, and L5) highlighted the use of different kinds of soft-ware including softcopies of learning and teaching material. For instance L1 and L2 highlighted that they use electronic copies of readings or articles and previous question papers, videos, presentation (MS PowerPoint), L3 also asserted the use of MS word and MS excel as well as L5 who confirmed that chat application is used for discussion forum purpose in order to unpack the module content. This suggests that lecturers in this case of using soft-ware resources were addressing the needs of students (societal needs) and they were much influenced by informal reflection (Brookfield', 2017; Bulman & Fairlie, 2016). As a result, the use of soft-ware resources relates to horizontal curriculum where society (students) is always at the centre of teaching and learning process. These suggests that the use of soft-ware resources such as chat applications gives the platform to all students to share their own ideas about the module content.

Furthermore, L4 was the only lecturer who reflected on the use of hard-ware because L4 indicated that a scanner and photocopier are used to upload some relevant documents on the Moodle platform. Thus, some hard-ware resources can be input, processing, and output resources (Naicker, 2016). This suggests that L4 used input hard-ware to upload files for the module, and this is influenced by formal reflection where all functions follow a step by step process. As a result, hard-ware resources relates to vertical curriculum where module content is always at the centre of the curriculum. This suggests that a lecturer (L4) was influenced by formal reflection in order to address the module need. These reflections show that there were few lecturers who were familiar about hard-ware resources and none of them was aware of ideological resources for personal needs (lecturers' needs).

After the intervention was implemented, phase 2 of the action research showed much improvement because all lecturers were able to reflect on the bases of soft-ware and hard-ware as well as ideological-ware resources when using Moodle. Automatically, all lecturers were familiar with soft-ware resources; for instance, each lecturer mentioned the use of any soft-ware resources which includes applications like Microsoft Word, Microsoft PowerPoint, Acrobat Reader files, and

videos from YouTube, Microsoft Outlook for emails and others. In line with this, lecturers accounts were influenced by informal reflection in order to meet the needs of student by making all reading available for students in different soft-ware formats (Peabody & Noyes, 2017). Be that as it may, Pearson (1994) asserts that soft-ware resources can be form of application soft-ware and system soft-ware. However, lecturers' accounts seem to suggest that lecturers were much familiar with application soft-ware than system soft-ware. This then suggests that lecturers were not aware that the Moodle platform also runs by using an operating system soft-ware like Linux, Microsoft Windows, and others.

Moreover, all lecturers indicated the use of hard-ware resources like desktop computers, laptops, mobile cell phone, and others. For instance, L5 indicated that he needs a laptop, cell phone, and a tablets in order to use Moodle. This suggests that lecturers were driven by formal reflections which seek to address the module need (content). As a results, Cruz (2013) further affirms that Moodle as a resource takes into consideration the hard-ware resources which can be input resources, processing resources, and output resources. In support of this affirmation, lecturers' accounts indicated the input and output device, and none of them reflected on processing devices like internal memory required to run Moodle. For instance L1 said, “...*but I only use my laptop to post notes on Moodle for students to download... I use data projector in lecturer venues as well as USB to store my data*”. Further to this, formal reflection influence the vertical curriculum and its main focus is on the module or subject to be taught (Hoadley & Jansen, 2013; Khoza, 2017). This suggests that hard-ware resources was used by lecturers to input, process, and display module content in order to address the module need. As a result, the use of hard-ware resources allows lecturers to have control over the sequence and pace in which the module content is offered (Mohammadyari & Singh, 2015; Mpungose*, 2016).

Interestingly, these accounts further indicated that lecturers took step further to realize their ideological-ware resources (worldviews/ideologies/theories) that guides their teaching and learning using Moodle. Take for instance L3 who outlined that teaching and learning practices was guided by Communities of Practice (Lave and Wenger), which are learning theories that assist in the process of mediating learning between students and the content. Both L2 and L5 were in line with L3 that their teaching and learning process on the Moodle platform is more interactive and

the space is created for students to share their own experiences in unpacking the content. These accounts suggest that lecturers were influenced by personal reflection which assisted them to use relevant teaching theories or methods. Remember that Amory' (2010) further affirm that knowing soft-ware and hard-ware resources without mastering the ideology behind its use is meaningless. Thus, these accounts (phase 2) indicated a great improvement from the first phase because lecturers were able to display the ideology behind the use of Moodle. Moreover, ideology behind the use of Moodle is embedded on constructivism where ideals of behaviourism and cognitivism are intertwined, and this allows active engagement of students in order to make sense of the content from their own experiences (Bates*, 2016; Khoza, 2017; Piaget, 1976; Vygotsky, 1978). This then seeks personal reflection from lecturers t prevail so that they will know their strength and weakness behind the use of Moodle.

7.2.3 Permission

- *Are you permitted to use Moodle and how do you gain access to Moodle to teach your modules (accessibility)?*
- **Phase 1**

Lecturers' reflections indicated different experiences because of the employment status of lecturers' in such a way that L1 responded that:

“as a permanent staff member who coordinates the modules, yes I am permitted because the university requires every lecturer to have access to Moodle... I gain access via my laptop bought by the university... I use my username and password to login”. Moreover, L2 said that, *“when I am on campus I use Wi-Fi to access with Moodle, and could help in extending lectures and communicate with students on academic matters...”* L3 reflection was also from the point of view of the contract staff who said that, *“As contract staff lecturer I do not have a direct access and if I have anything we want to post it goes through module coordinators for standardisation since a module can have more than 8 lecturers...”* Further to this L4, avers that, *“...as a permanent staff who coordinates different modules in my department, yes I have the full access to use Moodle as a teacher... I am therefore allowed to registering my modules I teach, edit all Moodle resources, and activities”.*

- **Phase 2**

L1 Highlighted: *“As a permanent lecturer I am obliged to use Moodle... I normally drive to campus to access Moodle... I can use Moodle at home anywhere provided I have internet access... no cultural hindrances that I have met so far since I started using Moodle.”*

L2 Indicated: *“Normally I use Moodle after driving from home to campus because of cost effective of data bundles when I am at home... Moodle does not discriminate any student irrespective of their culture or race.”*

L3 Conveyed: *“I do not pay anything to access Moodle when inside campus, I use my own transport to come to campus to access Moodle... I make sure the uploaded informal on Moodle is not discriminatory in terms of race, language, colours, culture, and others.”*

L4 Affirmed: *“I use English as a common mode of communication to accommodate all students from deference race...wife and my laptops helps me to use Moodle efficiently.”*

L5 quoted: *“To use Moodle it is cost effective because for me to use Moodle when I am out of campus it cost me data bundles to connect to a Wi-Fi. As a module coordinator, I use Moodle to accommodate different background in terms language, race and others.”*

Unfortunately, the lecturers' accounts during the first phase indicate that lecturers did not use their personal reflection to reflect on cultural permission. According to Yuan et al. (2013), cultural permission in the use of online learning platforms seeks to address personal differences in term of race, language, gender, and others. This suggests that the Moodle platform is bound to cater for student's differences and lecturers should ensure that those differences are observed while teaching their modules. Note that none of the lecturers articulated on which language is used when teaching their modules, and the issue of different race using Moodle was not reflected on as to how Moodle LMP accommodates different student from different race. Be that as it may, most of lecturers reflected on physical permission. For instance L1, L2, and L4 indicated that, for the fact that they are permanent staff of the university, they have full access to the use Moodle. This suggests that

the university should provide resources (soft-ware and hard-ware) at the disposal of lecturers so that they can meet all Moodle requirements (license, internet access, upgrades, hard-ware resources such as laptops and computers, and others) (Noblit & Pink, 2016; Richardson, 2011). In support of this, physical permission seeks lecturers to be well versed about hard-ware resources like desktop computers, laptops, policy documents or manuals, and others (Jackson, 2017). Furthermore, L1 quoted that, *“I gain access via my laptop bought by the university... I use my username and password to login”*. In other words, some lectures were driven by informal reflection where all cost was taken as the responsibility of the university management to pay for the access to Moodle. Thus, the accounts seem to be mainly driven by formal reflection (physical permission) and followed by informal reflection (financial permission), and none of the cultural permission drove the accounts. Thus, there was a need to administer a common intervention with all lecturers in order to empower them. This was witnessed during phase 2 of action research.

In addition to the above, after the intervention was initiated, lecturers then showed great improvement on cultural, physical and financial permission to the use of Moodle. All lecturers managed to use their personal reflection to reflect on cultural permission. Lecturers’ accounts were very clear that Moodle was not used for the discriminatory purposes in terms of race, language, and colour. For instance, L4 indicated that *“I use English as a common mode of communication to accommodate all students from deference race”*. This then suggests that Moodle is a platform used to create cultural inclusion (language and religion) of student taking a particular module (Khoza, 2017; Vygotsky, 1978). In other words, the Moodle environment is capable of creating a multicultural environment where every lecturer and student, irrespective of their culture, can access Moodle at any time (Kumar & Sharma, 2016; Mpungose*, 2016).

Moreover, all of lecturers who reflected were driven by formal reflection as occurred in phase. Thus, L1, L2, and L3 indicated they use their own transport to come to campus in order to access Moodle using their laptops to access the internet. Take for instance L3 who said, *“I use my own transport to come to campus to access Moodle”*. This is in line with what the Moodle training guide seeks, that lecturers are expected to have login details in their laptops/computers in order to access the Moodle platform (University Moodle Training Guide, 2017). Furthermore, both the

module outline and the training guide articulates that both the student and the lecturer needs to be registered by the administrator in order to have login details to access Moodle (Science Module Outline, 2017; University Moodle Training Guide, 2017). This is in line with what Maxwell (2013) and Jackson (2017) outline that financial permission is driven by informal reflection where all cost on the use of Moodle becomes the responsibility of the university. On the one hand, this is true because lecturers' accounts indicate that when they are inside campus the internet access is free through Wi-Fi. For instance L3 asserts that, "*I do not pay anything to access Moodle when inside campus*". On the other hand, this is not true because lecturers use their own funds in their homes to access Moodle, as L5 explains, "*To use Moodle it is expensive because for me to use Moodle when I am out of campus it cost me data bundles or Wi-Fi*". This then suggests that financial permission to Moodle has a discrepancy because it does not cater for lecturers once they are away from the campus. Further to this, lecturers were then made to reflect on how they ensure justice when teaching.

7.2.4 Justice/goals

- *How do you ensure justice when teaching your module using Moodle (goals to be achieved)*
 - **Phase 1**

Based on attainment of justice or goals in the use of Moodle L1 said that:

"Justice is maintained through the use of Moodle because it provides somewhat better communication with students... there is immediate access to learning and less printing in this platform". L2 only provided a short and concise response, "*...I provide quick communication with students through the use of Moodle...*" Be that as it may, L3 reflected that, "*Since access is limited, there is little effort I put to maximise justice in the use of Moodle, and this is because of module coordinators are the ones who only have a direct access which also limits innovation for me to achieve my lesson goals... creativity on the part of all the contract staff to attain module goals is limited since some will be afraid to be judged by the module coordinators*". L4 said, "*I ensure justice in my module by making sure that all notes and other resources are available online for students*". The last participant, L5, alluded that, "*I ensure justice because I set a learning programme with*

due dates for tasks, test dates after class discussion, and agreement with students... I grant extension if dates are not suitable for students. I care for student because I always provide timeous feedback with memo for students to check.”

○ **Phase 2**

L1 noted: *“My long term goals of using Moodle is to see it to more user friendly and interactive to me and students...”*

L2 outlined: *“I would want to see Moodle more interactive where a lecturer can do live streaming with students...”*

L3 asserted: *“My aims of using Moodle is to promote technological advancement so that students can able to see that learning can able to take place anywhere they are as long as they have internet access... my short term goal is to equip student with the module content... I ensure that students can and will be able to use Moodle even in their schools where they will be employed.”*

L4 affirmed: *“My main aim is to move away from paper format to electronic format for flexibility... use Moodle to create computer literacy skills of students so that they can address the module content.”*

L5 said: *“I would wish to see Moodle upgraded to live streaming at a long run... an immediate change should be the integration of turn tin with Moodle... I would wish 1200 students to make follow up discussion after a lecturer is sorted... I am concerned about Moodle because it is complicated with many different interfaces.”*

Hyland, Kennedy, and Ryan (2006), as well as Chittleborough (2014), assert that justice seeks to ensure fairness in the educational programme through the attainment of goals (aims, objectives, and learning outcomes) in order to meet the personal needs, module need, and societal need. In addition to this assertion, Khoza and Mpungose (2017) further aver that aims seek to ensure justice through long term goals (aims), short term goals (objectives), and student goals (learning outcomes). Based on this literature, lecturers’ account during phase 1 of action research was dominated by student goals in ensuring justice in the use of Moodle to teach the module. Hence

most of the lecturers were driven by informal reflection because they articulated mostly on the needs of students. This is evident because L1, L2, and L5 all asserted that justice is assured if student needs are met. As L4 stated, *“I care for students because I always provide timely feedback with memos for students to check”*. This is in line with what the policy documents affirm that students should be provided with all necessary opportunities to develop their online skills in order to access feedback (grading) (Science Module Outline, 2017; University Moodle Training Guide, 2017).

Further, lecturers' accounts during phase 1 also indicated the lack of understanding when it comes to the attainment of aims and objectives because only one lecturer articulated on each goal. For instance L1 quoted, *“...there is immediate access to learning and less printing in this platform”*. This indicates that Moodle usage ensures immediate access to teaching and learning, and this gives the clear direction to lecturers as to how and when to access Moodle for teaching and learning (Hyland, Kennedy, & Ryan, 2006). This seeks to address what lecturers are trying to achieve (immediate access) through the use of personal reflection to address their personal needs (strengths and weakness). Moreover only L4 reflected on objectives which addresses the needs of a module through formal reflection (Khoza, 2017). L4 said *“I ensure justice in my module by making sure that all notes and other resources are available online for students”*. This then suggests that this short-term goal (objectives) addresses the needs of a module. Be that as it may, the overall accounts of lecturers indicated that lectures were lacking understanding of objectives and aims. As a result, the readings (articles and policy documents), as interventions, were given to them to empower them and prepare them for phase 2.

It was quite interesting to note that lecturers showed improvement in ensuring justice in the use of Moodle because most of the lecturers (L1, L2, L4, and L5) were driven by personal reflection in order to address their needs in the use of Moodle. This suggests that these lecturers reflected much on the aims on the use of Moodle, Govender and Khoza (2017), reminds us that aims act as a building block for lecturers to formulate learning outcomes, and they should be specific in order to provide direction. Take for instance L4 who said, *“My main aim is to move away from paper format to electronic format for flexibility”*, and L1, *“My long term goals of using Moodle is to see it to more user friendly and interactive to me...”* These accounts are in line with Moodle training

guides which seeks lecturers to move away from the traditional way of offering a lecture (face-to-face) to the digital way (online) (University Moodle Training Guide, 2017). This suggests that lecturers were driven by personal reflection in order to address their personal needs.

Moreover, objectives are specific statements that address the module need (content), and they are driven by formal reflection which seeks to cater for vertical curriculum signals to any educational technology (Van den Akker, Branch, Gustafson, Nieveen, & Plomp, 2012). In support of this, lecturers' accounts seemed to take objective into consideration such that L3 said, "...*my short term goal is to equip student with the module content...*" This was a clear indication that lectures were aware that objectives seek to address the module need. In support of this, the policy documents aver that objectives seek to address the content of a module like chemistry, physics, and teaching methods (Science Module Outline, 2017). Lecturers accounts showed that they did not follow the characteristic of formulating objectives of having performance (what is observable), condition (context) and criteria (degree) as articulated by Hyland, Kennedy, and Ryan (2006). Further to this, lecturers were well advanced when it comes to ensuring justice through learning outcomes because the majority of lecturers reflected on learning outcomes. This suggests that they were driven by informal reflection which caters to societal need (students) (Hoadley & Jansen, 2013; Hyland, Kennedy, & Ryan, 2006). For instance, L4 and L5 reflected in the similar way to L3 because L3 outlined that "*My aims of using Moodle is to promote technological advancement so that students can able to see that learning can able to take place anywhere they are...*" This is in line with what policy documents are advocating for; that students must be able to use all kind of electronic media at their disposal (University Moodle Training Guide, 2017). Moreover, all the accounts in phase 1 and 2 seem to be dominated by informal reflection (learning outcomes) which caters for student needs, As a result, the world wide lecturers' challenge of lacking goals before teaching as articulated by Van den Akker* et al. (2009) seemed to be resolved through reflection Moreover, lectures managed to reflect in all phases on the theme activities.

7.2.5 Teaching activities

- *What Moodle teaching activities do you use when teaching your module (Moodle activities)*

- **Phase 1**

L1 said, *“I use the announcements portal frequently to notify the students every time I upload a file, which immediately sends out the announcements in a form of an email to the registered students. Secondly, I also sometimes use the portal where students upload their written assessment tasks. Thirdly, I also use it frequently to upload the power point slides that I have used in the classroom to teach. And lastly, I use it to share notes, articles etc. with students to help them in their studying.”* Note that L2 said, *“Not a site that I use often as I am a junior Tutor yet to familiarise myself with it.”* Furthermore L3 responded that, *“virtual classroom lecture students can up load their electronic assessments for marking posting of students’ marks and general feedback timed quiz... I give follow up activities like home work and group assignments to students to do...”* On the very same sentiment L4 said, *“...I select my resources such as uploading a file and send it to students.”* L5 quoted, *“...from Moodle platform, when I teach, I normally use class discussion forum and other means... I encourage students to use Moodle chat resource for their work and be present and upload on Moodle.”*

- **Phase 2**

L1: *“It is easy for me to use discussion forum Moodle activity... theoretically, I know how to use lesson activity but practically it is not easy for me to do it successfully.”*

L2: *“I using the forum activity and announcement and others to post practical task for each module.”*

L3: *“I use virtual platforms, where students can view my lesson on line and ask questions... I also use discussion forum to discuss the module content.”*

L4: *“... I know how to use attendance activity but it is not easy to do it because of team teaching... I depend of survey activity to evaluate my progress”*

L5: *“For undergraduates I use chat and discussion forums... at houneres and masters I use QPA... I can hardly use attendance activity because of large number of student taught by different*

lecturers... contracts staff normally are not given access to Moodle and that's makes it difficult to use Moodle."

Van den Akker- et al. (2012) assert that teachings activities in any curriculum forms the core of what is happening in the teaching and learning environment in order for students to receive knowledge, skills, and values. In line with this assertion, Biggs' (2011) and Van der Merwe et al. (2015) further assert that teaching activities can be categorised into informal (problem-based/learner-centred), formal (content-driven), and personal (teacher-centred) activities. This suggests that lecturers were expected to reflect under these three categories of Moodle teaching activities in both phase 1 and phase 2 respectively. With respect to phase 1 of action research, it was evident that lecturers' accounts were most driven by informal and formal reflection because their accounts highlighted mostly the use of both informal and formal reflection. Take for instance L3, "...I give follow up activities like home work and group assignments to students to do...", and L5, "...I encourage students to use Moodle chat resource for their work and be present and upload on Moodle." These accounts show that lecturers were driven by informal reflection because informal reflection encourages lecturers to engage students in learner centred activities such as chat activities, discussion forums, consultation activities and others (Science Module Outline, 2017; University Moodle Training Guide, 2017).

In addition to the above, only one lecturer 2 reflected on formal activities in order to address the module need during the first phase of action research; and L1 quoted, "...I also use it frequently to upload the power point slides that I have used in the classroom to teach. And lastly, I use it to share notes, articles etc. with students to help them in their studying." Accounts are in line with the what is articulated in policy documents and the literature that formal activities are content centred with an aim of addressing the module such as assignment activity Quiz activity, revision activities, practical work, and others (Jackson, 2017; Science Module Outline, 2017). Further to this, it was disappointing to note that most of lecturers were not familiar with personal activities which uses personal reflection to address their personal needs during teaching and learning (Boud[^] et al., 2013; Nkohla, 2017). That is, only one lecturer out five highlighted the issue of personal activities such that L1 said, "I use the announcements portal frequently to notify the students every time I upload a file..." This account is in parallel with policy document that personal activities may include activities like Questionnaire activity, Survey activity, Attendance Register, Emails

for announcement, and others (Science Module Outline, 2017; University Moodle Training Guide, 2017). It is clear that this lecturer only reflected on the announcement than on any other stipulated activity. This then suggests that lecturers are struggling to master teaching activities when teaching using Moodle LMP, and this then seeks intervention in order to empower lecturers on different types of activities. This leads to phase 2 reflections which were held after intervention programmes were administered.

Furthermore, phase 2 reflection showed intense improvements because lecturers were aware of different categories of teaching activities used when teaching their modules. Note that L2, L4 and L4 were much more driven by personal reflection in order to address their needs in administering those personal teaching activities such as announcements, question activities, survey activity, and others. As L4 said, “...*I know how to use attendance activity but it is not easy to do it because of team teaching... I depend of survey activity to evaluate my progress*”. This account is in line with what Berkvens et al. (2014) and Van den Akker- et al. (2012) affirms that personal activities continuous checks if lecturers’ aims and objectives are attained during teaching and learning process. This suggests that personal reflection assists lecturers to be reflective in order to check if the lesson is successful for the purpose of improving practices.

Interestingly, the majority of lecturers (all of them except L4) were driven by informal reflection because each of them did reflect on informal activity in order to address the needs of students (societal needs). Take for instance L1, “*It is easy for me to use discussion forum Moodle activity...*” and L5, “*For undergraduates I use chat and discussion forums...*” These accounts advocate that when lecturers give informal activities to students, the main aim is to engage students so that they can construct their own understanding (learner-centeredness) during teaching and learning (Khoza & Mpungose, 2017; Schubert, 2009). Note that formal activities are influenced by the prescribed or vertical content of a particular module offered (Bernstein, 1999). This suggests that all given activities to students should address the need of the module and lecturers seek to be driven by formal reflection respectively (Boud[^] et al., 2013; Esau, 2017). This is evident from lecturers’ accounts because it was observed that lecturers were conscious about formal activities because almost all lecturers reflected on formal activities. Take for instance L2 who highlighted that, “*I using the forum activity and announcement and others to post practical task for each*

module". Practical work addresses the modules content because it seeks students to demonstrate their skills based on each of the module content (Science Module Outline, 2017). This suggest that students are required to possess the theory (content) before attempting practical work or experiments in science. In summary of their reflection lecturers were lacking the implementation part of Moodle teaching activities. Note that no lecturers who reflected on wiki activity. Be that as it may, lecturers were then expected to reflect on their character or roles when teaching their modules.

7.2.6 Character

- *How do you perceive your character when using Moodle? (lecturers' role)*

- **Phase 1**

On the one hand L1 articulated that:

"My position is to find ways to assist students in their learning. Moodle gives me a platform to be of assistance to the student." On the other hand L2 alluded that, *"I perceive myself as a facilitator..."* Further to this L3 said, *"I act as a facilitator there to communicate with students providing learning materials to make their understanding of the module better. Preparing learning materials and sharing them to students. Availing important information to students."* L4 responded that, *"...Moodle serves as a good mode to access materials for the module..."* L5 said, *"It provides me and students with confidence that all student share the material such as textbooks or guides..."*

- **Phase 2**

L1: *"It is not easy to assess using Moodle when teaching physics... I only upload relevant documents only and sent emails to students with instructions."*

L2: *"I depends on the number of students I sometimes act as instructor, facilitator and assessor...in chemistry's practical work I become the facilitator, but in a lecture hall I am more of instructor because of large numbers and finally I assess students based on what I have taught."*

L3: *“as an editing teacher on Moodle, I send emails to instruct students as to what is expected of them to do... I put assessment task on Moodle for a semester... I also act as a mediator to unpack the content during discussion forum.”*

L4: *“...More of a facilitator to put across all the module content that they are queried by students... all assessment tasks are clearly stipulated on the module outline and their percentages”*

L5: *“I believe that students should construct ideas from their own experience, thus I give them both group work and individual task in order to unpack the content”*

Studies affirm that lecturers' character influences the process of teaching and learning and it depends on learning theories (constructivism, cognitivism, behaviouralism, TPACK, and others) that guides a lecturer when teaching a module (Kolb, 2014; Laurillard, 2013; Ramsden, 2003; Van der Merwe et al., 2015). These studies further assert that teaching actions are categorised as being a facilitator (driven by learning outcomes), assessor (driven by module content), and instructor (driven by aims). Similarly, lecturers' character is also determined by the teaching methods adopted by the lecturer such as group work, practical work or experiments (facilitator), individual tasks, problem-based activities (instructor), and test and examination (assessor). This assertion requires lecturers reflections (personal, informal, and formal) to prevail in order to address the needs of students (facilitator), module (assessor), and of the lecturer (instructor) (Khoza & Mpungose, 2017). Most importantly, these studies (Antunes et al., 2012; Conway, Murphy, Rath, & Hall, 2009; Govender' & Govender-, 2014; Govender & Khoza, 2017) further aver that teaching of chemistry content is mostly associated with the facilitator role while teaching of physics is often associated with the assessor role. On the contrary, this studies outline that the role of being the instructor draws from both science content, and all activities are lecturer-centred in order to address the needs of the lecturer.

Furthermore, even though phase 1 accounts were not clear as what module content (chemistry or physics) were done by lecturers. However, it was evident that lecturers perceived their roles as facilitators. This is clear when L1 said, *“My position is to find ways to assist students in their*

learning...” and L2 accounts were in line with L1 when L2 said, “*I perceive myself as a facilitator...*” This was an indication that lecturers were too keen to meet the needs of students, and this suggests that they were driven by informal reflections in order to attain learning outcomes (Hyland, Kennedy, & Ryan, 2006). As L4 outlined, “*...Moodle serves as a good mode to access materials for the module...*” which was similar to that of L5 who said, “*...all student share the material such as textbooks or guides...*” These accounts indicate that their roles were perceived as assessors because their teaching was influenced by resources (articles, textbooks, and others) which addresses the content of the module. Note that, none of the lecturers articulated on the instructor role when using Moodle for teaching. In addition to these lecturers’ accounts during the phase 1 does not tally with what is outlined from the literature and policy documents. For instance, not even the single lecturer who indicated the roles of being an editing or non-editing teacher (instructor) on Moodle. Lecturers did not indicate whether they were driven by constructivism or learner-centeredness (facilitator). This leads to the second phase of action research.

Furthermore, L2 assertion that, “*... I sometimes act as instructor, facilitator, and assessor...in chemistry’s practical work I become the facilitator, but in a lecture hall I am more of instructor because of large numbers and finally I assess students based on what I have taught.*” This assertion indicates the empowerment of lecturers in terms of receiving their roles when teaching science modules, and this suggests that no role (assessor, instructor, and facilitator) is innocent of having its limitation. As a result, the lecturer can be taken as assessor, instructor, or facilitator depending on the current (Biggs', 2011; Borondo et al., 2014). Further to this, some lecturers also indicated their modules taught such Chemistry and Physical Science consisting of different kinds of teaching theory and activities used which outline their roles. See L5 who said, “*I believe that students should construct ideas from their own experience, thus I give them both group work and individual tasks in order to unpack the content*”. This account suggests the lecturers were driven by social constructivism which advocates learner-centred activities as mentioned in policy documents (Science Module Outline, 2017). In addition to this L3 said, “*as an editing teacher on Moodle, I send emails to instruct students as to what is expected of them to do*”. This lecturer’s account is in line with what is stipulated in the Moodle training guide which advocates different roles (teacher, none-editing teacher) for lecturers (University Moodle Training Guide, 2017). The above-mentioned assertion from the policy documents shows that lectures were driven by both the

informal reflection (facilitator) in order to address the needs of the students (societal needs), and by the personal reflection (instructor) to meet their (lecturers) own personal needs. Moreover, in the second session the role of being the assessor was also observed; lecturers were confident to declare that even though it was not easy to assess student using Moodle, they depend on the content taught for assessing students. This was evident when L2 said, “...*I assess students based on what I have taught.*” And L5 said “*all assessment tasks are clearly stipulated on the module outline and their percentages*”. These accounts are in parallel with most of the science module policy document which indicates the breakdown of weight/score, in percentages, of each assessment task (Science Module Outline, 2017). This suggests that lecturers were driven by formal reflection and that is the reason why they followed the planned module outline in order to meet the module need and they perceived their roles as assessor (Bernstein, 1999; Kennedy* et al., 2006). Be that as it may, lecturers seem confused in terms of the module (Physical Science for assessor, chemistry for facilitator) being associated with a particular role as according to the literature. This then led lecturers to reflect on the way in which they do assessment.

7.2.7 Assessment

- *How do you assess your module using Moodle?(assessment)*

- **Phase 1**

Interestingly L1 averred that:

“...I find it difficult to mark using Moodle so I collect hard copies but it helps me store assignments and record the time of submission. Should there ever be an issue with the hard copy assignment (copied or missing submission), I can always go to Moodle and check...”

L2 attested that, *“I allow students to use posted evaluation forms to assess themselves.”*

While L3 articulated that, *“students can up load their electronic assessments for marking posting of students’ marks and general feedback timed quiz follow up activities like home work and group assignments Instructions of assessment.”* L4 said, *“...All my assessment is done using Moodle resource...grading is easily displayed for feedback.”* Lastly, L5 said,

“I use quiz to assess students on Moodle... I also use assignments to assess their progress.”

○ **Phase 2**

L1: *“Survey, assignments and practical task are useful in my module but students used to turn a blind eye on it and that makes difficulties for me to use it.”*

L2: *“I sometimes use quiz, to assess students... I create chances for creates chances for students to make presentation.”*

L3: *“I use quiz, surveys, and the assignments to assess students in my module... I can allow students to use workshops to asses each other if I can be well-trained.”*

L4: *“...I use to upload practical task on Moodle to be done by students.”*

L5: *“...Because of large numbers of students I only use quizzes to assess students... am able to use other activities like survey, assignment, examinations and others even though I was not trained how to use them, I am only trained to upload readings and minor settings of the module.”*

The accounts in the first phase of action research is most influenced by formal reflection of lecturers. This is an indication that most lecturers reflected on assessment of learning. Thus, all lecturers (L1, L2, L4, and L5) articulated on assessment of learning except for one lecturer (L3). Take for instance L1 who said, *“it helps me store assignments and record the time of submission”*. Similarly L5 said, *“I use quiz to assess students on Moodle... I also use assignments to assess their progress”*. These accounts are in line with the Moodle training guide policy which affirms that assignment Moodle activity and quiz activity are relevant to assessment of learning done for the purpose of grading. It is was also observed that lecturers did not reflect on assessment task stipulated on their module policy documents which includes test, examination, and others (Science Module Outline, 2017). Remember that according to Black and Wiliam (2009), and Naude and Davin (2017), assessment of learning is conducted for the purpose of grading, occurs at the end of each programme of teaching and learning, and is influenced by formal reflection which addresses the module need. This suggests that assessment of learning is content driven and must be aligned to module objectives (Berkvens et al., 2014).

Furthermore, L2 said, “*I allow students to use posted evaluation forms to assess themselves*”. This was the only lecturer who reflected on assessment as learning. This indicates that most lecturers were not well versed with this kind of assessment within the Moodle platform, even in their policy documents. Assessment as learning is the kind of assessment which advocates for self or peer assessment, and this may include Moodle activities like chat, workshops, and others (University Moodle Training Guide, 2017). Similarly, assessment as learning may also include presentation, practical task, short test, and others (Science Module Outline, 2017). Further to this Hyland, Kennedy, and Ryan (2006), assert that assessment as learning is made of attributes which seek lecturers informal reflection in order to meet the needs of students to check the progress of the lesson or programme offered. It was worth noting that lecturers’, did not reflect on the assessment for learning during the first phase. This suggests that lectures were not driven by personal reflections which strive to cater to their own personal needs. Note that according to Dreyer' (2008) and Harris et al. (2012), assessment as learning addresses personal needs of lecturers and this allows lecturers to probe while doing class observation in order to promote the habits of good teaching. In parallel to this, policy documents assert that lecturers can engage in survey, questionnaire, and others from Moodle; Tutorial task from a module policy document (Science Module Outline, 2017; University Moodle Training Guide, 2017). Thus, it was then necessary for the second phase to occur to improve lecturers’ practices on assessment.

Interestingly, in Phase 2, the majority of lecturers were aware of different kinds of assessment (assessment of/as/for learning). This is evident because almost all lecturers did reflect on assessment of learning except L4. In reference to this, L1 said, “...*assignments and practical task are useful in my module...*” L2 said, “*I sometimes use quiz to assess students...*”, and L5 said “*I am able to use other activities like survey, assignment, examination...*” These accounts show that lecturers were driven by formal reflection in order to address the module needs (vertical curriculum) (Bernstein, 1999). Moreover, these accounts are in line with what is asserted from science module documents, but no lecturer who reflected on the writing of any other kind of a test for the purpose of grading (Science Module Outline, 2017). Further to this, it was evident that lecturers are now much more aware of assessment as learning. For instance, L3 quoted, “*I can allow students to use workshops to asses each other*”, and L4 similarly said, “...*I use [it] to upload practical task on Moodle to be done by students...*” These accounts shows that students were made

first priority, their needs were catered for, and this is because informal reflection prevailed in order to allow students to assess each other. As a result, assessments as learning activities are made up of informal activities which are not meant for the process of grading, but may contribute to the final mark per programme (Black & Wiliam, 2009).

Based on assessment for learning, lecturers were now aware of their personal reflection which requires them to conduct assessment activities which can assist them to improve their practices (Chappuis & Stiggins, 2002; Dreyer', 2008). This suggests that assessment for learning activities is taken as daily activities done with the purpose to create reflective teachers who can diagnose the problem and improve their practices. Thus, lecturers showed the interest on how this assessment was conducted in their modules such L4 said, *"...I use [it] to upload practical task on Moodle to be done by students."* And this was similar to L1 who asserted, *"Survey, assignments, and practical task are useful in my module..."* These accounts draw much from the policy documents which speak the same language as the literature.

7.2.8 Platform and time

- *Where and when do you use Moodle to teach science modules?*

- **Phase 1**

L1 stated that, *"...I use Moodle during my admin time, when I prepare work for the students. I also use it after the lecture to upload the power point slides... I also use it when I am in the office, mostly; however I also prefer using Moodle when I am at home if necessary."*

In line with that, L2 said, *"...Office and home including anywhere where there is Wi-Fi even on the mobile phone as well as in internet café during weekends... anytime is convenient for me to use Moodle..."*

Further to this L3 said, *"I use Moodle when I finish my lecture and students have queries and follow up issues on content taught."*

L4 articulated, *"...I like using Moodle at home during evening"*. L4 also asserted that, *"...I use Moodle in lectures rooms, in computer LAN... sometimes in workshops at any anytime."*

○ **Phase 2**

During phase 2 the four lecturers responded as detailed below:

L1: *“Moodle does not cater for blended learning like doing the podcast so that learners even if there are not in a lecture hall but they can still view an online lecturer... I use Moodle when I am at work only... and I can hardly use it at home.”*

L2: *“I prefer an online environment... I use both working hours and after working hours.”*

L3: *“I prefer the online platform than gives a lectures... I use Moodle to demonstrate how the documents are assessed... It is hard to use Moodle after hours since I do not have internet access at home, then I often use Moodle when at school during working hours.”*

L4: *“I use a little bit of face-to-face and online learning environment to accommodate all student’s needs...”*

L5: *“... It depends on the need... normally use it at work and little bit when I am at home...”*

According to studies (Govender & Khoza, 2017; Jackson, 2017; Van der Merwe et al., 2015) Moodle platform can be termed as platform for a space of teaching and learning. Thus, these studies affirm that the Moodle platform can be informal, formal, and personal depending on the time, environment, and reflection that are favoured. As a result, the formal Moodle platform is driven by the formal reflection, and it is the kind of platform taking place face-to-face platform within the specified period of time (Mpungose*, 2016; Sharma & Barrett, 2011). Moreover, an informal platform is driven by informal reflections in order to address the societal needs in an online environment during spare time, like lunch time (Khoza & Mpungose, 2017). Interestingly, personal platforms seek lecturers’ personal reflection to prevail in order for their own personal needs to prevail. (Bates*, 2016; Bijker, 2010).

In support of the above, the accounts from the first phase of reflection speak to all learning platforms (personal, formal, and informal). Both the formal and informal platforms were the most observed platforms by the lecturers when teaching science modules. For instance, all lecturers reflected in a similar way as L4 that, *“...I use Moodle in lecture rooms, in computer LAN... sometimes in workshops at any anytime”*. This assertion indicates a formal platform driven by

formal reflection and an informal platform driven by informal reflection seeks to address module and societal needs respectively. This is attained through the use of Moodle in the demarcated platforms like office and lecturers' halls, and in platforms with no demarcation like home and restaurants. This suggests that lecturers used their own contact time for module need including consultation time to cater for students need (Science Module Outline, 2017). Be that as it may, there are a few lecturers who reflected on personal platforms, L2 and L3 indicated that, "...where there is Wi-Fi even on the mobile phone as well as in internet café during weekends..." This suggests that lecturers' personal phones as a platform addresses the needs of lecturers even if they are away from home and work as Moodle can be accessed, and this advocates for personal reflection. The minimal accounts of personal platform provoked the need of the second phase of reflection.

During the second phase, all Moodle platforms were equally observed, and this showed a great improvement after the intervention had been administered. This is evident when L1 and L5 were all driven by personal reflection to address their needs in such a way that they all advocated for blended platform. L5 said with regard to this: "*I use a little bit of face-to-face and online learning environment to accommodate all student's needs...*" This accounts affirms that Moodle can be used during contact time or during anytime that suites personal needs of a lecturers (Science Module Outline, 2017). For this reason, Driscoll and Tomiak (2000) further assert that personal platforms need more contact time with online learning. Further to this, both informal and formal platforms were highly observed because lecturers reflected the same on personal and formal reflection in order to meet the needs of a module and that of the students.

7.2.9 Content

- What module content do you cover when using Moodle
- **Phase 1**

L1 articulated that, "*Content that I have developed that aligns with the module templates... using a module outline that I have designed, the content includes themes like electrostatics, electric circuit, electromagnetism and induction, alternating current and electronics... I use slides to present to upload it on Moodle.*"

L2 said that, “...Content taught are parts of the course outline and the slides, PDF articles, are uploaded later after the actual lecture or articles is presented. Main content in this module is based on chemistry and it includes main topic like Kinetic theory, state of matter, chemical kinematics, practical work, chemical energetics, chemical equilibrium, acid and base, tutorials, organic chemistry.”

L3 avers that, “...I only teach certain topics in science module based on the level of students. This content includes properties of matter, and mechanics such as force and momentum...I use PowerPoint and MS word application soft-ware to handle the content.”

L4 highlighted content according the module taught by saying that, “I teach different type of content in different module... I am specialising in Physical Science method in education which includes themes like Concepts mapping, Problem-solving learning, Group work, School-based practical work, Teaching and learning strategies, Resources-based, learning-IC, Ways of assessment, Addressing misconception in teaching, Teaching practice reflection, Lesson planning, Research and projects, and Expo and presentation... videos and video links are much useful in this module... I also do MEd- cohort guidance and workshop feedback teaching science methods.”

L5 said, “I teaching chemistry... I am allocated to teach chemistry and I cover direct topics per semester such as Introduction to chemistry, Sub-microscopic particles in chemistry, Symbolic presentations in chemistry, Chemical formulae and equations, Atomic structure, and Chemical bonding... I upload all module resources on Moodle either in folder or file.”

This is the only theme (content) which was concluded within the first phase of action research because all lecturers were much familiar with the module content that they were teaching in Physical Science modules. Remember that Spiller and Ferguson (2011), as well as Van den Akker-et al. (2012), assert that content is what is planned to be taught by a lecturer which includes skills, knowledge, behaviours, and attitudes. This suggest that lecturers need to be driven by informal reflection in order to instil skills, formal reflection for imparting knowledge, and personal reflection for enhancing values and attitudes when teaching science modules. Moreover, the lecturers' accounts indicate that lecturers were confident with what they teach (content) in each

module. This was evident when each lecturer outlines topics to be covered per each module. Take for instance L1 who said “...*the content includes themes like electrostatics, electric circuit, electromagnetism and induction, alternating current and electronics...*” These accounts were parallel to what the policy document is stipulating which is in line with the literature that the science module may include concepts like force, capacitance potential energy in electrostatics; potential difference, resistance, current under electric circuit, magnetism, magnetic flux in electrostatic induction as well as circuit components and its application under alternating current. (Giancoli, 2005; Science Module Outline, 2017).

In addition to the above, Lecturer L1’s accounts were similar to that of L3 who also displayed much knowledge of the Physical Science content, and this was evident when L3 quoted that “...*Content includes properties of matter, and mechanics such as force and momentum*”. In support of this, a policy document Science Module Outline (2017) suggests each content to be cover in each module. For instance, lecturers teaching physical science education module can be expected to cover forces, rotational dynamics, momentum, kinematics, work, energy and power; and under matter elasticity should be covered. This suggests that teaching of Physical Science content draws much from the vertical curriculum where a lecturers acts as an assessor because most of the activities are content-centred and requires a high level of thinking (Bernstein, 1999; Govender' & Govender-, 2014). Interestingly, it was also noticeable from the lecturers accounts that they all used a certain kind of file format stipulated from the policy document in order to handle their content on Moodle, which includes file, folder, label, URL, Word documents, PowerPoint, PDF’s, videos etc. (Science Module Outline, 2017). This suggests that Moodle LMP caters for all kinds of content offered in science education.

Furthermore, one lecturer showed much interest of teaching a module offering teaching methods in science education. This was evident when L4 said, “...*themes like Concepts mapping, Problem-solving learning, Group work, School-based practical work, Teaching and learning strategies, Resources-based, learning-IC, Ways of assessment, Addressing misconception in teaching, Teaching practice reflection, Lesson planning, Research and projects, and Expo and presentation...*” Note that methods seek to meet the needs of the lecturers, and this advocates for personal reflection in order to offer this kind of a module (teaching methods) (Boud^ et al., 2013;

Khoza & Mpungose, 2017). In other words, lecturer-centred activities should prevail when offering the content of this module. Further to this this module content equip student teachers with relevant mode of delivering the science content to learners for effective teaching and learning of science. (Richardson, 2011; Roberts & Bybee, 2014),

Moreover, it was witnessed that two lecturers were driven by informal reflection in order to meet the students' needs through the content offered in the chemistry modules. Note that chemistry is a branch of Physical Science which deals with chemical systems (Giancoli, 2005; Harrison & Treagust, 1996). In support of this assertion, L3 quoted that, "...it includes main topics like Kinetic theory, state of matter, chemical kinematics, practical work, chemical energetics, chemical equilibrium, acid and base, tutorials, organic chemistry". Similarly, L5 affirmed the covered topic in a module "... Introduction to chemistry, Sub-microscopic particles in chemistry, Symbolic presentations in chemistry, Chemical formulae and equations, Atomic structure, and Chemical bonding..." This content is in line with what is stipulated in the module policy document and the literature. Take for instance the Science Module Outline (2017) which affirms that chemistry content should cover different concepts for each theme as indicated by lecturers which can include concepts like: how chemists works, atomic theory, chemical equations, calculations, the periodic table, heat of reaction, state of matter, rate of reaction, equilibrium, and practical tasks per theme. This affirmation seeks informal reflection so that lecturers may meet students' needs by allowing them to share their ideas of practical work per each theme. In other words, this seeks lecturers to administer activities which are learner-centred (Van den Akker- et al., 2012).

7.3 Conclusion

It is worth noting that this chapter analysed and discussed the generated data from the five participants. The chapter was framed around the RRPAMS theory under 8 themes, namely: lecturers' reflections, resources, assessment, permission, justice, activities, character, platform and time, and content. These themes were as a result of different categories around each theme. The discussion under each theme was driven by the personal reflection which later was modified to be non-formal reflection, formal, and informal reflection. Note that the first phase of lecturer's reflection was driven by formal and informal reflection in each theme, but after the intervention

was administered, the second phase was also dominated by the personal reflection. Consequently, chapter seven answers the research questions of this study.

CHAPTER EIGHT

Reflecting on their reflections

8.1 Introduction

This chapter intends to reflect and further understand lecturers' reflections on the use of Moodle when teaching their modules/subjects. The chapter intends to discuss lecturers' reflection based on artefacts indicating their reflection on the teaching practices of science modules when using Moodle LMP. Furthermore, this chapter aims to put across the guiding principles in the development of theory of equilateral Moodle curricula, based on the good practices (positivity of lecturers' reflections) and the bad practices (negativity of lecturers' reflections) of lecturers drawn from the artefacts. Furthermore, this chapter intends to draw the summery of principles constituting the theory of equilateral Moodle curricula drawing from literature, RRPAMS theory (contextualised TPACK framework) as well as research design and methodology. The illustration of the theory of equilateral Moodle curricula seeks to be displayed which can lead to the summary of findings, recommendations, and conclusions.



8.2 Lecturers' reflections when teaching using Moodle

According to the study conducted by Brookfield' (2017) on how to become a reflective teacher, it is outlined that there are four lenses through which the teacher can become a critical reflective teacher namely: from the self, student, peer, and scholarly lenses. This study concluded that the self-lenses seek teachers to refer to their autobiographical experiences in order to frame their action when teaching; student lens seeks teachers to engage with student feedback to frame their actions; peer lenses seeks teachers to seek advices and feedback from the colleagues in the surroundings; and the scholarly lens requires teachers to engage with the scholarly literature in their field in order to fertilise their vocabulary to shape their actions. In the context of this study, this then suggests that the self-lens relates to the non-formal reflections where lecturers are expected to reflect in order to develop themselves and cater to their personal needs. Further to this, both the student and the peer lenses relate to informal reflection where lecturers and students should engage in dialogue with the purpose of sharing ideas and giving advice amongst themselves for teaching and learning, such as attending workshop, conferences, and debates. Moreover, the scholarly lenses relate to formal reflection where teachers' action should be guided by scholarly literature from various

sources such as articles, policies, and others. As a result, the following lecturer’s reflections are framed by non-reflection, formal reflection, and informal reflection.

Interestingly, five lecturers have presented their good and bad experiences of using this using artefacts in this action research. The first lecturers reflected as detailed below.

Table 8.1: L1 practices

<u>Artefact: Good practice</u>	<u>Artefact: Bad practice</u>
	
<u>Brief write up</u>	<u>Brief write up</u>
<p>L1 said: <i>“I normal use thumbs-up signal to show the personal approval of any important actions in my class during teaching and learning...this thumbs-up hand signal indicates my personal approval to some Moodle activities...I enjoy using Moodle because it gives me better and direct access to the students (after contact sessions), I can see the number of students registered for my module”</i></p>	<p>L1 said: <i>“apple is my favourite, sweet, and well-known fruit for vitamin C enjoyed by most people; it can mitigate different diseases like asthma...on the contrary, eating apple with my students that have fungal or rotten, and having bacteria inside, this can course more harm to our health...this symbol of eating the rotten apple symbolises the use of Moodle with unavailability of some function or activities. I do not enjoy using Moodle because of its limitations e.g. size for file upload. It is</i></p>

	<i>because it does not allow me to make live video streaming for my lecturers.”</i>
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L1 taught well when she saw elements of Moodle that seemed to address individual needs like this thumbs-up hand signal. In other words, the thumbs-up hand signal serves as her part of the body to address her needs in all actions taken during teaching and learning process. As a result, the thumbs-up hand signal addresses the needs of the Lecturer L1 in such a way that there are some Moodle activities that serves her needs for personal development. This is evident when she says “...*I enjoy using Moodle because it gives me better and direct access to the students...*” This shows the approval of some of the Moodle activities, such as the function of the registers (registered students), accessing student marks (grades), and others. This thumbs-up hand signal indicates that L1’s good practices were driven by non-formal reflection as compared to informal and formal reflection. However, when s/he saw something that seemed to address the societal needs, informal reflection prevails). L1 starts to feel frustration which is a result of bad practices. This is evident when she says, “...*eating apple with my students that have fungal or rotten, and having bacteria inside, this can course more harm to our health ...*” This account suggests that the rotten apple can cause harm to the those in society who are involved in the teaching and learning process, using Moodle. In other words, L1 shows that if Moodle does not address all the societal needs during teaching and learning using Moodle, some lecturers and students can be reluctant (affected with diseases) to use Moodle. L1’s accounts relate to informal reflection since she cares most about addressing the needs of the society while using Moodle during teaching and learning.

Drawing from the artefacts indicating the bad practice , the first lecturer, L1 illustrated frustration on the use of Moodle, for instance L1’s write up indicated that “...*it does not allow me to make live video streaming for my lecturers*”. This account indicates that from what lecturer L1 has experienced when using Moodle, Moodle does not allow live streaming and this causes frustration in the teaching. This then suggests that the lecturers are driven by the non-formal and informal reflection because these accounts is from their selves and what others are doing, sharing, or doing. In other words, lecturer L1’s reflections are driven by non-formal reflection but mostly by informal reflection because these frustration of file size and live streaming was experienced personally



experienced and shared among other lecturers in the same teaching environment (teaching module). As a result, lecturer L1's account seems to indicate that scholarly lenses were not taken into account because according to moodle.org (2017), live streaming activity helps teachers to prepare live video with interactive blended/virtual lessons from their webcam and student can watch the lesson live. moodle.org (2017) asserts that live streaming soft-ware is downloaded separately and can be integrated with Moodle LMP as an extra Moodle activity. This suggests that, based on scholarly lenses which are driven by formal reflection, Moodle is able to provide live streaming activity provided the additional soft-ware is downloaded and integrated with Moodle by the administrators. As a result, this brings frustration to some lecturers, like lecturer L1, who seems to take the scholarly information so that it can be easily negotiated with Moodle administrators at a university.

In addition to the above, both the Science Module Outline (2017) and the University Moodle Training Guide (2017) are silent when it comes to live streaming. As a result, this confuses the lecturers as the users of these policies and the implementers of modules using Moodle. This shows the gap that university policy has which yields to lecturers' frustration when using Moodle. In other words, lecturers end up being driven by non-formal and informal reflection because they only use Moodle activities that are good and that they most enjoy; and they use Moodle activities that are often used by others like chat and messaging activity (sending emails). In addition, this suggests that lecturers are determined to use Moodle activities that are chosen by Moodle administrators of higher learning institutions, in this case universities.

Note, that various studies aver that the worthiness of any teaching and learning practice is determined by the level of reflection (non-formal, formal, and informal reflection) that the lecturer/teacher adopts (Boud[^] et al., 2013; Brookfield', 2017; Hernandez & Endo, 2017; Tavakoli & Davoudi, 2016). These studies further assert that reflections phenomenon relates to the level of thinking which invokes different skills which includes critical thinking skills (non-formal reflection), problem solving skills (formal reflection), and social skills (informal reflection). In other words, these assertions from these studies affirm that any reflective lecturer needs to reflect in order to improve teaching and learning practices. For instance, lecturers should question and interrogate their practices of using the adopted LMP, like Moodle, so that they can improve daily.

In addition of the above, Lecturer L1 said that, “...*I can see the number of students registered for my module.*” This account indicated the good practices of Moodle represented in the artefacts above, because L1 indicates that keeping records of all registered student is simple when using Moodle since all registered students with their student number can be tracked through Moodle activities. This is in line with docs.moodle.org (2017a) because it states that the attendance activity helps teachers to take attendance during class. This suggests that lecturers can be driven by non-formal reflection to satisfy their needs by ensuring that student are present, absent, late, or excused. Further to this, L1’s accounts illustrate that the good practices enhances non-formal reflection during teaching and learning. This is an indication that good practice of any adopted LMP, like Moodle, can only be attained if lecturers can first be driven by non-formal reflection which seeks lecturers to have love and be able to develop self-identity to shape their practice. In support of this, Brookfield' (2017) asserts that excellent teachers liberate themselves and become democratic teachers through critical reflection (non-formal) in order to shape their future practices. This then requires lecturers merge non-formal reflection with formal reflection so that their needs and the needs of the module can be addressed fruitfully. Consequently, L2 also reflected his good and bad practice in the use of Moodle.

Table 8.2: L2 practices

<u>Artefact: Good practice</u>	<u>Artefact: Bad practice</u>
	
<u>Brief write up</u>	<u>Brief write up</u>
<p>L2 said: <i>“light bulb device brings light to a dark place. Thus, this artefacts symbolises some Moodle activities that give light to my mind for teaching and learning to occur... I appreciate the input made by Moodle to my teaching practice. I have had students paying compliments on how the Physical Science Quiz activities on Moodle have extended their thinking on the module content. The above artefacts highlights a lightened up mind”</i></p>	<p>L2 said: <i>“no internet connection symbol pops ups when the system is down and there is no internet. This artefacts, bring a lot of frustration to me since there will not be any communication between me and student... This created a dilemma having to check a number of students who completed the quiz and those who haven't, securing the marks for those who have completed. Reworking the questions and postponing the assessment to another day. Poor connection or no internet is the worst experience that traumatised when using online learning tools.”</i></p>

Based on the good practices of L2 in Table 8.2, L2 enjoyed using Moodle because he is be able to prepare activities for students that demand higher order thinking. Thus, whenever he sees a light bulb, the level of higher order thinking is triggered in such a way that he can use Moodle activities

as the light bulb can give light to the module content, and in turn, that can enhance students to think critically about the module content. This suggests that some Moodle activities like quiz, assignment, and others can act as light towards teaching and learning the module content using Moodle. This is evident when L2 avers that, “...*I have had students paying compliments on how the physical Quiz activities on Moodle have extended their thinking on the module content...*” This accounts show the importance of using Moodle activates to address the module needs. In other words, the good practice of lecturer L2 was driven by formal reflection since he was interested in using module activities that triggers thinking and also engages student to think about the module content.



Be that as it may, L2 also noted that the no internet connection artefact comes with various frustrations during teaching and learning of the module. He asserts the frustration of no communication with students registered for the modules. The halt of communication comes with many consequences which include the loss of marks and the reworking of the question set. In support of this L2 said, “...*Reworking the questions and postponing the assessment to another day...*” In other words, this artefacts triggers L2 to think of student needs (societal), and this shows that his bad practices of Moodle during teaching and learning was driven by informal reflection (loss of communication with students). See when he says, “...*Poor connection or no internet is the worst experience...*” This suggests that, communication with the society around him during teaching and learning is the key, and when it does not occur it stops the whole process. This indicates how deeply L2 is concerned about the needs of the society

See the study conducted by Luft and Roughley (2016) at the University of Seattle in USA. The purpose of the study was to explore the role of reflection or reflective practice for supporting post-graduate students for student success. The study revealed that personal understanding, cultural contexts, and theoretical models of the profession are the key elements for students’ success. The study further outlines that the failure to reflect among the three (non-formal, formal and informal) may enhance students to take unethical decisions that may hinder their success at a university. This then indicates that for post graduates to excel and succeed in their careers, the need to be driven by non-formal reflection (personal understanding) in order to address the personal needs; informal reflection (cultural context) in order to address the needs of the university society; and formal

reflection (theoretical models) in order to address the needs of the profession. In the context of this study, this suggests that lecturers need to have their personal understanding for their own identity and development, know the university context which includes the kind of LMP (Moodle) platform adopted, and be able to read the guiding theories in the use of Moodle.

In addition to the above, the good practice accounts of L2 is driven by formal reflection since the module need requires the theoretical models and it needs to be imbedded in a particular discipline. In support of this L2, said “...on how the *Physical Science Quiz activities on Moodle have extended their thinking...*” This account suggests that the good practices of Moodle activities give light to the module content which goes hand in hand with theories of teaching and learning of Physical Science (Govender' & Govender-, 2014). Thus, formal reflection prevails in the accounts of lecturer L2 because his good practices seem to address the need of the modules of the science discipline. On the contrary, L2's bad practice is drawn from the cultural context of using Moodle LMP. Moodle as an online teaching resource automatically requires the cultural context that has intent connection, or else it will be fruitless in the process of teaching and learning (Bates*, 2016; Driscoll & Tomiak, 2000). As a result, L2 was frustrated because of having a no internet context, and this result in bad practice of Moodle which draws much from informal reflection in order to meet the needs of the university society. This is evident when L2 outlined that “*This created a dilemma having to check a number of students who completed the quiz...*” In other words, his main concern in the use of Moodle was to meet the needs of students (societal needs), and if this is not met, frustration prevails and leads to the bad experience of using Moodle.

Table 8.3: L3 practices

<u>Artefact: Good practice</u>	<u>Artefact: Bad practice</u>
	
<u>Brief write up</u>	<u>Brief write up</u>
<p>L3 said: <i>“helping others artefacts always a drive of my teaching using Moodle. In this artefacts I see myself capable of putting students first in all Moodle activities, assist them with some skills of using Moodle functions. Moodle helps me to engage student during discussion forum and chat activity”</i></p>	<p>L3 said: <i>“land snail artefact symbolizes slowness of Moodle and laziness of Moodle to be user friendly. I ways feel lost when I am creating some Moodle activities because of so many interfaces for activity setting. ...to me, Moodle is very slow in and confusing settings of Moodle activities and resources ”</i></p>

On the first hand, L3 seems to enjoy using Moodle much more when she addresses the needs of students (societal needs). In other words, lecturer L3’s reflections on the good practices of using Moodle are greatly influenced by informal reflection which seeks lecturers to address the needs of others before their own individual needs. Thus, the helping hand artefacts puts L3 as the assistance to students during teaching and learning, and this is evident when she says “...I see myself capable of putting students first in all Moodle activities...”. L3 seems to understand that the students she is teaching using Moodle are from different backgrounds in a way that L3 can notice that some students have and some do not have computer skills of using and online resources like Moodle. As

a result, due to the influence of informal reflection, L3 creates some time to show how some functions of Moodle are operated such as the use of discussion forum. In support of this, L3 indicates that she “...*assist them with some skills of using Moodle functions.*” It shows that the good practice use of Moodle for teaching does not only involve the lecturer and the content but it also includes the needs of students.

On the other hand, L3’s reflection on bad practices is symbolised by a land snail which works slow by nature and brings confusion when it retract into its shell because you cannot see it but you can see the shell. In others words lecturer L3’s bad practices sees Moodle activities and resources as slow in her process during teaching and learning because she became stuck at times when creating or setting Moodle activities like chat or discussion forum. This is evident when she said “...*I ways feel lost when I am creating some Moodle activities because of so many interfaces for activity setting...*” This reflection has to do her personal needs of using Moodle, and this suggest that she wants Moodle activities to be quick and responsive to her needs. For instance, she would want Moodle to provide two interface options of a discussion forum name, description and type, not including all other settings like grade, ratings attachment, word count, and many others. This suggests that in her bad practice of Moodle she was driven by non-formal reflection to cater to her needs in the teaching and learning of the module offered.

See the survey design study conducted by Hao, Barnes, Branch, and Wright (2017). The study had sampled two groups from 219 computer science students from a large USA university. The main purpose of the study was to explore ways in which computer science students seek online help in their learning, including the factors that predict their online help. The study revealed that computer science students were driven by online seeking behaviour which includes online searching (non-formal), asking teachers for help (formal) online, and asking peers online (informal). The study concluded that students were more driven by online help than any other behaviour. In other words, online searching behaviour seeks to address the personal need of each student because the student has to meet their own personal goals of searching and they must know what to search including the use of relevant keywords. In the context of this study, this suggests that students using an online search are driven by non-formal reflection which seeks to address the individual needs of each individual during the teaching and learning of the module or a course. Moreover, asking peers



online relates to informal reflection which seek to address the needs of the society. This is done through asking and sharing information or ideas with other people to meet the needs of the society in a particular context. Further to this, asking teachers online for help relates to formal reflection which seeks to address the needs of the profession (asking from teachers) by seeking help from teachers who are familiar with the teaching and learning in a certain discipline.

The findings from the above study are similar to the mixed method (qualitative and quantitative) study conducted by Padayachee, Van Der Merwe, and Kotzé (2015) in two South African universities. The main purpose of the study was to analyse the feature usage of virtual learning system (VLS) and explore some associated challenges faced by lecturers at two South African universities. Ten lecturers using Blackboard for teaching and learning participated from the Durban University of Technology (DUT) and sixteen lecturers using Moodle from the University of KwaZulu-Natal (UKZN) were included. The study revealed four features in the usage of VLS for online teaching and learning of Modules which includes communication (informal), management (non-formal), content, and pedagogy (formal). The study concluded that both groups of lecturers were lacking in the content and pedagogic features in the use of VLS for teaching and learning. Thus, the study recommended the initiation of staff development programmes. These findings suggest that lecturers were lacking the essence of formal reflection which seek for knowledge of the module content. This helps lecturers to integrate the content with VLS for proper and effective teaching and learning. Further to this integration advocates for lecturers to use blog discussion, chat, discussion forums, sending emails and others in order to maintain communication within the module. This requires lecturers to be driven by informal reflection which seeks to address the needs of lecturers, students, and other stakeholders. The management feature relates to non-formal reflection which seeks to address the individual need of each lecturer. This suggests that lecturers should be able to select the relevant slide or presentation, the kind of assessment, grouping of students and others to upload on VLS.

Based on the two above interpreted studies, it is evident that the success of the online learning (LMP) is driven by non-formal, formal, and informal reflection. As a result, note that the good practice of L3 was influenced by informal reflection. This then seeks lecturers to advise their students to seek online help of how to use Moodle properly by asking information via different

online search engines like Google, Bing, yahoo, ask.com and others in order to share the ideas and information of how to use Moodle (Hao et al., 2017; Kafyulilo et al., 2015). Further to this, lecturers needs to invest in different ways of attaining constant and immediate communication with students such as using the chat, discussion forum, and others so the society (student and teachers) stays up to date with the current information of the module (Padayachee et al., 2015; Rienties et al., 2013). Interestingly, L3’s reflections on bad practice of Moodle are drawn from non-formal reflection which seeks to address her personal needs. According to Hao et al. (2017), searching online features requires the lecturers to know keywords to search and the goals of why they are searching. In other words, lecturers must be able to use Moodle functions that can assist them to manage the module selection, grouping of all students, way of grading and others (Padayachee et al., 2015). Thus, lecturers L3 reflection revolved around non-formal and informal reflection and this lead to the reflection of the next lecturer.

Table 8.4: L4 practices

<u>Artefact: Good practice</u>	<u>Artefact: Bad practice</u>
	
<u>Brief write up</u>	<u>Brief write up</u>

<p>L4 said: <i>“A white dove carrying an olive branch to me symbolises peace. When I see this artefacts I become free from any challenge I am facing.</i></p> <p><i>It makes me drives planning my teaching peaceful without any disturbances... Moodle gives me freedom to upload any kind file format...I use tables in PDF, MS excel, MS word format where students complete activity on elements and compounds in class and search the net and upload these on Moodle- after working in a group—then they present their work in class.”</i></p>	<p>L4 said: <i>“snake is dangerous because it possess venom which can kill people. I am afraid of snakes. When I see a snake, I become frightened and run way from its space.</i></p> <p><i>On the first hand, it is frightening to me is that, there are many Moodle activities that gives me challenge to use them for teaching and learning like workshop, lesson, assignment, attendance and others I have noticed that most students do not have computers, LAN are few for large number of students and this delays them to meet due date of the given task. This brings frustration. Thus, I become reluctant to use Moodle.</i></p>
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The assertion of L4 that *“A white dove carrying an olive branch to me symbolizes peace...”* is advocating for meeting the personal needs of himself, and this is driven by non-formal reflections. Thus, L4’s good practices is drawn from a white dove with an olive Branch, and this means that there are some Moodle activities that give him peace of mind during teaching and learning. This is evidence, when he pointed that *“It makes me drives planning my teaching peaceful without any disturbances...”* As a result, Moodle activities makes his life of teaching and learning simpler and he fills confident and stress free at any time in order to address the content. In other words, the olive branch carried by the doves seems to symbolise peace. In other words, when there is peace in the use of Moodle, the content of the module is also addressed peacefully by L4. . Note that L4 stated that, *“I use files in PDF, MS excel, MS PowerPoint MS word format where students complete activity on elements and compounds...”* Thus, the peace of mind for L4 comes with the need to address the content of the module. In other words, for peace to exist, L4 had to consider the handling of Physical Science content in various file formats like uploading presentation/slides (MS

PowerPoint). This then illustrates that L4 reflections on his good practices was moving from non-formal reflection to formal reflection in order to address the needs of a module after his needs were met.

However, it is worth noting that lecturer L4's bad experiences is symbolised by a snake which shows fear and frustration that L4 experience during teaching and learning in the science Module. This is evident when he mentioned that, "*When I see a snake, I become frightened and run way from its space*". This suggests that when L4 wants to serve his life from death and harm that can be caused by a snake, he must run away from it and avoid it. In other words, when L4 meets with some challenges of using some of Moodle activities, he must run away from frustration by not attempting to use it. Note that he mentioned that, "*...there are many Moodle activities that gives me challenge to use them for teaching and learning like workshop, lesson, assignment, attendance...*" This then advocates the point that when lecturer L4 is unable to utilise these activities up its maximum potential, he can then run away from this frustration and be reluctant to use important Moodle activities. This seems to be driven by non-formal reflection since he does not want any Moodle activities that will frighten or bring stress; he would rather stay away from Moodle. Further to this, L4 indicated that, "*...most students do not have computers, LAN are few for large number of students and this delays them to meet due date of the given task...*" This seems to draw much from informal reflection in order to address the needs of the student (societal need). Thus, L4's frustration caused by difficult Moodle activities does shift it to become the burden of student. Instead, L4 still cares about his students' needs since most students lacks the resources used to access Moodle activities like laptops and others. This shows the move of L4's reflection on bad experience from non-formal to informal reflection. This is an indication that L4 is grounded on non-formal reflection before any other reflection (Formal or informal) can prevail.

According to Giancoli (2005), L4's good practice draws from chemistry because it addresses the teaching of element and compounds content of science modules. In other words, L4 becomes happy when he sees himself as the facilitator in order to engage students to understand the content. As a result, Lecturer L4 feels happy when he is using Moodle to teach chemistry content like matter, equilibrium, kinetic theory, laws, and others (Science Module Outline, 2017). This suggests that the teaching and learning of such content using Moodle activities brings joy and

happiness to the lecturer if his needs are met. Thus, this then seek lecturers to be driven by non-formal reflection (personal need) before formal reflection (module need) that will enhance them to address the module content (Boud[^] et al., 2013; Hao et al., 2017).

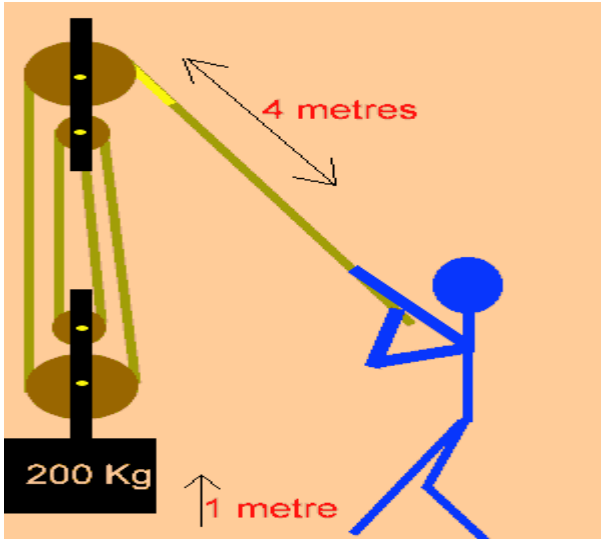
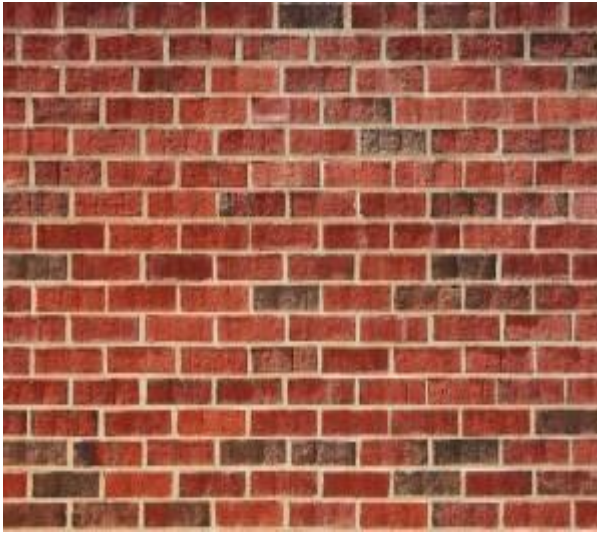
In addition to this, see the qualitative study conducted by Nixon, Campbell, and Luft (2016). The main purpose of the study was to explore degree on the subject knowledge of chemistry. Science teachers were sampled as participants in this study. The study reveals that lecturers that hold relevant chemistry degrees were more coherent in teaching the content than those who hold other qualification. This then suggest that the lecturers holding the chemistry qualification can enjoy teaching science modules and become free and happy to address any chemistry content using Moodle. For instance, a lecturer can provide a correct explanation of chemical equilibrium change in gaseous systems by drawing from Le Chatelier's Principle. This seems to make a move towards formal reflection in addressing the module content.

Note that resources are any tools used that can be used non-formally, formally, and informally to teach the module content (Khoza & Mpungose, 2017). As a result, L4's bad practices draws much from the learners concerns of being incapable of having and using computers (hard-ware, Moodle (soft-ware) and others in order to meet due date. In line with this, the Science Module Outline (2017) and "Phasing in of Moodle" 2016) assert that students can access all module material on the learning site such as notes, tutorials, assessment and other; and each student is expected to have one laptop in order to have access to the module content. On the contrary, L4 indicated that "*I have noticed that most students do not have computers*". This then influences L4 to stay away from Moodle activities (snake) since most student are not in line with module policies and the university has few LANs for a large number of students. This frustration is as a result of informal reflection in order to meet student's needs (informal reflection). This frustration forces the lecturer to stay away from the Moodle Platform (bad practice).

In addition to the above, note the study conducted by Levy and Ramim (2017) at Nova South eastern University and Middle Georgia State University. The main aim of the study was to explore the skills both lecturers and students have in an online learning. The study indicated that lecturers

were possessing knowledge acquisition skills, whereas students were possessing socialising skills. This then suggests that lecturers were driven by formal reflection in addressing the need of the module (knowledge acquisition). On the other hand, students were greatly driven by informal reflection in order to address their social needs with their peers. In other words, both students and lecturers are moving in an opposite direction in the process of teaching and learning using Moodle. For instance, lecturers can send emails to students, and students cannot access emails because they are busy with social networks. This then brings frustration on the side of the lecturer (addressing the module need) while students are enjoying the informal space (addressing the societal need).

Table 8.5: L5 practices

<u>Artefact: Good practice</u>	<u>Artefact: Bad practice</u>
	
<u>Brief write up</u>	<u>Brief write up</u>
<p>L5 said: <i>“the Pulley is made up of wheel and axle with a rope attached. A pulley reduces work and look by taking into account the direction of motion and force of gravity. The pulley symbolizes the reduction of duty load which makes my good practice in my teaching.</i></p>	<p>L5 said: <i>“This brick wall artefact reflects me when I cannot use Moodle activities effectively. It is like hitting a brick wall. For me there was no proper training or induction for Moodle usage, and this was frustrating and this made matters worse.</i></p>

<i>Moodle is good to me because it can reduce a lot of paper work where there will be no need to print course outlines, prescribed articles, assignments and even tests for students this helps me and the university save money.</i>	
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Pulley triggers the ease of duty load to Lecturer L5, and his life becomes easier during teaching and learning using Moodle activities. For instance, he said “*Moodle is good to me because it can reduce a lot of paper work...*” This means that when L5 sees Moodle activity, he sees a saviour in reducing printing of module outline, notes and others. In other words, this shows that the needs of the L5 are made to become the priority in the process of teaching and learning. As a result, L5’s reflection on good practices on the use of Moodle was driven by non-formal reflection in order to meet his needs as a lecturer. This is evident when he says, “...*this helps me and the university save money*”. Further to this, the pulley means that the use of Moodle activities assists L5 to execute assessment tasks like test and assignment, manage time, and the online environment while he act as a facilitator at an online environment.

Look at the artefact of L5 indicating his bad practice of using Moodle during the teaching and learning of science. Lecturer L5 used the brick wall to illustrate the hardships that he encountered when using some of the activities in the Moodle platform. Note what he said “... *artefact reflects me when I cannot use Moodle activities effectively.*” This suggests that L5 also struggles when it comes to some of the Moodle activities, even though he did not indicate which problematic Moodle activities were. L5 also outlined the reason why Moodle is taken as the hard wall to break. Thus, he outlined that “*there was no proper training or induction for Moodle usage*”. This suggests that for him to use Moodle activities at its maximum potential, he believes he must get training from other people. This then suggests that L5’s reflection is most influenced by informal reflection because he believes that for him to break the wall he must get assistance from others. This suggestion further illustrates that L5 does not believe in reading books, training guidelines, or manuals about Moodle for himself in order to master some of the Moodle functions that are difficult. As a result, he has nothing to do with formal reflection in order to meet the needs of the module.

In support of the L5 good practices reflection on the use of Moodle for teaching science, ("Phasing in of Moodle," 2016, p. 1) policies indicate that, "Lecturers will upload all notes and learning material on the Moodle system, where students will access and download the material. This suggests that the burden or the duty load is now shifted to students to do printing for more paperwork. In other words, personal reflection prevails in order to meet the needs of lecturers by reducing the burden of teaching sciences so that lecturers will have time to prepare for their lecturer. In support of this, "a number of resources such as notes, tutorials, solutions and past assessments are included on the website" (Science Module Outline, 2017, p. 2). This assertion shows the move from face-to-face learning to online learning platforms. Thus, the lecturers have the responsibility to upload all resources to be accessed by students. As a result, lecturers are stress free and they use Moodle activities for their own good practice.

See a study conducted by Gillett-Swan (2017) at Queensland University of Technology in Australia. This study outlined the challenges met by both lecturers and students in an online platform which includes the inability to use an online platform, inability for online peer interaction for assessment. These findings concurred with that of the study conducted by Meyers and Bagnall (2017) in Griffith University in Australia. The aim of the study was to explore the online learning challenges faced by students. The study revealed that some of the challenges met by students included little technical advice and support, lack of online navigation and exploration skills, no readings provided for online learning, and face-to-face dialog is not provided. These findings from two studies indicate the hardship that both lecturers and students meet when using online platforms such as Moodle. Those challenges are in line with what L5 indicated that, "*there was no proper training or induction for Moodle usage, and this was frustrating and this made matters worse*". As a result, this suggests that lecturers' reluctant use of Moodle is as a result of various challenges but mainly the lack of support (informal reflection).

8.3 Interpretation of lecturers' reflection (phenomenon) in the use of Moodle resources

The exploration of lecturers' reflection (phenomenon) is guided by three major research questions which address the three research objectives of this study respectively. These research questions also had an influence on the process of finding the relevant literature, research designs and

methodology, and the analysis of findings. As a result, the first question outlined, ‘What are the lecturers’ reflections on the use of Moodle in teaching the Physical Science module?’, and this question sought to address the research objective stated ‘to understand lecturers’ reflections on the use of Moodle to teach Physical Science module’. In the process of unpacking the first question to address its objective, both the literature and RRPAMS theory proposed that lecturers’ reflection can be informal, formal, and personal, but the findings indicated the move from personal to non-formal reflection. The articulation on the levels of reflection from data generation indicated that most lecturers were driven by their rationale of addressing the needs of students during the teaching of Physical Science modules as compared to the rationale of addressing the module need and their personal need. This then indicates that lecturers’ reflections were moving towards the direction of informal reflection. In addition to this, the theme of resources (resources signal from RRPAMS theory) also indicated that out of three proposed resources, hard-ware, soft-ware, and ideological-ware, lecturers preferred the use of both the soft-ware and hard-ware resources over the ideological-ware resource. In other words, the findings indicate that informal and formal reflection prevails in the use Moodle resource in teaching science modules. This is in line with the interpretation of lecturers L2’s reflections using artefacts (light bulb). Hence, the lecturer focused more on the bulb glass (hard-ware) and light from the filament (soft-ware) while the mind (ideological-ware) was ignored. This evidence seeks to indicate that lecturers were driven by informal and formal reflection since they reflected on what is at their disposal (hard-ware and soft-ware). Thus, lecturers ignored to reflect on the mind (ideological-ware) which seek cognitive thinking on the use of Moodle LMP in order to meet the module need.

Furthermore, the second question of how lecturers reflect on the use of Moodle in the teaching of the Physical Science module was also intended to address its stated objective: To explain the lessons that can be learned from teachers’ reflections on the use of Moodle to teach Physical Science modules. Note that Van den Akker- et al. (2012) outlined that curriculum signals like assessment, goals, permission, justice, activities, character, as well as platform and time are mostly and likely to give answers to the question of how teaching of science occurs using Moodle LMP. This is in line with what is articulated by RRPAMS theory, that procedures signal also have some curriculum signals with its propositions included in order to unpack the second question. For instances, procedures signal in RRPAMS theory assert that assessment propose assessment as

learning, assessment of learning, and assessment for learning; permission propose financial permission, physical permission, and cultural permission; justice propose aims, objectives, and learning outcomes; activities propose personal activities, formal activities, and informal activities; character propose instructor, assessor, and facilitator; platform and time propose personal platform (spare time), formal platform (working hours), and informal platform (after work).

In addition to the above-stated procedure, the findings indicated that lecturers were struggling to administer both assessment as and for learning (informal and non-formal reflection), but they were good in the assessment of learning (formal reflection prevailed). Lecturers did not address the cultural permission (lack of non-formal reflection) while most lecturers were driven by learning outcomes in order to ensure justice (informal reflection). Interestingly, lecturers were driven by informal and formal Moodle activities, and their roles were perceived as facilitators and assessors rather than being assessors. The findings also stipulated that lecturers were not comfortable with an online platform, thus they preferred using Moodle during working hours. Drawing from these findings in each procedure, a lesson drawn can be that lecturers were influenced by one or two proposition of each procedure on the teaching of science using Moodle. For instance, assessment of learning (assessment), physical and cultural permission (permission), learning outcomes (justice), informal and formal activities (activities), as well as facilitators and instructors (character) were the most preferred part of the procedures in the teaching of science modules. Further to this, the lecturers' reflection also prevailed in both where procedure signal were more dominating and where procedure signals were less dominating in answering the second research question. This is evident when lecturer L1 used the thumbs up signal to indicate his personal perceived character (instructor) influenced by non-formal reflection; lecturer L3 used helping others hand artefact being influenced by informal reflection of addressing the societal needs of those using Moodle; and lecturer L4 who interpreted his reflection using a snake to symbolise the administering of assessment of learning (formal reflection).

The third and the last question which sought to explain what informs lecturers' reflections on the use of Moodle when teaching Physical Science module (objective), was framed as 'why do lecturers' reflect in particular ways on the use of Moodle when teaching Physical Science module?'. In response to this question, studies outlined that the way the lecturer reflects is

determined by the content prescribed or chosen to be implemented/enacted in order to address the module need (Le Grange* & Reddy, 2017; Van den Akker* et al., 2009). Similarly, the RRPAMS theory illustrated that science content modules is proposed as Physical Science content, chemistry content, as well as teaching methods content. From the findings, the theme content outlined that lecturers were very clear of the content from all propositions. In other words, lecturers were equally driven by non-formal, formal, and informal reflection. For instance, lecturer L5 used the brick wall artefact to indicate difficulties of using Moodle to teach all science module content, and this suggests that all levels of reflection prevailed to address the module content but the problem was the use of the Moodle LMP. As a result, the content is taken as the building block that informs the teaching of science modules using Moodle LMP.

8.4 Guiding principles in the development of theory of equilateral Moodle curricula

According to the Berkvens et al. (2014), principles of teaching in any platform is guided by curriculum signals which includes reflections (rationale), content, time, platform (location), activities, character (role), permission (accessibility), resources, justice (goals), and assessment as depicted in Figure 8.1 below. As a result, Van den Akker- et al. (2012), aver that these signals are to be balanced in order to ensure consistency, practicability, sustainability, and relevancy in any teaching process. This then suggests that, lecturers are turned to balance these signals when teaching science modules using Moodle LMP in order to address the module needs, societal/student need, as well as individual need of lecturers. Thus, reflection (non-formal, informal, and formal reflection) lies at the Centre of all other signals, and this shows the importance of reflection (phenomenon) in the teaching process. As a result, the following discussion of principles towards the development of a theory of Moodle curricula is drawing from these curriculum signals from the Figure 8.1 below.

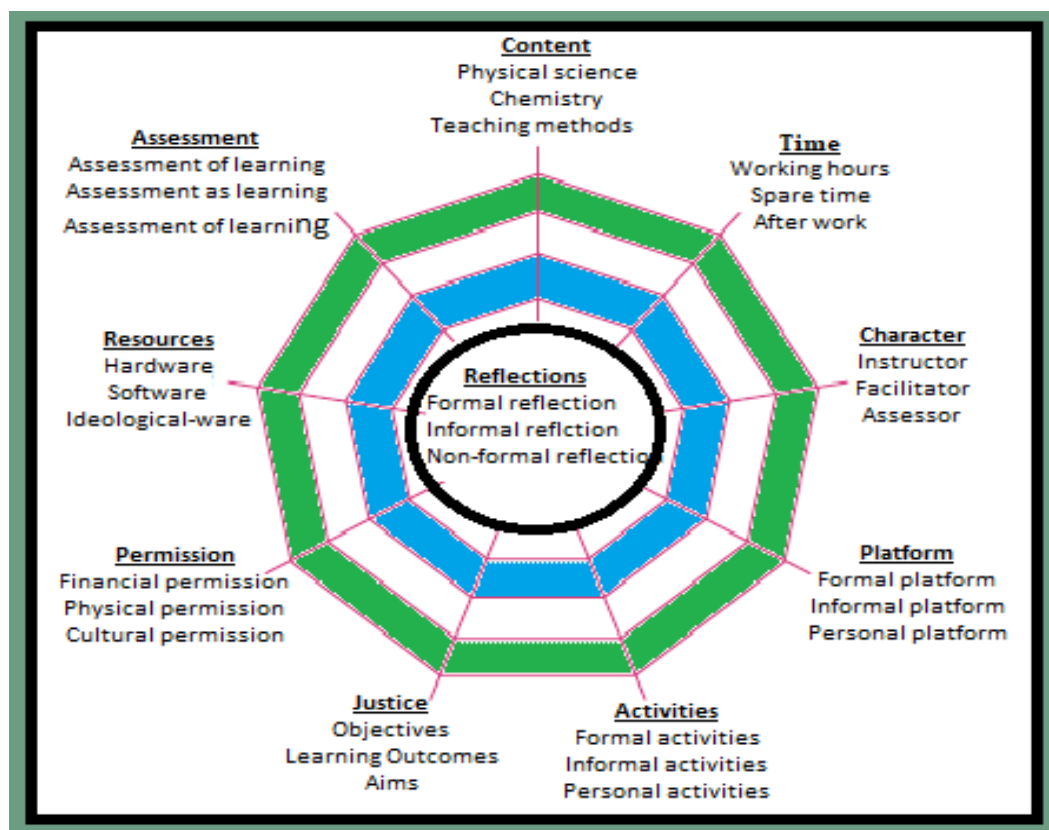


Figure 8.1: The curricula signals framework adopted from Berkvens et al, 2014, p, 8

8.4.1 The positivity of lecturers' reflections: lecturers' character principle

According to the literature, one of the key features for knowing lecturer identity is their character or perceived role during the teaching and learning process (Biggs', 2011; Khoza, 2017; Ramsden, 2003; Richardson, 2011; Van den Akker- et al., 2012). These studies aver that teachers' character can be identified as instructor (driven by lecturer-centred/aims), facilitator (driven by societal or student-centred/outcomes), and assessor (content-centred/objectives). This suggests that lecturers' character depends on the teaching approach or a theory that influences the lecturer. This is evident when lecturers are driven by behaviourism, their role is associated with that of the instructor; when they are driven by constructivism, their role is associated with that of being a facilitator; and when they are driven by cognitivism, their role is associated with that of assessor (Van den Akker* et al., 2009; Vygotsky, 1978). Further to this, Govender' and Govender- (2014), and Giancoli (2005), outline that being a facilitator usually relates to the teaching of chemistry, instructor relates to

teaching Physical Science, while being an assessor seeks the lecturer to be well-grounded on the content from both Chemistry and Physical Science and have specific methods of teaching. In other words, all these roles are influenced by lecturers' reflection in order to meet all the needs during the teaching and learning process (Boud[^] et al., 2013; Brookfield', 2017).

The above discussion, is in line with what transpired in the contextualisation of TPACK theory into RRPAMS theory. Consequently, both the University Moodle Training Guide (2017) and the Science Module Outline (2017) policies, further assert that a lecturer can use traditional approach to become a teacher or non-editing teacher when teaching their modules using Moodle. This suggests that lecturers' character in this context is termed to be that of instructors because they use the lecturing traditional method when teaching their modules. Policies also indicate that teaching of modules is influenced by social constructivism and roles can be switched from teacher to student mode when using Moodle. This indication suggests that a teacher's role is termed to be that of a facilitator when teaching science modules. Further to this, policies also indicate the weighing of the content to be assessed, for instance, minimum of 40% is coursework (test, projects, assignments, and others) and examination is 60%. This then turns to take lecturers' character as the assessor in order to address the needs of the module content.

After triangulation (one-on-one semi-structured interview and reflective activity), the findings (Chapter Seven) from participants indicate that lecturers during the first phase were only driven by informal and formal reflection, and they only reflected on their character as facilitators and assessor when teaching the science modules using Moodle. On the contrary, during the second phase, all lecturers were aware of all their roles or character (assessor, facilitator, and instructor). These findings suggest that the lecturer's identity is grounded on their character when teaching science modules using Moodle. This then suggests that lecturers' role is one of the most vital curriculum signals when teaching science Modules (Berkvens et al., 2014; Van den Akker- et al., 2012).

Interestingly, the lecturers' reflections are also viewed through their artefacts, representing their good practices, and various artefacts were used. Look at the thumbs-up signal indicating the good practices of teaching science using Moodle activities, and this artefacts shows the lecturers

'identity on the perceived character since lecturers should know when thumbs must be up and when thumbs must be down. This seeks lecturers to know their character/identity during the teaching and learning process. In other words, lecturers' character as the curriculum signal is taken as the important principle during teaching and learning of science modules using Moodle. This suggests that, lecturers' character reflected from thumbs-up artefact relates mostly to the lecturers as being the assessor rather than being a facilitator or instructor in order to address the good practices of using Moodle. This is because, the lecturers should assess whether the use of a particular Moodle activity addresses his or her needs; if it does, thumbs-up, but if not, thumbs-down. In other words, lecturers' reflections indicates that their character were perceived as assessor as the most dominating role than that of being a facilitator and the instructor. As a result, lecturers seem to be more influenced by formal reflection then personal and informal reflection in handling their roles when teaching science using Moodle.

8.4.2 The positivity of lecturers' reflections: resources principle

According to Khoza (2017) and Mpungose (2017), a resource is anything or a person that is assisting to communicate the process of teaching and learning. These two studies further affirm that resources are termed to be proposed in terms of hard-ware, soft-ware, and ideological-ware. Remember, hard-ware are any physical resources that communicate learning, soft-ware support the hard-ware to display information, and ideological-ware is the ideology behind the use of hard-ware and soft-ware (Khoza & Mpungose, 2017). In other words, laptops, tablets, books (hardcopies), and others can be taken as hard-ware; MS PowerPoint, LMP, and others can be taken as soft-ware; and, theories or principles guiding the use of both soft-ware and hard-ware is termed to be an Ideological-ware. Note, that hard-ware resources are known as the major resources that come first because they are seen and can be touched; they also make input, store, process and output information (Hollowell, 2011). This suggests that hard-ware resources may be easily seen and be used in order to address the needs of the module (formal reflection). further to this, soft-ware resources are programed instructions, and it is driven by informal reflection since it allows the active engagement of all stakeholders in the teaching process (Bates*, 2016). Ideological-ware seeks lecturers to have ideas behind the use of any soft-ware or hard-ware, and this is informed by personal reflection in order to meet the needs of the lecturer.

In line with the above, RRPAMS theory goes in parallel with what is articulated by science module and Moodle policies (Science Module Outline, 2017; University Moodle Training Guide, 2017), because it states that recommended textbooks, laptops, and other resources are set to be part of hard-ware resource that can be used for teaching science modules. Further to this, RRMAPS theory further affirms that browsers like chrome and others should be used, and electronic lecturer's notes should be in various formats like PDF, PowerPoint slide, and others. At first hand, it is also according to RRMAPS theory that ideological-ware should be taken into accounts by individual lecturers in order to address their needs of using hard-ware and soft-ware. On the other hand, in contextualising the TPACK theory, the policies were silent on the ideology behind the use of hard-ware and soft-ware resources. This suggests that policies need severe amendments that are driven by formal and non-formal reflection in order to inform the needs of the society as well as the needs of the module.

Moreover, findings indicated from the first phase of action research illustrated mostly the use of hard-ware and soft-ware when teaching science modules. As a result, they were using hard-ware like laptops, photocopier, and others, including soft-ware like MS excel, MS word, and other. In other words, lecturers were in line with the policies in the contextualisation of TPACK (RRPAMS). Further to this, lecturers indicated an awareness of ideological-ware in the second phase of data generation in such a way that they highlighted the use of some theories like community of practice theory, student-centred method and others. This suggests that the most used recourse is hard-ware and soft-ware followed by ideological-ware. In other words, lecturers were more driven by informal and formal reflection than non-formal reflection. Thus, it is recommended that lecturers are to be driven by non-reflection so that lecturers can be made aware of the ideology behind the use of Moodle.

With reference to light bulb and the mind artefacts (Table 8.2) which reflected the good practice of using Moodle by lecturers when teaching science, these reflections relate to concepts of resources. The light bulb can represent both hard-ware (glass) and soft-ware (filament), but the mind of a person represents the ideology behind the use of Moodle activities. Consequently, the lecturer did not reflect on the mind symbol, only on the light bulb. In other words, this suggests that the lecturers ignored ideological ware resources (since it is hidden) and concentrated only on

soft-ware and hard-ware (light bulb). Thus, this is in line with the first phase of data generation and the contextualisation of TPACK (RRPAMS) where policies were also silent on the use of ideological-ware. As a result, this indicates that lecturers turn to ignore ideological-ware to put their focus on soft-ware and hard-ware resources. Thus, the most dominating resources on the good practice of Moodle are hard-ware and soft-ware over ideological-ware. Consequently, lecturers are most often driven by both formal (Module needs) and informal reflection (societal needs) than non-formal reflection (individual needs). Most importantly, it is recommended that lecturers read scholarly articles for any resources adopted in the use of teaching, like Moodle LMP, so that they know and are able to use that resource effectively. This may avoid the reluctance on the use of Moodle.

8.4.3 The positivity of lecturers' reflections: Permission principle

These remind us that the use of Moodle for teaching sciences require lecturers to have access or be permitted the use of Moodle LMP based on financial, physical, and cultural permission studies (Farmer, 2017b; Letseka & Pitsoe, 2014; Pitman et al., 2015; Richardson, 2011). These studies further assert that financial permission relates to any financial resources involved in the use of Moodle; physical resources relates to any mode of transport that leads to the access of Moodle LMP; whereas, cultural permission speaks to any cultural influences that exist in the use of Moodle LMP. This suggests reflection plays a major role for lecturers' permission on the use Moodle. In other words, this seeks an indication from lecturers of ways and means as to how Moodle is accessed.

In support of the above, the contextualisation of TPACK into RRPAMS theory indicated that both University Moodle Training Guide (2017) and Science Module Outline (2017) were silent when it comes to cultural permission. This suggests that, policies did not address issues related to cultural perception which includes gender, age, race, and others in the use of Moodle. In other words, lecturers were permitted to use Moodle to teach science modules, irrespective of any culturally-related issues that need to be addressed, such as the terms of language difference. In other words, the guide line and module outline may not be taken as policy documents that specifically address the use of Moodle in the teaching of science Modules. As a result, teaching and learning in a Moodle platform with student may yield lecturers being informed by informal reflection where

they access and use Moodle to serves their needs and that of others (students/society). This assertion, may lead to the reluctance of access of Moodle by lecturers, and lecturers may use Moodle according to what other colleagues, and technicians instruct them to do. As a result, this contrasts with the lecturers and academics that are driven by formal reflection to address the module content in the science discipline. Further to this, university as a formal learning institution requires a formal policy document guide the teaching of science in Moodle platform. Note that even if the language issue was not addressed in black and white, these documents/policies were written in the English language. It is then recommended that policies should be made to address the cultural permission issues, and this requires lecturers' non-formal reflection to prevail. Further to this, these policies are vocal when it comes to both physical and financial permission. In other words, policies outlined that lecturers should login to the system using their login details (physical permission) and lecturer can only send or communicate via emails with students that are only financial cleared and registered (financial permission). In other words, this seeks lecturers' formal and informal reflection to prevail in order to meet the needs of both the module and the students.

Furthermore, the findings from data generation after one-on-one semi-structured interview and reflective activity have been administered which indicates that during the first data generation lecturers' were driven by both formal and informal reflection excluding non-formal reflection. This suggests that lecturers were silent on cultural permission issues (language, gender, and others) but they were most vocal when it comes to physical (login details and mode of transport) and financial permission (financial constraints). It was then after intervention, where lecturers became aware of all these permission propositions (physical, cultural, and financial). It is then recommended that lecturers teaching science modules should be aware of cultural permission issues that come to existence on the use of Moodle platform.

In accordance with lecturers' reflection on the good practices of Moodle, their reflections were reflected on the basis of an artefact showing a helping hand to others (table 8.3). This artefact answers the question of with who I am teaching the science module and how are they accessed. As a result, this relates to the permission curriculum signal, and this indicates that the use of Moodle can be a good resource and its use can be successful only if lecturers are in contact with members of society (students, and others). Their reflection seems to be driven mostly by physical

and financial permission because they can login to the system and only get hold of those registered students (lecturer holding hands with those registered). On the contrary, their reflection seem to ignore cultural permission since the artefact is not clear if members of society are male or female (gender), and their language is not specified. The lecturers' good practices on Moodle, when it comes to permission, are driven by formal and informal reflection, and exclude non-formal reflection. This is in line with the assertion from the RRPAMS theory and with the findings from data generation. As result, it is recommended that lecturers and the university management should address cultural permission issues on the use of Moodle during teaching and learning of science.

8.4.4 The positivity of lecturers' reflection: Goals principle

Tyler (2013a), Van den Akker- et al. (2012), as well as Khoza (2017), aver that justice to any curriculum can be achieved if the goals are clearly set. These studies affirm that justice can be enhanced through the attainment of long-term goals (aims) which indicate the general statement short terms goals (objectives) which are specific to the statement of teaching, and students' goals (learning outcomes) which address the skills in teaching. This suggests that lecturers needs be driven by non-formal, formal, and informal reflection to prevail in order to address their needs (aims), the module need (objectives), and that of societal/students (learning outcomes). Similarly, RRPAMS theory sought to address all the needs (module, lecturer and societal/student's needs) through ensuring justice/goals. As a result, the policy documents ("Phasing in of Moodle," 2016; Science Module Outline, 2017; University Moodle Training Guide, 2017) affirm that teaching of science seeks lecturers instil skills (learning outcomes) to students for both using Moodle and teaching methods. Policies further aver that lecturers are required to upload notes or any other material on Moodle which covers the concepts in both Physical Science and chemistry (objectives). These policies outlined the move from paper work to an on-line learning, and the provisions of developing values and attitude (long term goals-aims). In other words, the contextualisation of TPACK into RRPAMS theory affirms what is stipulated in the literature, because the assertions emphasise the assurance of addressing the needs of the individual lecturer (aims), module (objectives), and societal/students (learning outcome). As a result, informal, formal, and non-formal reflection prevailed in both cases (literature and RRPAMS theory).

In addition to the above, the findings outlined the lack of understanding of both aims and objectives by lecturers on the teaching of science using Moodle. In other words, lecturers were not aware of attaining their needs and module need in order to ensure justice in the teaching of science using Moodle. It was only after the intervention was administered, when they become aware of their short term and long term goals (aims and objectives). Interestingly, findings indicates that lecturers were all driven by informal reflection in order to enhance justice, since they were aware of learning outcomes which drives them to instil skills to students during teaching and learning. For instance, lecturers were all keen to engage students in order to promote students' technological advancement in the teaching of science. This question, "*How do you ensure justice when teaching your module using Moodle*", sought lecturers to reflect on the good practice of using Moodle to teach science, and the dove (Table 8.4 above) represents hope and peace in the teaching of science. As a result, the dove (justice signal) has wings (objectives) to fly high to the destination, eyes (aims) to see further, and is able to carry a branch (learning outcomes) to give to the society/students. Consequently the dove represents peace and is reflected as a good practice of Moodle. These then relates to the attainment justice in the teaching of science curriculum on Moodle platform because when there is justice (aims, objectives and learning outcomes) there is peace and the direction which brings good practice of Moodle, as a result, this then seeks lecturers to take into account informal, formal, and non-formal reflection when teaching science modules using Moodle. Thus, lecturers' reflections seem to tally with the literature, RRPAMS theory, and the findings. In other words, aims, objectives and learning outcomes are balanced through non-formal, formal, and informal reflection respectively.

8.4.5 The positivity of lecturers' reflections: Teaching activities principle

Studies refer to activities as experiences that occur during the process of teaching and learning in order to attain a particular behaviour, and it is proposed as informal activities, formal activities as well as personal activities (Berkvens et al., 2014; Biggs', 2011; Khoza, 2015d; Le Grange* & Reddy, 2017; Mpungose-, 2016a; Nkohla, 2017). Studies further aver that informal activities are problem-based and seek students to share their ideas and experiences; formal activities are content-based which seek the attainment of unpacking the module content; and the personal activities are lecturer-centred, and the lecturers select activities that best suit them. In other words, this seeks lecturer's non-formal, informal, and formal reflection to prevail in order to meet the needs of the

module, society/student, and that of the individual lecturer. Further to this, these studies assert that the most commonly used activities when teaching using Moodle are chat activity, forum activity, and others to allow students to share their problems-based activity. In other words, formal activities (lesson activity and others) including personal activities (attendance activity and others) can hardly be used. This suggests that lecturers are driven by informal reflection more than non-formal and formal reflection on the teaching of science using Moodle.

In the context of RRPAMS theory, both Science Module Outline (2017) and University Moodle Training Guide (2017), fully addresses all proposed activities in the teaching of science. For instance, consultation time and chat activity are taken in to consideration to engage students in order to address their needs; assignment activity and the practical work are also outlined and in place to cater for a module need; and survey activity and email messaging are served to meet lecturers' individual need. Thus, RRPAMS theory seeks lecturers to draw from their non-formal, formal, and informal reflection when administering all activities in the teaching of science modules. The theory seems to balance the use of activities when using Moodle. Furthermore, drawing from the findings, there is the contrast that lecturers were more frequently driven by informal reflection and formal reflection, than non-formal reflection. This then suggests that lecturers were using Moodle activities that address students' needs and the module needs like discussion forum and quiz activity. This then indicates the gap of personal activities in the teaching of science using Moodle.

In addition to the above, the pulley artefact reflected the good practices of lecturers when using Moodle. The pulley (activities) consists of an axle (formal activities) which if fixed, wheel (informal activities), and rope (personal activities). The axle is always fixed and it relates to all formal activities that address the needs of the module content. Wheel enhances a smooth motion of the load when force is applied and it relates to informal activities; and the rope pulls the load depending on the power that the individual has, thus it relates to personal activities. Lecturer's reflection from the artefact indicates that both individual lecturer need and the module need becomes the priority as compared to informal need. In other words, their good practices are influenced by non-formal reflection (assist to reduce paper work) and formal reflection (easy to upload notes). Note that informal activities assist students to share ideas in order to unpack

concepts. Thus, these reflections from the literature, theory, and the findings seem to favour both informal reflection (informal activities) and formal reflection (formal activities), excluding non-formal reflection (personal activities). Note that reflection from artefacts only recognises the personal activities through non-formal reflection. As a result, it is therefore recommended that teaching activities, when using science on Moodle platform, should be balanced and be able to address all needs (module, lecturer, and societal/student need).

8.4.6 The negativity of their reflections: Assessment Principle

Remember, Black and Wiliam (2009), Purvis et al. (2011) and Reddy and le Grange (2017), affirm that assessment is made to address the needs of lecturers, students, and the module taught. These studies assert that assessment is therefore termed to be proposed in three forms namely: assessment of learning (module need), assessment for learning (lecturers need), and peer assessment (student/societal need). Further to this, these studies outlined that summative assessment is the most used assessment on the teaching of science when using Moodle. For instance most lecturers (L1, L2, L4, and L5) from the findings, turned to use assignment, quiz activity for the purpose of grading on the module content (assessment of learning). This is line with what is articulated by RRPAMS theory that most lecturers turn to administer assessment of learning (test, quiz examination and others) than any other form of assessment. The findings further indicated that lecturers were mostly driven by formal reflection in data generation. In other words, lecturers were most driven by assessment of learning when teaching science modules as compared to assessment for and as learning. With reference to the lecturer's reflections from the artefacts, lecturers used rotten apple (Table 8.1) and the snake (Table 8.4), and this seems to take the direction of administering assessment. Thus, eating an apple (assessment) is healthy but eating the rotten one (failing assessment) can cause diseases (failure to graduate or to pass). Similarly, everyone is afraid of the snake (assessment) since it is dangerous (fail or pass for grading). Thus, these reflections from artefacts indicate lecturers' bad practices when teaching science using Moodle. In other words, assessment curriculum signal is taken as the worst signal that brings negativity on the use of Moodle. Thus, lecturers become reluctant to use Moodle assessment activities when teaching science modules.

8.4.7 The negativity of their reflection: Time

Literature asserts that time is the major curriculum signal that needs to be considered during teaching and learning (Berkvens et al., 2014; Biggs', 2011; Khoza, 2017; Van den Akker- et al., 2012). The studies further affirm that teaching time can occur during contact time, spare time, and after work. As a result, RRPAMS theory also asserts that time management plays a big role on the teaching of modules using Moodle in such a way that there are consultation times, contact time allocated for modules, and an allocated time table for practical work. Thus, non-formal, formal, and informal reflection seems to prevail in order to address all the needs (personal need, module need, and societal/student need) within a specified period of time. With reference to the findings from interviews and reflectivity activity, most lecturers were keen to use Moodle to teach science during contact time (formal reflection), and few were using Moodle during spare time (informal reflection) and after working hours due to financial constraints (the cost data bundles for Wi-Fi internet connection). Drawing from the lecturers' reflections from the artefacts, lecturers used a no internet connection symbol to indicate their bad practices on the use of Moodle. This then seems to relate to time (contact time, after-work, and spare time) that is convenient to use Moodle for teaching and learning science modules. The symbol brings frustration when teaching and the system cuts off because of the unavailability of an internet connection. As a result, time curriculum signal is taken as the one that brings negativity on the use Moodle when teaching science module. In other words, there is no time for teaching science using Moodle when there is no internet connection, and this causes reluctance to most lecturers teaching science modules.

8.4.8 The negativity of their reflections: Platform

According to Khoza (2017) and Kehdinga (2014), platform is referred to as any proven space or environment where teaching and learning can occur. Any teaching and learning can be classified as informal platform (online), formal platform (face-to-face), and personal platform (blended) (Anderson, 2016; Bates*, 2016). These studies reveal that most students prefer using informal platform (students need) while most lecturers are still preferring the use of formal platform (module need). In other words, both formal and informal reflection is more recognised than non-formal reflection. On the contrary, the RRPAMS theory was silent when it comes to the personal platform. Be that as it may, the theory averred that lecturers were using formal and informal platform which includes online Moodle platform, lecture halls, and others for teaching science

modules. This is in line with what is articulated on the literature. Drawing from the findings, both informal and the formal platforms were the most observed platforms. This then suggests the gap to be closed. As a result, it is recommended lecturers should engage on the blended learning in order to meet their needs in the teaching of science modules. Based the negativity of their reflection, depicted in Table 8.3 (snail), the snail is slow and it can fit inside its shell when unconducive conditions compels. In other words, a snail can use two environments, namely, outside the shell platform and inside the shell platform. This artefact then relates to the platform curriculum signal of formal platform (inside shell) and informal platform (outside shell). This then suggests that other platforms that address the personal were not observed. As a result, blended learning is still recommended to prevail since it addresses the needs of lecturers. Thus, platforms without the personal platform destruct teaching and learning using Moodle which cause the reluctance on the use of Moodle platform. As a result, this platform is taken as that which enhances reluctance during teaching and learning of science modules using Moodle. As a result, platform forms part of the principle in the teaching of science modules using Moodle.

8.4.9 The negativity of their reflections: Content

According to Van den Akker- et al. (2012) and, Le Grange* and Reddy (2017), teaching the module without any stipulated content is meaningless, and content should cover all concepts of the module. As a result, Giancoli (2005), and Govender' and Govender- (2014), affirm that science content can be proposed into Physical Science content, Chemistry content, and teaching methods content. This suggests that lecturers seek to be driven by informal reflection (chemistry), formal reflection (Physical Science), and non-formal reflection (teaching methods work) in order teach science module content using Moodle properly. This is in line with the assertion from RRPAMS theory because it is outlined that lecturers are required to poses content knowledge from Physical Science, Chemistry and teaching methods such as mechanics, Acid and Base, collaborative and others. In support of this, lecturers are required to use Moodle activities to teach this content. With reference to the findings, lecturers were clear about the content of science module depending on whether Physical Science, Chemistry, or teaching methods. Further to this, the artefacts from Table 8.5 of the brick wall show the negativity of having the content and being unable to use Moodle properly to teach it. Thus, it is like hitting a brick wall that will not crack. This suggests that lecturers have what it takes to possess science module content, but when it comes to implementing

it using the Moodle platform, this then becomes a mess and frustrates them. In other words, the brick wall is taken as inflexibility of Moodle to have different ways to unpack the content. These then bring frustration to lecturers in such a way that they take Moodle as the sources of confusion in teaching the content. In other words, lecturers are good with content but they are not familiar with the Moodle platform, thus content may not be considered as the curriculum signal that brings negativity on the use of Moodle, instead it falls under the positivity of their reflections. This then suggests that content is one of the most vital principles that forms the basis of the teaching process using Moodle.

8.5 The summary of principles that constitute theory of equilateral Moodle curricula

With reference to Figure 8.1 in this chapter, the importance of curriculum signals were drawn from Chapter Two and Chapter Three. In other words, Chapter Two revealed the importance of the lecturer being driven by the phenomenon (reflection) in their teaching of science modules in terms of formal, personal/produced/non-formal, and informal reflection. This according to Schön (1983) and Van den Akker- et al. (2012) reflection remains the rationale that drives teaching science modules at an online learning platform. Further to this, Chapter Two outlined the significance of the use of resources (hard-ware, soft-ware, and ideological-ware) in the teaching of science modules. Similarly, Chapter Three clearly unpacked all other curriculum principles required in the teaching of science, namely: content, time, platform (location), activities, character (role), permission (accessibility), resources, justice (goals), and assessment. Chapter Two and three indicated that curriculum principles/signals should be balanced as based on the scale of their three propositions (1-3) as depicted with a blue line in Figure 8.2 below, so that teaching and learning processes can be successful and smooth.



Figure 8.2 Balanced curriculum principles from the literature

Similarly, in the contextualisation of TPACK theory (refer to Figure 4.2) into RRPAMS theory (refer to Figure 4.8) in Chapter Four, all curriculum principles were unpacked against the use of relevant documents/policies such as training guide and module outline guiding the practice of lecturers when teaching science modules using Moodle LMP. RRPAMS theory reflected that reflections still remain the drive/rationale for lecturers to teach science modules, the three basic signals forms the bases of teaching any science modules, namely resources signals (hard-ware, soft-ware, and ideological-ware); procedures signal (time, platform, activities, character, permission, resources, justice, and assessment); and Module signal (content forms the bases of teaching science in Moodle curriculum. Thus, RRPAMS theory indicated the imbalances and the balances of curriculum principles on the teaching of science using Moodle LMP. The balances were determined when all the proposition of the principles were fully applicable in the teaching context of science. As a result, according to RRPAMS theory, the majority of curriculum principles where balanced because their proposition were fully contextualised as follows: 1. Character (instructor, assessor, and facilitator); 2. Goals (aims, objectives, and learning outcomes); 3. Activities (informal, formal, and personal/produced); 4. Time (spare time, contact time/working hours and after work); 5. Content (chemistry, Physical Science, and teaching methods). This

suggests that propositions of this curriculum principles/signals were well observed by lecturer guiding policies.

On the contrary RRPAMS highlighted the minority of principles that were not balanced were based on the lack of some propositions in the contextualisation process as follows: 1. Resources (hard-ware, soft-ware, and the lack of ideological-ware); 2. Permission (financial, physical, and the lack of cultural); 3. Assessment (assessment of learning, the lack of assessment as learning, and assessment for learning); 4. Platform (informal, formal, the lack of personal platform). As a result, Figure 8.1 takes a different shape indicating the balances and the imbalances of principles based on the RRPAMS theory, see Figure 8.3 below indicated in red colour.



Figure 8.3: Principles/signals according to RRPAMS theory

Furthermore, after data was generated in Chapter Five and six, it was then analysed using guided analysis (deductive and inductive processes) in Chapter Seven. As a result, the findings also indicated its own imbalances and balances of the Moodle curricular principles/signals. Note that the findings during the first phase of action research before the intervention was administered; the only propositions that were balanced were from goals and content theme. Surprisingly, the majority of the themes indicated imbalances of the themes by lecturers up until the intervention was considered. For instance, lecturers were lacking propositions of principles as indicated in

brackets as follows: Character (instructor); 2. Activities (personal/produced activities); 3. Time (spare time and after work); 4. Resources (ideological-ware); 5. Permission (cultural permission); 6. Assessment (assessment as and for learning); 7. Platform (informal, formal, and the lack of personal platform). Once again, findings influence the new shape of the principles; see Figure 8.4 below indicated in the grey colour.



Figure 8.4: Principles according to findings

However, the overall interpretations of lecturers' reflections from the interpretations of their artefact represented in the early stages of this chapter (Chapter Seven) also indicated the drive of the using curriculum principles. This curriculum principles indicate a move to another direction in the development of Moodle theory. As a result, the majority of signals where balanced and were reflected to enhance the influence of their positive practices on the use of Moodle, namely: the character, resources, permission, goals, activities and the content. Further to this, only three of nine principles were not balanced and they termed to be the ones that influence the lecturer's bad practices on the use of Moodle, namely; assessment, time, and the platform. As a result, the new shapes of principles are formed, see Figure 8.5 below, as indicated in yellow colour. Thus, articulated principles in the literature, RRPAMS theory, findings, and interpretation of lecturers' reflections using artefacts indicate the move to the discovery of theory that can frame teaching of Physical Science modules using Moodle LMP.



Figure 8.5: Principles according to interpretation of lecturers' reflection from artefacts

8.6 Theory of Equilateral Moodle Curricula

This theory draws from the principles of curriculum interrogated above based on the assertion from the literature, RRPAMS theory, findings, and interpretations of findings. The unfolding assertion confirmed that every learning management platform has to address curriculum signals, namely Goals, Resources, Assessment, Character, Permission, Time, Platform, Content, Activities, and lastly the reflections that guides and controls all other signals. In the context of this study, these signals were observed in all spheres and it was proven that they remain the basis of teaching science modules within Moodle LMP. As a result, this study proposes the theory of Moodle curricula, which consists of three proposed curricula, namely: formal Moodle curriculum, informal Moodle curriculum, and non-formal Moodle curriculum, depicted in Figure 8.6 below.

This theory seeks for any learning management platform (Moodle, MOOCs, WebCT, Blackboard, and others) to address and bring balance in all curriculum signals. This theory seems to provide the solution of the imbalances of curriculum signals in different spheres discussed above. Firstly, the formal Moodle curriculum seeks to address formal/vertical Moodle curriculum signals which

includes Objectives, hard-ware resources, and assessment of learning, instructor, financial access, working hours, face-to-face learning, and Physical Science content, and content-centred activities. (Bernstein, 1999). Thus, the formal Moodle curriculum seeks to address the Physical Science module need through the process of formal reflection (Khoza & Mpungose, 2017). Secondly, the informal Moodle curriculum seeks to address informal Moodle curriculum signals which includes learning outcomes, soft-ware resources, and assessment as learning, facilitator, physical access, spare time, online learning, chemistry content, and societal-centred activities. This suggest that the informal Moodle curriculum is driven by informal reflection in order to address the needs of the society/students using Moodle (Mpungose, 2017). Lastly, the non-formal Moodle curriculum addresses personal/autobiographical curriculum signals which includes aims, ideological-ware resources, assessment-for-learning, assessor, cultural access, after-work hours, blended learning, teaching methods, and lecturer-centred activities (Pinar, 2012). In other words, non-formal Moodle curriculum address the individual personal needs (identity) of lecturers teaching science modules, and it requires them to be driven by non-formal reflection (Mpungose, 2017). This study has affirmed the imbalances of founding principles making up Moodle curricula, and this affirms that the three Moodle curricula stated were not balanced. This affirmation remains the cause of lecturers being reluctant on the use of Moodle to teach science modules. As a result, theory of Moodle curricula can be the lens through which the teaching of science module using Moodle can framed. This theory can be the weapon that can create the maximum potential usage of Moodle by lecturers. Similarly, the theory can influence universities to have online learning policies in place in order to regulate the teaching and learning of modules in the HEIs. Therefore, the theory of Moodle curricular intends to bring balance of both sides of Moodle curricula (non-formal, formal, and informal) in order to yield the balance of principles in all sides during teaching and learning of science modules. See Figure 8.6 below showing the equilateral sides of Moodle curricula with its respective principles which are driven by reflections at the centre.

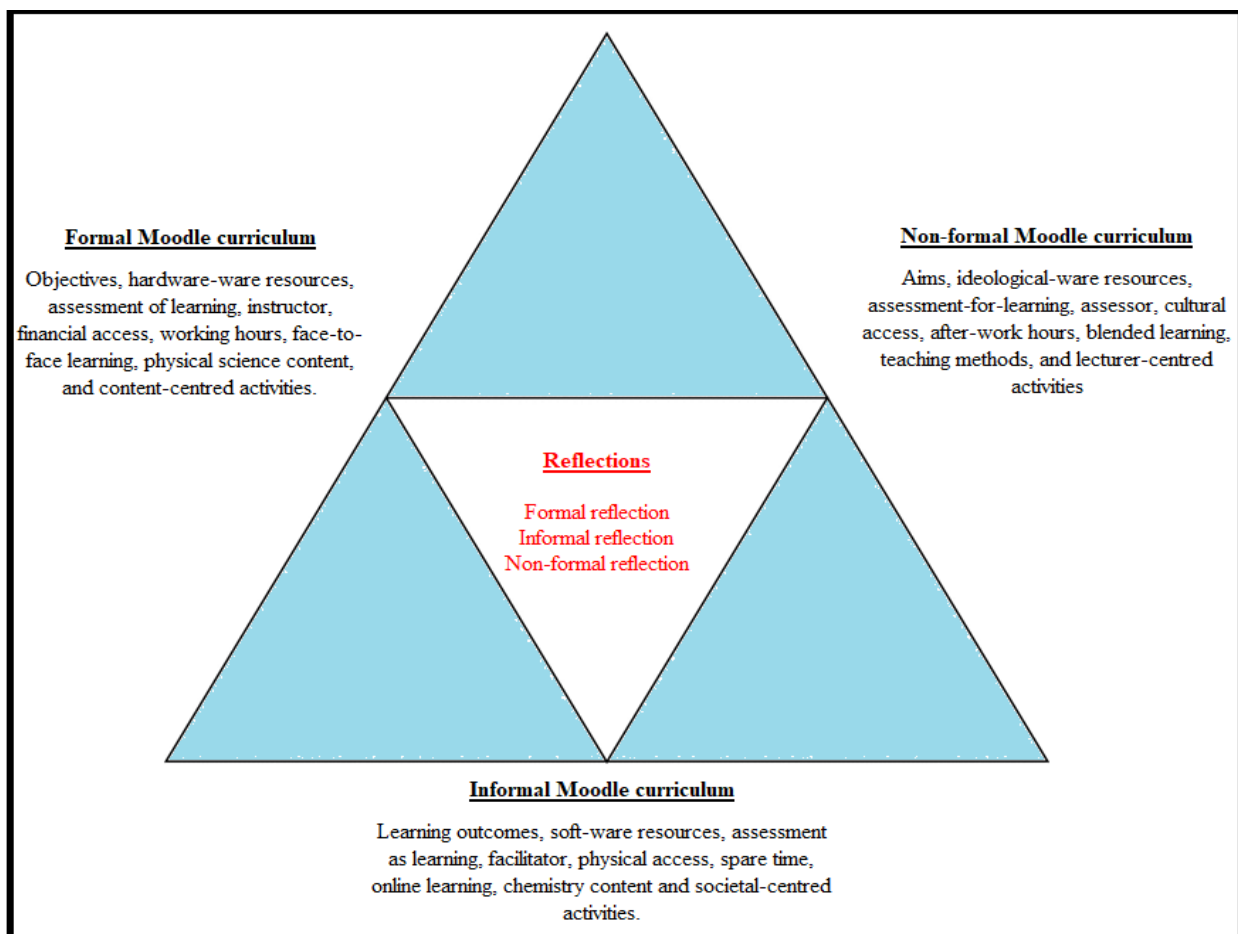


Figure 8.6: Theory of Equilateral Moodle Curricula.

8.7 Summary of key findings and recommendations

With reference to the table 8.1 below, all the above elaborated principles are tabled with their respective propositions which all are driven by reflections (formal. Informal and non-formal) respectively. As a result, each principle had three propositions accordingly, and these proposition were indicated in terms of a scale, for instance, if all three propositions were balanced in all spheres, scale number three (3) was allocated, if two propositions then scale two (2) was allocated, and if one proposition was considered, a scale of one (1) was allocated. These proposition were interrogated in different spheres namely literature, RRPAMS theory, findings and interpretation. As a result, the table below intends to leads the discussion of the key findings and also provide the space for this study to make recommendations in order make conclusions.

Table 8.6 summary of findings Lecturers' reflections (Phenomenon)

Principles /signal	Propositions/principles	Reflections	Literature	RRPAMS theory	Findings	Interpretation
Content	Physical Science	Formal	3	3	3	3
	Chemistry	Informal				
	Teaching methods	Non-formal				
Time	Working hours	Formal	3	3	1	1
	Spare time	Informal				
	After work	Non-formal				
Character	Instructor	Formal	3	3	2	3
	Facilitator	Informal				
	Assessor	Non-formal				
Platform	Formal platform	Formal	3	2	2	2
	Informal platform	Informal				
	Personal platform	Non-formal				
Activities	Formal activities	Formal	3	3	2	3
	Informal activities	Informal				
	Personal activities	Non-formal				
Justice	Objectives	Formal	3	3	3	3
	Learning Outcomes	Informal				
	Aims	Non-formal				
Permission	Financial permission	Informal	3	2	2	3
	Physical permission	Formal				
	Cultural permission	Non-formal				
Resources	Hardware	Formal	3	2	2	3
	Software	Informal				
	Ideological-ware	Non-formal				
Assessment	Of learning	Formal	3	1	1	1
	As learning	Informal				
	For learning	Non-formal				

The literature asserts that reflection is always at the centre of the teaching and learning process in any curriculum (Boud[^] et al., 2013; Hernandez & Endo, 2017; Khoza & Mpungose, 2017; Van Manen, 1991). These studies further affirm that for lecturers to succeed in their teaching they need to reflect on the basis of formal reflection, informal reflection, and non-formal reflection in order to address the needs of the module, society/student, as well as the needs of each individual lecturer. This then suggests that lecturers teaching the Physical Science module should take into consideration these proposed reflections when teaching using Moodle LMP so that all sides of the Moodle curriculum may be treated equally to balance the curriculum signals. With reference to the Table 8.6 above, each principle is driven by its proposition which goes hand-in-hand with its proposed reflection. Remember scale 3 indicates three proposed propositions of each curriculum signal, and this suggests that if all three proposition are applied, scale 3 is displayed. This is also applicable to other scales (1 and 2). As a result, drawing from the table, there are twenty two scale 3s, nine scale 2s and five scales 1s indicated in all spheres (literature, RRPAMS theory, findings, and interpretation). This then suggest that the majority of lecturers were driven by all levels of reflection (formal, informal, and non-formal) when teaching science module using Moodle. On the contrary, there were few lecturers who are driven by either one or two levels of reflection. These key findings are evident that lecturers need to reflect before, during, and after the teaching and learning process of science module using Moodle. As a result, reflection plays a major role in balancing Moodle curricula on all sides. Thus, this study recommends that reflective programmes and awareness be in place for both lecturers and university management in order to enhance the balance on the use of new adopted leaning management platforms as emerging technology.

8.7.1 Content principle/signal

Furthermore, based on the content principle/signal, the scale of 3 is indicated in all spheres. This then indicates that lecturers were driven by all levels of reflection in order to administer all proposed content of the Physical Science module (Physical Science, Chemistry, and teaching methods). In other words, lecturers were well versed with the module content signal during the teaching and learning process using Moodle LMP. As a result, levels of reflection had much influences in this case module content module content is taught. Note that lecturers need to possess module content knowledge and be an expert in their own disciplines so that teaching and learning can be attained properly (Biggs', 2011). This study then takes a motion forward that lecturers

should capacitate themselves quite often in readings/research of their own respective modules, especially science modules, in order to become experts in their modules and stay updated at all times.

8.7.2 Time principle/signal

The findings and the interpretation of findings has a scale 1, and this indicates that lecturers were driven by one type of reflection which led to the use of only one proposed time schedule in the use of Moodle. Both the finding and interpretation outlined that lecturers were lacking the use of Moodle during their own spare time (informal reflection) and during after working hours (non-formal reflection) due to the lack of resources (funds to pay internet connection). On the contrary, lecturers were only driven by formal reflection and this led them mostly to use Moodle during the working hours (university contact time). This then indicates a huge gap when it comes to times schedules of using Moodle. Therefore, this study seeks that HEIs should make funds available for lecturers so that lecturers can have an allowance to install Wi-Fi in order to buy data bundles to be used at their homes so that they are able to use Moodle LMP even after work and during their own spare time.

8.7.3 Character principle/signal

Interestingly, with reference to scales represented under character signal/principle, scale 3 dominated all spheres except in the sphere of findings, where scale 2 is only indicated. This suggests that all levels of reflection (non-formal, formal, and informal) mostly prevailed in the teaching of science modules using Moodle. In other words, lecturers character were mostly perceived as instructor, facilitator, and assessor during teaching and learning of Physical Science modules in Moodle LMP, and these characters were perceived in all levels of reflections. Be that as it may, scale 2, suggests that on some occasional instances, lecturers did miss one kind of reflection during the teaching process, and this indicates that one character (instructor, facilitator, and assessor) out of three was never observed. Thus, the missing of one character in the process of teaching and learning of science modules creates the unbalanced Moodle curriculum. In other words, this will lead to the state where the Moodle curriculum can be vulnerable. This means that one or two Moodle curricula can be favoured than others. As a result, this study is highly concerned that lecturer's character should be balanced in the teaching and learning process of Physical

Science modules while using Moodle LMP at all times. This is the reason why this study recommends the development of an online learning policy that will stipulate the lecturers' character on the teaching of science modules so that lecturers will know their roles when teaching science modules.

8.7.4 Platform principle/signal

Moreover, Berkvens et al. (2014) reminds us that any teaching and learning platform should be driven by informal, formal, and non-formal reflection in order to address the conducive teaching space that can address the individual needs of a lecturer, societal/student needs, and the module needs. As a result, the literature sphere has scale 3, and this indicates that literature seeks that the lecturer be driven by all levels of reflection (informal, formal and non-formal) so that they can be comfortable to teach in all proposed platforms, namely formal (face-to-face), informal (online learning), and personal platform (blended learning). Further to this, the scale 2 prevailed in all other three spheres (findings, RRPAMS theory, and interpretation), and this indicates that lecturers were only good in using two out three proposed Moodle platforms. As a result, the findings, artefact interpretations and the RRPAMS theory spheres illustrated that lecturers were good in using formal and informal platform. On the contrary they were lacking the use of personal platform (blended learning) such as doing live video streaming. This this was because the university Moodle platform did not have this function installed in Moodle LMP and there was no policy outlining the use of live video streaming. For this reason, this study then recommends the use of live video streaming (personal platform) so that lecturers are able to provide online lectures from their offices or home. This can be advantageous in cases of serving time lost during annual students' protest that normally disturbs lectures and planning at the South African universities in particular.

8.7.5 Activities principle/signal

The literature, RRPAMS theory, and interpretations were all in parallel that teaching activities of science modules using Moodle can be formal (content-centred), informal (societal/student-centred), and personal (lecturer-centred). This requires the influence of formal, informal, and non-formal reflection to prevail respectively in the teaching process. In support of this affirmation, literature, RRPAMS theory, and interpretations has scale 3, and this implies that lecturers were operating in all three level of reflection which led them to be able to administer, formal, informal,

and personal Moodle activities. It was opined that lecturers were able to use Moodle activities like chat forum, messaging activity, quiz, assignment, and others in order to unpack the module content. On the contrary, the findings indicated the gap that lecturers were lacking the use of personal Moodle activities such as the use of attendance and Journal activity from Moodle LMP because they were lacking technical skills of using them. Therefore, this study is appealing for the structured programme to be in place in order to capacitate all university lecturers with skills of using all Moodle activities.

8.7.6 Justice principle/signal

It is in the best interest of this study to submit that university lecturers should continue to be driven by informal, formal, and formal reflection so that Moodle curricula in the teaching of science cannot be vulnerable but balanced. This submission is evident to what is transpired in all spheres (literature, RRPAMS theory, findings, and interpretations) because each sphere had scale 3. This affirms that lecturers were driven by aims, objectives, and learning outcomes in order to ensure justice in the teaching of science modules using Moodle LMP. In other words, lecturers had goals to be attained which address their individual need (aims), module need (objectives), and societal/student need (learning outcomes). This then indicates that lecturers can bring the balance of three Moodle curricula provided the proposed justice (aims, objectives, and learning outcomes) are taken into consideration for the successful teaching of Physical Science modules using Moodle.

8.7.7 Permission principle/signal

Both literature and the interpretation of lecturer's reflections (artefacts) has a scale 1 while RRPAMS theory as well as the findings has scale 2. This then affirms that lecturers in the scale 3 were driven operating in all three levels of reflection in order to ensure that access (permission) is observed based on financial (societal need), physical (module need), and cultural permission (lecturer' need). This suggests that all proposed signals of permission were observed. Be that as it may, scale 2 indicates the gap that one out of three permission propositions were not observed. In line with this, both RRPAMS theory and findings indicated that cultural permission was hardly observed. In other words, lecturers lacked a non-formal level of reflection in order to address their needs when it comes to issues of permission (gender, language, and others) when teaching science modules. This study then sees the need to recommend that lecturers' teachings of science should

find ways to stipulated how different kinds of student are accommodated in terms of their sociocultural background such as language, gender, computer skills and others.

8.7.8 Resources principle/signal

Khoza and Mpungose (2017) affirm that resources are anything or personal that assists during the teaching and learning process, and sources are proposed in terms of hard-ware, soft-ware, and Ideological-ware resources. This suggests that lecturers should be driven by formal reflection (hard-ware.), informal reflection (soft-ware), and non-formal reflection (ideological-ware). Further to this, and drawing from Table 8.1 referring to resources, RRPAMS theory, and findings have scale 2 which shows that lecturers were silent when it comes to one of the three proposed resources. It was indicated that lecturers not aware of ideological-ware resources which address their individual needs. In other words, lecturers were lacking ideology behind the use Moodle resources to teach science modules. In closing this gap, this study ascertained that lecturers can be driven by non-formal reflection to have a drive to address their needs; they can read the literature on Moodle and books informing the use of Moodle so that they can practice accordingly. In addition, the university management may design a Moodle usage Policy which may address all Moodle resources.

8.7.9 Assessment principle/signal

It was mentioned from RRPAMS, interpretation, and findings that lecturers were silent when it comes to the execution of assessment as and for learning when teaching science using Moodle. As a result, they were good at administering assessment of learning using Moodle. In support of this, Table 8.1 under resources signal, RRPAMS, interpretation and findings have scale 1 which indicates that lecturers were driven by only one reflection when assessing science module, and this enhanced to concentrate only on the use of assessment of learning (assignment, tests, examination, quiz, and others. As a result, this study further summits that lecturers should take assessment as and for into account in order to bring the balance in the process of assessment. Lecturers need to have read university policy on assessment in higher education and find stipulated ways of administering assessment. The study further recommends the regular amendment of assessment policy in order to speak to the current conditions of teaching (online learning). In line with this

recommendation, the university should hire one educational technologist who can assist lecturers in each campus in order to assist struggling lecturers when using Moodle LMP to run assessment.

8.8 Summary of key responses to key research questions and educational implications

The main purpose of this study was to explore lecturers' reflections on the use of Moodle in teaching Physical Science modules. This purpose was addressed using three research questions guiding this study. The first research question was intended to address the first research objective outlined as: 'to understand lecturers' reflections on the use of Moodle to teach Physical Science module'. As a result, the first question posed: 'What are the lecturers' reflections on the use of Moodle in teaching Physical Science module'. Further to this, the study found that lecturers' practice when teaching Physical Science modules were framed by three levels of reflection namely: formal, informal, and non-formal reflection. This study affirmed that lecturers were operating in all these levels of reflection. As a result, lecturers were able to cover various proposed propositions of curriculum principles on the teaching of Physical Science modules using Moodle.

Although lecturers were driven by all levels of reflection during teaching and learning of these science modules in Moodle LMP (online), the study found out that lecturers were operating at levels of informal reflection as compared to that of formal and non-formal reflection. In other words, lecturers' rationale of teaching science modules was propelled by addressing the needs of society/students. As a result, lecturers were operating in the informal/horizontal space where their practices of using Moodle LPM were not informed or guided by any online learning policy (formal reflection), but lecturers were informed by other colleagues, technicians, and others' opinions or ideas on how to use Moodle (informal reflection). This then leads to the reluctant use of Moodle (online LMP) by lecturers as academics operating from the level of formal reflection (academics guided by the profession with policies in place). Note that some lecturers do not even use Moodle LMP up its maximum potential since there was no online guiding policy on the use of Moodle. This assertion does not bring the balance between informal reflections (no guiding policy) and formal reflection (lecturers/academic from the profession with guiding policy) so that lecturers can use non-formal reflection to find their identity on the use of Moodle. As a result, this study driving the point where it is advisable for all HEIs to develop and have an online learning (Moodle) policy document in place before any emerging LMP can be adopted and be used by lecturers. This can

bring the balance of all levels of reflection in order to cater for lecturers' needs, societal/student needs, as well as module needs in HEIs because in education there are structures with their own policies.

The second question, which sought to address this research objective, stated: 'Explain the lessons that can be learned from teachers' reflections on the use of Moodle to teach Physical Science module'; and the research question posed was, 'How do lecturers reflect on the use of Moodle influence the teaching of physical science module?' In addressing this question the study found that when lecturers are operating in platform (Moodle LMP) where there is no policy guiding their practice, they will socialise (informal reflection prevails) in the platform and as a result university curriculum outcomes cannot be attained because lecturers can always do Moodle activities that are comfortable. For instance, some lecturers only upload notes to be downloaded by students from Moodle LMP, instead of engaging students to contrast their meaning by sharing their experiences on the platform through chat activity or forum activity (Moodle activities). Moving further, this study affirms the lesson that if non-formal reflection (lecturers' need/identity) can drive lecturers practices on the use of Moodle, it has to be online learning guiding policy documents in place so that lecturers can bring the balance of their operation between informal reflection (societal/student need) and formal reflection level (module need). In other words, if there is no online learning policy document guiding lecturers' practices on the use of Moodle, the whole process of teaching and learning Physical Science modules moves away from university professional space to social community space where students can take long to complete their degrees within specified periods of time, and the high rate of failing modules prevails. On the contrary, presence of online learning policy can create order and give direction to the university management, students and mostly to lecturers on how to use Moodle LMP up its maximum potential. After it was found that the university where lecturers were teaching science module had no online learning policy guiding lecturers. As a result, this study had much influence on the university to initiate the process of developing the policy guiding the online teaching and learning (Moodle LMP).

With reference to the last question, 'Why do lecturers' reflect in particular ways on the use of Moodle when teaching Physical Science module?' This question intended to address the following objective, 'Explain what informs lecturers' reflections on the use of Moodle when teaching the

Physical Science module'. Moreover, this study affirmed that the reason why lecturers are mostly operating at the informal level of reflection than other levels (formal and non-formal level) is because there was no online learning policy document guiding their practice during the teaching and learning process. The study found that due to the fact that the university adopted and made Moodle LMP compulsory to be used by all lecturers without any policy in place, lecturers and student were forced to use this platform irrespective of whether they do understand how to use it. This then affirm that the university was promoting the informal level of reflection (societal practice) than formal level of reflection (professional practice), and this made lecturers to lose their identity (non-formal reflection). As a result, lecturers ended up using Moodle training guides, as well as module outlines, instead of online policy documents.

8.9 Conclusion

Chapter Eight represented the final chapter of this study titled, 'Exploring lecturers' reflections on the use of Moodle to teach Physical Science modules at a South African university'. The purpose of this study was to 'explore lecturers' reflections on the use of Moodle to teach Physical Science modules at a South African university'. This was attained by answering the three research question of this study as follows: 1. What are the lecturers' reflections on the use of Moodle in teaching Physical Science modules?; 2. How do lecturers reflect on the use of Moodle to teach Physical Science modules?; 3. Why do lecturers' reflect in particular ways on the use of Moodle when teaching Physical Science modules? This questions were intended to address the following research objectives accordingly as follows: 1. Understand lecturers' reflections on the use of Moodle to teach Physical Science modules; 2. Explain the lessons that can be learned from teachers' reflections on the use of Moodle to teach Physical Science modules; 3. Explain what informs lecturers' reflections on the use of Moodle when teaching Physical Science modules.

In addition to the above, the first part of this chapter emerged with the elaboration and discussion of lecturers' artefacts reflecting on their teaching practices when teaching using Moodle LMP. The second part of this chapter interpreted lecturers' reflections through using their artefacts as guided by the research questions. The third part of this chapter discussed the guiding principles in the development of theory of equilateral Moodle curricula, and this was based on the good (positivity of lecturers' reflections) and the bad practices (negativity of lecturers' reflections) of lecturers

drawn from the artefacts. The fourth part indicated the summery of principles constituting the theory of equilateral Moodle curricula. The unfolding of this chapter was drawing from the stipulated literature, RRPAMS theory (contextualised TPACK framework), as well as research design and methodology. Further to this, the fifth part discussed the theory of equilateral Moodle curricula with its diagram representation, and the second-to-last part represented a summary of key findings and recommendations. The last part presented a summary of key responses to key research questions and educational implications

In the world of academia, where emerging technology plays an imperative role in conducting research as well as teaching and learning using various LMPs like Moodle and others (Bates*, 2016; Khoza, 2017), this study has proven that the level of reflection (formal, informal, and non-formal) seems to prevail in all corners of academia so that all curriculum signals (content, time, character, platform, activities, justice, permission, resources, and assessment) may be balanced and yield the balanced curricula during teaching and learning. This can be attained through the use of relevant theoretical frames guiding the use of certain LMP such as the use of newly developed theory of equilateral Moodle curricula from this study, which always advocates for the balanced curriculum signal in all three Moodle curricula (informal, formal, and non-formal) in order to address the needs and lecturers, society/student, and the module need.

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Annexures

Annexure A: Turnitin in report

The screenshot displays the Turnitin Feedback Studio interface. The main document area shows the following text:

¹⁶⁷ This dissertation is submitted in fulfilment of the requirements for a
Doctor of Philosophy degree in Education and Curriculum Studies
**School of Education, College of ³⁰⁸ Humanities, University of KwaZulu-Natal, Durban, South
Africa.**

Supervisor: Dr. Simon Bheki Khoza

Date of submission: November 2017

1

Page: 1 of 260 Word Count: 141260

The right-hand side of the interface features a 'Match Overview' panel with a total match rate of 10%. Below this, a list of sources is provided:

Rank	Source	Match Rate
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The Windows taskbar at the bottom shows the system clock as 9:19 AM on 11/13/2017.



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Submission title: PhD. Thesis 2017
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File size: 2.36M
Page count: 260
Word count: 141,260
Character count: 772,599
Submission date: 11-Nov-2017 10:55AM (UTC+0200)
Submission ID: 878088599



Exploring Lecturers' Reflection on the Use of Moodle to Teach Physical Science Modules
at a South African university.

By
Cedric Bheki Mpungose
214581968

This dissertation is submitted in fulfillment of the requirements for a
Doctor of Philosophy degree in Education and Curriculum Studies
School of Education, College of Humanities, University of Kwazulu-Natal, Durban, South
Africa.

Supervisor: Dr. Sison Bheki Khosa

Date of submission: November 2017

1

Annexure B: Ethical clearance letter



20 August 2015

Dr Simon Bheki Khoza
School of Education
College of Humanities
Edgewood Campus
UKZN
Email: khozas@ukzn.ac.za

Dear Dr Khoza

RE: PERMISSION TO CONDUCT RESEARCH

Gatekeeper's permission is hereby granted for you to conduct research at the University of KwaZulu-Natal (UKZN) provided Ethical clearance has been obtained. We note the title of your research project is:

"University lecturers' reflections on the experiences of using Moodle in teaching postgraduate modules".

It is noted that you will be constituting your sample by handing out questionnaires and conducting interviews with Academic staff teaching postgraduate modules on all campuses.

Please ensure that the following appears on your notice/questionnaire:

- Ethical clearance number;
- Research title and details of the research, the researcher and the supervisor;
- Consent form is attached to the notice/questionnaire and to be signed by user before he/she fills in questionnaire;
- gatekeepers approval by the Registrar.

Data collected must be treated with due confidentiality and anonymity.

You are not authorized to contact staff and students using 'Microsoft Outlook' address book.

Yours sincerely



PROFESSOR D JAGANYI
REGISTRAR (ACTING)

Office of the Registrar

Postal Address: Private Bag X54001, Durban, South Africa

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Website: www.ukzn.ac.za



1910 - 2010
100 YEARS OF ACADEMIC EXCELLENCE

Founding Campuses: ■ Edgewood ■ Howard College ■ Medical School ■ Pietermaritzburg ■ Westville

Annexure C: Gate keepers letter



20 August 2015

Dr Simon Bheki Khoza
School of Education
College of Humanities
Edgewood Campus
UKZN
Email: khozas@ukzn.ac.za

Dear Dr Khoza

RE: PERMISSION TO CONDUCT RESEARCH

Gatekeeper's permission is hereby granted for you to conduct research at the University of KwaZulu-Natal (UKZN) provided Ethical clearance has been obtained. We note the title of your research project is:

"University lecturers' reflections on the experiences of using Moodle in teaching postgraduate modules".

It is noted that you will be constituting your sample by handing out questionnaires and conducting interviews with Academic staff teaching postgraduate modules on all campuses.

Please ensure that the following appears on your notice/questionnaire:

- Ethical clearance number;
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- Consent form is attached to the notice/questionnaire and to be signed by user before he/she fills in questionnaire;
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Data collected must be treated with due confidentiality and anonymity.

You are not authorized to contact staff and students using 'Microsoft Outlook' address book.

Yours sincerely



PROFESSOR D JAGANYI
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Website: www.ukzn.ac.za



Founding Campuses:  Edgewood  Howard College  Medical School  Pietermaritzburg  Westville

Annexure D: Consent letter



Curriculum Studies, School of Education,
College of Humanities,
University of KwaZulu-Natal,
Edgewood Campus,

Dear Participant

INFORMED CONSENT LETTER

My name is Cedric Bheki Mpungose. I am a PhD student studying at the University of KwaZulu-Natal, Edgewood campus, South Africa. I am interested in exploring lecturers' reflections on the use of Moodle to teach modules at a South African university. I have observed the use of Moodle in teaching modules varies among university lecturers irrespective of the DVC's intentions of phasing Moodle as mandatory for the maximum potential usage. Thus, I am doing an action research. This means that I will be also involved in this research. Therefore, to gather the information, I am interested in requesting any kind of relevant information seeking your reflections on the use of Moodle to teach modules.

Please note that:

- Your confidentiality is guaranteed as your inputs will not be attributed to you in person, but reported only as a population member opinion.
- The interview may last for about 30 minutes, relevant documents will be analysed, and the reflective activity will be sent to you via e-mail.
- Any information given by you cannot be used against you, and the collected data will be used for purposes of this research only.
- There will be no limit on any benefit that you may receive as part of your participation in this research project;
- Data will be stored in secure storage and destroyed after 5 years.
- You have a choice to participate, not participate or stop participating in the research. You will not be penalized for taking such an action.
- You are free to withdraw from the research at any time without any negative or undesirable consequences to yourself;

- Real names of the participants will not be used, but symbols such as A, B, C, D, and E will be used to represent your full name;
- Your involvement is purely for academic purposes only, and there are no financial benefits involved.
- If you are willing to be interviewed, please indicate (by ticking as applicable) whether or not you are willing to allow the interview to be recorded by the following equipment:

	willing	Not willing
Audio equipment		
Photographic equipment		
Video equipment		

I can be contacted at:

Email: mpungosec@ukzn.ac.za

Phone: +27 31 260 367.

Cell: +27 72 0645 5606.

My supervisor is Dr. SB Khoza who is located at the School of Education, Edgewood campus of the University of KwaZulu-Natal.

Contact details: email: khozas@ukzn.ac.za Phone number: +27312607595.

Discipline Co-coordinator is Dr. Labby Ramrathan,
Curriculum Studies, School of Education,
Edgewood College, University of KwaZulu-Natal
(Tel) 0312608065, Email: Ramrathanp@ukzn.ac.za.

You may also contact the Research Office through:

P. Mohun

HSSREC Research Office,

Tel: 031 260 4557 E-mail: mohunp@ukzn.ac.za

Thank you for your contribution to this research.

DECLARATION

I..... (Full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

SIGNATURE OF PARTICIPANT

DATE

.....

.....

Annexure E: Reflective activity

Question 1:	<i>Why do you use Moodle to teach your module/ why do you have an interest in the use of Moodle (reasons)</i>
Answer:	

Question 2:	<i>What resources do you use when teaching a module using Moodle (resources)</i>
Answer:	

Question 3:	<i>Are you permitted to use Moodle and how do you gain access to use Moodle to teach your modules (accessibility)</i>
Answer:	

Question 4:	<i>How do you ensure justice when teaching your module using Moodle (goals to be achieved)</i>
Answer:	

Question 5 :	<i>What content are you teaching using Moodle?(content)</i>
Answer:	

Question 6 :	<i>What are Moodle teaching activities do you use when teaching your module (Moodle activities)</i>
Answer:	

Question 7 :	<i>How do you perceive your character when using Moodle? (lecturers' role)</i>
Answer:	

Question 8 :	<i>Where do you use Moodle when teaching your module? (location/environment)</i>
Answer:	

Question 9	<i>When do you use Moodle when teaching your module? (time)</i>
Answer:	

Question 10	<i>How do you assess your module using Moodle?(assessment)</i>
Answer:	

Annexure F: 8. One-on-one semi-structured interview

Question 1:	<i>Why do you use Moodle to teach your module/ why do you have an interest in the use of Moodle (reasons)</i>
Sub- questions	<ol style="list-style-type: none"> 1. What informal rationale/reason that made you to use Moodle 2. What formal rationale/reason that made you to use Moodle 3. What personal rationale/reason that made you to use Moodle

Question 2:	<i>What resources do you use when teaching a module using Moodle (resources)</i>
Sub- questions	<ol style="list-style-type: none"> 1. What software resources do you use when teaching using Moodle 2. What hardware resources do you use when teaching using Moodle 3. Which learning theories or theories that guides your teaching when using Moodle

Question 3:	<i>Are you permitted to use Moodle and how do you gain access to use Moodle to teach your modules (accessibility)</i>
Sub- questions	<ol style="list-style-type: none"> 1. Do you have any cost implications in the use of Moodle 2. How do you access the use of Moodle? (physical ability) 3. Is the any cultural influence when using Moodle

Question 4:	<i>How do you ensure justice when teaching your module using Moodle (goals to be achieved)</i>
Sub- questions	<ol style="list-style-type: none"> 1. What are your aims of using Moodle 2. What are the objectives of using Moodle 3. Indicate learner intentions in the use of Moodle

Question 5 :	<i>What content are you teaching using Moodle?(content)</i>
Sub- question	<i>What module content do you cover when using Moodle (you can provide me with the module outline)</i>

Question 6 :	<i>What are Moodle teaching activities do you use when teaching your module (Moodle activities)</i>
Sub- questions	<ol style="list-style-type: none"> 1. What Moodle activities do you use to engage students 2. What Moodle activities do you use in to unpack the content

	3. What Moodle activities do you use in to ensure the attendance of students in your lecture?
--	---

Question 7 :	<i>How do you perceive your character when using Moodle? (lecturers' role)</i>
Sub- question	1. Is your role seem as the instructor, assessor or facilitator when using Moodle

Question 8 :	<i>Where do you use Moodle when teaching your module? (location/environment)</i>
Sub- questions	<ol style="list-style-type: none"> 1. Is online Moodle platform conducive, substantiate 2. Do you use Moodle in the lecture halls, office or home? 3. Is blended learning possible in Moodle learning management system

Question 9	<i>When do you use Moodle when teaching your module? (time)</i>
Sub- questions	<p>Which time is most suitable for you to use Moodle:</p> <ol style="list-style-type: none"> 1. Spare time 2. During working 3. After work

Question 10	<i>How do you assess your module using Moodle?(assessment)</i>
Sub- questions	<ol style="list-style-type: none"> 1. What Moodle activities do you use during assessment for learning 2. What Moodle activities do you use during assessment as learning 3. What Moodle activities do you use during assessment of learning

Annexure G: Artefacts

Artefacts 1

Draw/provide/paste an **artefact/object** that you think it represents your **good practice** on the use of Moodle in teaching your modules. Provide a brief write up that gives a clarity or indicating your emotions based on an artefact.

<u>Your Artefacts 1</u>
<u>Your brief write up 1</u>

Artefacts 2

Draw/provide/paste an **artefact/object** that you think it represents your **bad practice** on the use of Moodle in teaching your modules. Provide a brief write up that gives a clarity or indicating your emotions based on an artefact.

<u>Your Artefacts 2</u>
<u>Your brief write up 2</u>

Annexure H: Letter of Edit



Cedric Bheki Mpungose
School of Education
UKZN
Durban

Christine Davis
5A Denys Reitz
Roosevelt Park
Gauteng

Re: Cedric Mpungose: PhD Edit: "Exploring Lecturers' Reflections on the Use of Moodle to Teach Physical Science Modules at a South African university"

To whom it may concern

This letter services to confirm that the thesis submitted by Cedric Mpungose was edited for spelling and grammar only.

While feedback was given on his paper as a whole, no new content was added during the course of the edit by the editing team.

The research methodology, literature review, and the findings from his study are entirely his own.

Please feel free to contact me should you have further questions,

Christine Davis

Phone: 071 6850 170
Email: christinem4c@gamil.com