EXAMINING TEACHER LEARNING OF GRADE 12 LIFE SCIENCES TEACHERS IN A PROFESSIONAL LEARNING COMMUNITY LOCATED IN THE HARRY GWALA DISTRICT.

BY

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DECLARATION

I, Thanduxolo Rubela, student number 215076526, declare that:

1. The research reported in this thesis, except where otherwise indicated, and is my original research.

2. This thesis has not been submitted for any degree or examination at any other university.

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DEDICATION

This work is dedicated to my late mother, Nomasingili Rubela, my late Grandfather, Deba Ngcezwayo and my father, Mbongeni Rubela for their support and instilling in me fervour for education. This dissertation is dedicated to you.

LIST OF ACRONYMS

PLC	Professional Learning Community
ISPFTED	Integrated Strategic Planning Framework for Teacher Education and Development
PLCs	Professional Learning Communities

ABSTRACT

A professional learning community is one of the learning centres recommended by the department of education to provide teachers with skills, teaching strategies and solutions to the challenges they face on a daily basis in schools, especially within the classroom.

This research study examines teacher learning of grade 12 Life Sciences teachers in a professional learning community located in the Harry Gwala district. The focus of this study was to examine the professional learning activities grade 12 Life Sciences teachers engaging in a professional learning community. In addition, this study aimed to examine the extent to which the professional learning community serves as an effective professional learning community.

The study was located within the interpretive paradigm and a qualitative case study approach was used to obtain in-depth information about teacher learning in professional learning communities. Data was collected using two instruments, namely, semi-structured interviews and observations. Six grade 12 Life Sciences teachers were selected purposefully for the study. I interviewed six participants and observed three professional learning community meetings. The study was framed by Brodie's (2013) six characteristics of successful professional learning communities. Data was analysed using thematic data analysis. Findings of the study indicated that grade 12 Life Sciences teachers engaged in several learning activities such as memo discussions, moderation of examination papers, sharing teaching strategies, setting cluster papers, lesson presentations, group discussions and demonstration of practical tasks. Therefore, professional learning activities in the grade 12 Life Sciences professional learning community mainly focused on assessments, content discussions, and sharing new teaching strategies. The study highlighted that teachers learn and findings of the study also indicated that the life sciences professional learning community partially reflected the features of effective professional learning communities. The study recommends that all teachers should attend professional learning community meetings. The study further recommends that the Department of Education plays a more active role in supporting and encouraging all teachers to attend professional learning community meetings.

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Chapter One

Introduction and Background

1.1 Introduction

The aim of this study is to examine teacher learning of grade 12 life sciences teachers in a professional learning community located in the Harry Gwala District. This chapter describes the focus and the purpose and the background and rationale of the study. A brief outline of key concepts and the conceptual framework is presented. Additionally, the methodological approach and research design is included in this chapter. Lastly, the chapter presents the research questions and objectives, and further outlines the overview of the thesis.

1.2 Focus and purpose of the study

The Integrated Strategic Planning Framework for Teacher Education and Development (ISPFTED), launched by the department of education in South Africa, recommended that professional learning communities (PLCs) be established to fortify teacher professionalism (DBE & DHET, 2011, as cited in Brodie & Borko, 2016, p. v). The importance and values of (PLCs) to teacher learning are outlined in chapter two.

The purpose of this study is to examine the professional learning activities that grade 12 life science teachers engage in within a professional learning community (PLC) located in the Harry Gwala District. This study's aim is to explore the professional learning activities and the extent to which these learning activities contribute to teacher learning. In the next section I outline the rationale of this study.

1.3 Rationale

The grade 12 results in life sciences over the past few years have shown poor performance in the Harry Gwala district. Current strategies for improving learners' performance need to be examined including teachers' activities that take place within the cluster. PLCs are one of the main strategies planned to empower teachers professionally. At a grade 10 Life sciences teacher I had an interest on examining teacher learning of grade 12 Life sciences teachers and understand what they do in their PLCs. I have noticed that PLCs do not serve this purpose effectively

because grade 10, 11, and 12 life sciences teachers meet with the subject advisor in one group at the same time. Sometimes grade 12 life sciences teachers meet separately to engage in specific activities which could help them to achieve better results. Hord (2009) argues that it is possible to empower teachers through the establishment of PLCs. I have been participating in many activities involved with professional development and from my experience, different activities provide different kinds of learning opportunities.

Literature highlights many forms of activities that take place in PLCs locally and internationally. Robert and Pruit (2008) point out ten activities for job-embedded professional development:

- Observe other teachers teach,
- Plan lessons and units with other teachers,
- Give and receive feedback on instructional behaviours from peers,
- Conduct action research projects,
- Mentor new teachers,
- Coach one another,
- Keep a reflective log,
- Develop and maintain a professional portfolio,
- Look at student work together,
- Become part of the study group (p.70).

Servage (2008) argued that there are some helpful activities that were implemented in one of the improvement school project's she was part of. She highlighted four activities such as, "involves curriculum study, collaborative development of lessons and assessment tools, analysis of student achievement data, and the implementation and assessment of new teaching strategies" (p. 69).

Therefore, the focus of the study is to examine professional learning activities that occur within the cluster in the Harry Gwala District and to examine the extent to which these activities contribute to teacher learning of grade 12 life sciences teachers. The background of the study will be presented in the next section.

1.4 Background of the Study

Life science is the scientific study of living things from smallest molecular level to organ level and their interaction amongst them and their environment (DoE, 2011). Life sciences at school level help in understanding life at molecular, cellular and tissue level and life processes and diversity an also continuity. They also maintain that "life sciences to be accepted as a science, it is essential to apply certain techniques for broadening existing information, or discovering new things" (p. 8). Then the techniques have to provide themselves to replication and a methodical approach to scientific investigation. These techniques also include formulating hypothesis and carrying out investigations and experiments as objectively as possible to test these hypotheses. Repeated investigations are carried out and adapted. The methods and results are analysed, evaluated and debated before the community of scientists accepts them as valid. Knowledge production in science is an ongoing endeavour that usually happens gradually but, occasionally, knowledge and insights take a leap forward as new knowledge, scientific knowledge, or a new theory, replaces what was previously accepted. As scientific knowledge change overtime as scientists improve their knowledge and understanding and as people change their views of the world around them. Scientific investigations are mostly about things that are poorly understood or not understood at all. Scientists are frequently involved in debates and disagreements. As more people take on such investigations, they tend to reach consensus about the way in which the world works.

Learners develop through learning more about life sciences. Personally I chose to explore about life sciences teachers because of the above mentioned reasons and it is more scientific subject that involves practical investigations. Secondly, it is one of my teaching majors and I am still novice in teaching it therefore I wanted to gain more knowledge through the study.

Brodie and Borko (2016) contend that in many countries as well as South Africa teachers have been practicing teaching and learning in isolation as a tradition instead of collaborative learning. Similarly, Brodie and Borko (2016) argue that schools fail to provide the proper infrastructure for teacher support as a necessity to them to work collaboratively.

However, educational reforms and new professional development learning initiatives were established in order to improve the education system in South Africa. PLCs were brought into consideration as centres for learning by teachers. Traditionally teachers used to work in isolation and compete with each other through learners' performance at grade 12 level. This isolation affected novice teachers negatively because it became very difficult for them to consult experienced or expert teachers (Krueger, 2003).

According to Brodie and Borko (2016), PLCs have the potential to enhance teacher professionalism and learner performance. They further contend that PLCs are seen as fundamental social and collective learning centres. Teachers work together as a group to help each other through a variety of activities within PLCs (Brodie & Borko, 2016). In other words, PLCs aim to encourage teamwork and collaborative learning and not a form of learning where teachers work individually.

In addition, the Integrated Strategic Planning Framework for Teacher Education and Development in South Africa 2011-2025 (ISPFTED) (DBE & DHET, 2011, p. 23) is one of the current planned strategies with a set of recommendations for teacher development. Therefore, PLCs are part of the plan that functions at school level. According to Brodie and Borko (2016), PLCs support teacher knowledge through:

> [s]upport for a group of classroom teachers, school managers, and subject advisors to participate collectively in determining their own developmental trajectories and to set up activities that will drive their development (p. 2).

ISPTFTED outlines major activities that should take place in PLCs, such as development of understanding of:

> Curriculum Assessments and National Policy Statements; to learn how to interpret and use curriculum support materials; and to work together to learn from video recordings of practice and other learning materials (as cited in Brodie & Borko, 2016, p. 2).

Du Four et al. (2010, as cited in Brodie &Borko, 2016, p. v) describe the following principles and features of effective PLCs: teachers' collaboration and sharing of information and ideas; teacher involvement in professional and development growth; learning in social settings; provide

excellent continuous learning where teachers work in groups cyclically, and collective inquiry to improve learners' performance.

Therefore, the aim of this study is to explore professional learning activities that grade 12 Life Sciences teachers engage in, in a PLC in the Harry Gwala District and the extent to which these professional learning activities contribute to their learning.

1.5 Research questions

This research study is guided by the following two research questions:

1. What professional learning activities do grade 12 Life Sciences Teachers engage in, in a professional learning community?
2. To what extent is the PLC an effective for grade 12 Life Sciences teachers?

The objectives of the study are as follows:

1. To examine the professional learning activities that grade 12 Life Sciences teachers engage in, in a professional learning community.
2. To examine the extent to which the PLC is effective for grade 12 Life Sciences teachers.

1.6 Key concepts and conceptual framework

This section provides an overview of key concepts relevant to this research study. Key concepts such as professional learning communities, teacher learning communities of practice, collaborative learning and teacher learning are outlined. A detailed discussion of these concepts and conceptual framework is presented in Chapter Two.

Aubusson, Steele, Denham, and Brady (2007) describe a professional learning community (PLC) as a site where a group of professionals (teachers) within the profession meet and share their views to train one another to improve learners' performance in their schools. Correspondingly, Brodie and Borko (2016), argue that PLCs are the most important tools of professional development suitably aimed at shifting teachers' thoughts and attitudes about continuous curriculum change initiatives and learners. On the other hand, Yang (2009) contends that communities of practice usually serve as an effective platform for people to exchange knowledge and localize new information based on their personal needs and living environment.

Teacher learning is viewed differently by different researchers. Borko (2004) asserts that teacher learning can only be understood by searching it in different contexts and by taking into account the professional learning that teachers engage in at an individual level as learners themselves and more broadly, as part of a social system such as a learning community.

Fraser et al.(2007) view teacher learning as a holistic process of individual and collaborative processes that intend to develop the professional understanding, skills, attitudes and beliefs or actions of teachers. Opfer and Pedder (2011) argue that teacher learning is not just a simple process, and in order for teachers to learn in their practice there are other complexities to be considered. According to the authors, teacher learning involves three subsystems: the teacher, the school, and the learning activity.

1.7 Conceptual framework

This study is framed by Brodie (2013). The power of professional learning communities, which describe characteristics of successful PLCs are described by Brodie (2013). The six characteristics of a successful PLC will be used to analyse the findings of question number one; the professional learning activities grade 12 Life Sciences teachers engage in, in a professional learning community. This framework will also help the researcher to analyse the findings of question number two; the extent to which the PLC is an effective for grade 12 Life Sciences teachers.

This section summarized key concepts and the conceptual framework. A brief outline of the methodological approach will be discussed below.

1.8 Methodological approach

A qualitative approach was used in this study. Its focus is based on the way people view and comprehend the world and make sense out of their environments (Maree, 2007).My research study is located within the interpretive paradigm. Cohen, Manion and Morrison (2011) contend that a crucial endeavour of the interpretive paradigm is to understand the subjective world of different people.

This study adopts a case study research design. A case study is defined as a "systematic and in-depth study of one particular case in its context" (Rule & John, 2011, as cited in Bertram and Christiansen, 2014, p. 42). Bromley (1990, cited in Maree, 2007) defines case study as a methodical investigation into an occasion or set of related occasions which aims to define and explicate the phenomenon of curiosity.

Cohen et al. (2011) agree with Yin (2003) that case studies have numerous variables and therefore require many tools to collect data which results in empirical evidence. In this study I used more than one resource in collecting data, namely; interviews and observations.

In my study I used purposive sampling. It is a form of sampling where the researcher "makes specific choices about which people, groups or objects to include in the sample" (Bertram & Christiansen, 2014, p. 60). The sample size is frequently small and does not aim to generalize hence the targeted group does not represent the wider population but itself (Cohen, Manion & Morrison, 2011). Purposive sampling is suitable for my study because it is mostly used with the interpretive paradigm, (Bertram & Christiansen, 2014). In my study six grade 12 life sciences teachers were purposefully selected as participants.

1.9 Overview of the dissertation

The structure of thesis consists of five chapters. Chapter one provides an introduction to the study which outlines the focus and the purpose, background, as well as rationale of the research study. Chapter Two discusses a detailed literature review about the notion of professional learning communities and learning activities taking place in various professional learning communities. In conclusion, elaboration of the conceptual framework that helped the researcher to analyse the data collected and the findings is clarified. Chapter Three explains the methodological approach and design that was adopted by the researcher to answer the research questions. Chapter Four presents the data collection, the analyses and the findings of the research are discussed in detail. Lastly, Chapter Five outlines the findings of the researcher, research limitations, and recommendations and discusses suggestion for additional research.

1.10 Conclusion

This chapter introduced the study followed by a discussion of the focus, purpose and rationale. The background information, research questions and a brief outline of key concepts and the

conceptual framework that underpins the study were discussed. Additionally; it described the methodological approach, research design, data collection methods and sampling strategy. Chapter two presents the literature review and conceptual framework in detail.

Chapter Two

Literature review and conceptual framework

2.1 Introduction

The aim of this research study is to examine teacher learning of grade 12 Life Sciences teachers in a professional learning community located in Harry Gwala District. In chapter one the purpose, rationale and background of the study was outlined. In this chapter, literature relevant to the research study is reviewed. This chapter begins with an outline of professional learning communities (PLCs). This is followed by discussion of teacher learning and theories of teacher learning. To conclude, this chapter discusses the conceptual framework underpinning the study.

2.2 Professional learning communities

Dana and Yendol-Hoppey (2014) define a PLC as a collection of teachers who meet continuously and collaborate about a precise learning context by raising questions related to their local context and working together to come up with solutions. Vescio, Ross and Adams (2008), also assert that PLCs have the potential to equip teachers to participate in activities related to their work and provide learning in order to improve their ability to do work. Killion (2012) contends that successful professional learning immerses teachers in the content they teach and provides research-based knowledge about how students learn (Harris and Jones, 2010). Maintain that PLC model is a form of ensuring that there is the chance for professionals to gain knowledge of new tradition and to produce new understanding.

According to Brodie and Borko (2016), professional learning communities (PLCs) offer a chance for teachers' learning and thinking as a group in order to improve their teaching. Similarly, Darling-Hammond and Richardson (2009) contend that professional learning communities provide "ongoing opportunities for collegial work, teachers learn about, try out, and reflect on new practices in their specific context, sharing their individual knowledge and expertise" (p. 3).

PLCs concentrate on humanizing instructional teaching, and identifying challenges. At the same time, cluster participants have to make their implementation open to everyone in the cluster and take an investigative position (Darling-Hammond & Richardson, 2009). The authors suggest

that transformation happens while teachers acquire ways of describing, discussing and regulating their practices according to the norms and standard of education (Darling-Hammond & Richardson, 2009).

Stoll, Bolam, McMahon, Wallace and Thomas (2006) describe PLCs as a helpful system for continuous professional teacher development. They contend that the first term, professional denotes that the work of teachers requires specialist education and training for them to practice, is service-oriented and governed by a strong identity of professional commitment. The second term, learning puts an emphasis on progress. Therefore, professional learning is focused on improving teachers' knowledge and skills, which will enhance the quality of teaching as a result of learning that occurs in classroom. Then third term, community implies the useful collaboration and sharing of ideas amongst group of people. Graham (2007) refers to PLC as a representation model of an organizational approach which put emphases of individual (teacher) commitment in ensuring learning for learners and, to a duty of ensuring student learning, high levels of teamwork, and regular reflection on learners and school performance.

Brodie and Borko (2016, p. 141) argue that PLCs are "premised on the assumptions that provide social interaction that deepens professional learning". Similarly, DuFour (2004, cited in Brodie & Borko, 2016) asserts that PLCs generate space where co-operative meeting to resolve learning difficulties is ratified. In the same vein, Aubusson, Steele, Denham and Brady (2007) describe a PLC as a site where a group of professionals (teachers) meet and share their views to train one another for positive change and improvement of learners' performance in their schools. Similarly, Astuto et al. (1993, cited in Stoll, Bolam, McMahon, Wallace and Thomas, 2006) define a PLC as a site in which the educators in a school and its managers endlessly share learning, and act on their learning.

Stoll et al. (2006) assert that PLCs involve a group of teachers collaborating, sharing ideas, and reflecting on their teaching experiences in a progressive manner in order to learn from one another. In addition, Walton, Nel, Muller and Lebeloane (2014) attest that teachers gain ongoing and contextual support needed in their profession through professional learning communities.

Correspondingly, Brodie and Borko (2016) argue that PLCs are the most important tools of professional development suitably aimed at shifting teachers' thoughts and attitudes about

continuous curriculum change initiatives and learners. Vescio et al. (2008) further assert that PLCs have the potential to equip teachers to participate in activities related to their work and provide learning to improve their ability to do their work.

Brodie and Borko (2016) contend that PLCs provide a chance for teachers to learn and think as a group and to improve their teaching. (Brodie & Borko, 2016) also contends that PLCs are significant spaces for group of teachers to engage in professional learning which contributes to their growth and professional development. Similarly, Darling-Hammond and Richardson (2009, p. 3) highlight that PLCs provide "ongoing opportunities for collegial work, teachers learn about, try out, and reflect on new practices in their specific context, sharing their individual knowledge and expertise".

Moreover, Darling-Hammond and Richardson (2009) assert that PLCs aim to improve teacher knowledge and implement extra operative instructional teaching and learning within schools in the form of groups of colleagues. In addition, Darling-Hammond and Richardson (2009, p. 3) contend that schools need to form and support effective collaboration in learning communities at school to enhance teacher learning. Darling-Hammond and Richardson (2009) assert that PLCs, in partnership with districts provide useful programs to teachers and schools within the education system.

Servage (2008) contends that a PLC is one of the theories or models characterized by a series of core beliefs that staff professional development is critical to improved student learning; this professional development is most effective when it is collaborative and collegial; and the collaborative work should involve inquiry and problem solving in authentic contexts of daily teaching practices (p. 63).

Additionally, Darling-Hammond and Richardson (2009) argue that PLCs should concentrate on improving instructional teaching, and identifying challenges while at the same time, cluster participants (teachers within the PLC) should allow their presentation open to everyone in the cluster. Darling-Hammond and Richardson (2009) contend that transformation happens while

teachers acquire ways of describing, discussing and controlling their practices according to norms and standard of education.

2.3 Characteristics of effective PLCs

Stoll et al. (2006) argues that a successful PLC has the power to advance and prolong the learning for all people involved in the learning community with the shared intention of improving their learners learning.

In addition, Darling-Hammond et al. (2009) provide four strategies that could be considered the basic principles for effective professional learning communities. Darling-Hammond et al. (2009) claim that effective PLC addresses four strategies: "It should be intensive, ongoing, and connected to practice; it should focus on student learning and address the teaching of specific curriculum content; it should align with the school improvement priorities and goals, it should build strong working relationships among teachers". (p. 9-11)

In contrast, Lave and Wenger (1991 cited in Brodie & Borko, 2016) describe PLCs as a distinct kind of community of practice.

2.4 PLCs as community of practice

Wenger (2001 cited in Gray, 2004, p. 3) defines community of practice as "a group of people who share an interest in a domain of human endeavour and engage in a process of collective learning that creates bonds between them". Yang (2009) argues that communities of practice differ depending on its aim, how it works, and what skills it has empowered. She further asserts that an effective community of practice considers the input of each teammate within the community.

Furthermore, a community of practice tends to motivate all participants to take accountability for sharing information and solving problems in developing their personalities in the community, and to foster unification amongst members of the community. According to Leo (1990 cited in Yang, 2009) communities of practice might serve as alternate means for teachers to reflect on their practice. Similarly, Zeichner and Liston (1996 cited in Yang, 2009), highlight that communities of practice help teachers to, "examine and try to solve teaching challenges,

understand their teaching belief and objectives, take charge for their professional development through repetitive involvement in the community" (p. 12).

Therefore, there is a link between a community of practice and PLC in that teachers meet and share their understanding. Their regular meetings help them and improve leaning and teaching and also improve learner performance in their schools. Liu, Carr and Strobel (2009) asserts that group of people is referred to as community once there is an interaction with each other, working together as a team in order to assist each other and achieve common goal.

2.5 Teacher learning

Teacher learning is defined in many ways by different scholars. According to Kelly (2006), teacher learning is a continuous process whereby teachers shift from novice to expert. On the other hand, Van Eekelen, Boshuizen and Vermunt (2005, p. 448) contend that teacher learning refers to any practice in which information, abilities and new approaches related to the job are attained and documented by the teachers involved. Dunn (2002 p. 1) describes teacher learning as "a comparatively everlasting transformation in both visible activity and inner processes such as thinking, attitudes and emotions". Moreover, Burns suggests that teacher learning might not be evident in noticeable behaviour until after the informative program occurs.

In addition, Davis and Krajcik (2005) assert that teacher learning involves learning about:

> [c]ontent, teaching, and learning; becoming able to apply that knowledge in real time to make instructional decisions; participating in the discourse of teaching; and becoming enculturated into a range of teacher practices (p. 3).

However, teacher professional learning is viewed as a process that encourages changes "in the professional knowledge, skills, attitudes, beliefs, or action of teachers" (Fraser, Kennedy, Reid and McKinney, 2007, as cited in Bertram, 2011, p. 12).

Teacher learning is situated in teachers' practice including classroom instruction, planning, lesson modification, assessment, collaboration with colleagues, and communication with parents. The knowledge acquired and how a teacher thinks and expresses ideas are the products of the interactions of groups of participation over a continuous period through teacher learning.

Laal and Ghodsi (2012) contend that collaborative learning is a learning strategy that involves teachers working in groups to come up with solutions towards teaching and learning problems, and to complete their work. In addition, they assert that in collaborative learning teachers are working together towards the same goal.

In the same way, Jita and Mokhele (2014) define collaborative learning as a process where teachers share and exchange experiences to improve teaching and learning. Wenger (1998, as cited in Jita &Mokhele, 2014) suggest that collaborative learning occurs between teachers and schools in many ways such as clusters which are referred to as a teacher learning community.

Furthermore, Brodie and Borko (2016) describe collaboration as a professional, jointly constructive meeting between a single teacher and a group of teachers participating in learning. Teachers they come from different schools to meet and share material, information and challenges of teaching and learning. Their aim is to develop each other and improve learners' performance. Jita and Mokhele (2014) contend that collaboration between teachers and schools occurs in many forms. It can be in a form of online networking, clusters, and community of practice that encourages them to learn. During collaboration teachers in the PLC work together in different ways to improve teaching strategies, practice and improve learner performance.

Jita and Mokhele (2014) further assert that collaboration of teachers is a significant component of effective teacher-gathering inventiveness. They also indicate that in South Africa, teachers learn through clusters to improve both content knowledge and pedagogical content knowledge.

Muijs (2008, as cited in Jita & Mokhele, 2014) assert that teachers experience less pressure and struggle less in fulfilling curriculum reform initiatives in joint gatherings such as PLCs. Moreover, teachers working in schools from underprivileged societies gain a lot by sharing resources and leadership with teachers from privileged school communities (Muijs, 2008; Willstatter et al., 2003, as cited in Jita & Mokhele, 2014). However, Muijs (2008, as cited in Jita & Mokhele, 2014, p. 4) contends that:

> [c]lustering of teachers, as a type of formal school collaboration, can and should be considered as a possible intervention strategy to improve schooling in South Africa because it will enhance teacher professional development (p.4).

In summary, teacher collaboration involves meeting collaboratively for curriculum planning and professional development, sharing what works in their classes, discussing and reflecting on their lessons, analysing learner performance information, instruction and supporting individual teachers, and peer observations. In the next paragraph I will describe different types of teacher learning.

2.6 Types of teacher learning

Darling-Hammond and Richardson (2009) argue that teachers learn in different ways to improve their practice and learners' performance. According to Scribner (1999), teacher learning occurs through peer observation of practice, collaboration, individual inquiry, experiential learning, conferences/workshops, school-based in-service training, and graduate courses. Kyndt, Gijbels, Grosmans and Dench (2016) distinguish between formal and informal teacher learning.

They define formal learning as a planned learning process that is essential to be completed within a particular time and with well-planned aims and objectives to succeed. On the other hand, informal learning refers to less of or no procedure and form of learning activities, time of accomplishment, objectives and support towards learning activities. In addition, Wilson and Demetriou (2007) contend that informal learning occurs in a social situation where each teacher interacts with his or her colleagues. Kyndt, Govaerts, Verbeek and Dochy (2013) suggest that informal learning can either take place in a collaborative way or in isolation without control or monitoring by stakeholders from the Department of Education.

In the same way, Van Eekelen, Boshuizen and Vermont (2005) contend that in most cases, informal learning occurs through interaction amongst teachers as colleagues such as asking opinions or for explanations, chatting and teacher observation of other teachers' lessons. Gordon (2008, p. 324) asserts that "knowledge is attained when people come together to exchange ideas, articulate their problems from their own perspectives, and construct meanings that make sense to them".

In addition, Gordon (2008) further states that formal learning takes place through planned gatherings with other colleagues or sometimes with departmental officials such as subject

experts. It could be in the form of workshops, training and conferences with the aim of developing teachers.

(Darling-Hammond and Richardson (2009) contend that teachers in professional communities frequently make regular visits to one another's classrooms and offer advice and support when it is required. He further indicates that teachers can also video-record their teaching so that others can use those videos and learn different strategies of teaching from them.

2.7 Theories of teacher learning

According to Kelly (2006), the cognitive theory or approach of teacher learning describes acquiring knowledge in one setting, and the acquired knowledge is transferred by teachers to their respective classrooms. In the same way, Sfard (1998, p. 5) points out that the cognitive learning theorists understand learning as an "acquisition of knowledge that is accumulated, refined, and combined to form richer cognitive structure". The cognitive approach focuses on the brain and how knowledge is acquired by a person.

In addition, Kelly (2006) states that the cognitive approach do not focus on societal issues and resources available for learning. Kelly (2006) argues that an extensive shared context in which teachers work, including their identities as teachers, is disregarded by cognitive theorists. Furthermore, the cognitive theory of learning is defined as a process in which skills, information, and understanding is acquired by a person in an organised form of learning and a person is aware of what is intended to be learnt by him/ her and at the end of the learning he/she will be able to apply it to a different place (Kelly, 2006).

I believe that as per the above explanation, the cognitive theory is mostly associated with formal learning, whereby one person is taught by another such as teachers, lecturers in an institution or experts with the knowledge or skills required by teachers in their profession, especially novice teachers in training. There is always a purpose for learning to occur and teachers who are involved in learning activities are aware of their expected duties. Everyone, especially those who learn are willing to acquire skills. Context and collaboration is not included in the cognitive theory (Kelly, 2006).

On the other hand, Lantolf, Thorne and Poehner (2015) define the socio-cultural theory as a method of learning that occurs during involvement in educational, linguistic and a traditionally

apprehensive situation such as family or peer group interaction, and institutional contexts like schooling, organised social activities and workplaces. In this regard, everyday life experiences in school play a vital role in enhancing teacher understanding. In this theory, the situated context in which 'phenomenon' take place is highly significant according to sociologists (Lantolf et al., 2015).

Furthermore, the socio-cultural perspective is seen as a theory that focuses more on understanding the way both cultural and historical meaning is formed, reformed, and transformed through societal interventions (Charles et al., 2008). Putnam and Borko (2000) contend that the socio-cultural perspective describes activities that help teachers to learn more in their profession (knowledge in practice).

Researchers also view the situative perspective as one of the factors that leads to teacher learning. Borko (2004) argues that "Situative theorists conceptualize learning as changes in participation in socially organised activities, and individuals' use of knowledge as an aspect of their participation in social practices" (p. 4). In the same way, Putnam and Borko (2000) believe that the situative perspective on cognition is considered to be one of the learning approaches that help teachers to develop an understanding of their profession. They further contend that "knowing and learning are situated in physical and social contexts, social in nature, and distributed across persons and tool" (Putnam & Borko, 2000, p.12). Interaction between people determines what is learnt and how learning occurs.

Correspondingly, Kennedy (2005) in his models of 'continuing professional learning' says communities of practice play a vital role in teacher learning. It is said that a teacher who interacts with community members gains more knowledge from them. In addition, a person who has a limited understanding and collaborates with other people in the work place will improve their understanding and learn new information by sharing with colleagues (Kennedy, 2005).

Renick (as cited in Putnam & Borko, 2000) refers to social learning in teacher learning as a powerful tool that improves teachers' knowledge in many ways. Firstly, they highlight that teachers do not just learn to learn but are also motivated and enjoy their work. Similarly, Borko (2004, cited in Bertram, 2011) states that learning is situational, meaning it involves 'context, whereby a person gains knowledge through participation with others in their field of work.

Moreover, Putnam and Borko (2000) refer to learning that is situated in the work place from the socio-cultural perspective.

Furthermore, Kennedy (2005) refers to teacher learning theories as both socio-cultural and cognitive perspectives. Kennedy (2005) identifies nine models of continuous professional learning. Firstly, he identifies action research which is informed by the socio-cultural perspective as a model of continuous professional development for transformative practice and improves teachers understanding of his/her job.

According to Kennedy (2005) teachers learn through participation in doing research in their working site. In this model teachers learn more about their work because they work in collaboration with society, universities, and sometimes with other stakeholders such as department officials who are experts in the profession. In most cases teachers are researching their own practice, to improve themselves in classrooms or schools.

In addition to the socio-cultural perspective, Kennedy (2005) indicates that the cascading model also leads to teacher learning from the cognitive theory, since one teacher acquires knowledge and shares it with others. In the cascading model, teachers who have a better understanding transfer knowledge and skills acquired in one setting, so that they can do better in their job even if there are challenges such as a lack of resources. Kennedy (2005) highlights that cascading is normally used as a form of training in areas where there is a shortage of resources to provide teachers with the skills and knowledge required in the field. Lastly, some researchers report that 'a group of teachers' shares understanding with their colleagues through collaboration and participation (Kennedy, 2005). Nieto (2003 as cited in Kennedy, 2005, p. 240) maintains that cascading can be "skill-focused, sometimes knowledge-focused, but rarely focus on values".

2.8 Conceptual framework

The data analysis system of the study is guided by Brodie's (2013) professional learning communities, which describes six successful characteristics of PLCs. The focus was on the teacher learning activities within the PLC. Brodie (2013) further outlines examples of activities completed in PLC meetings which provide a challenging space for teacher professional learning and development. Their activities helped them to understand learners every day

misunderstandings/errors in mathematics and discover their strengths and weaknesses in teaching mathematics through interactions with each other. PLCs focus on specific problems in each meeting so at the end, teachers also understand the content and how to teach it. Therefore, Brodie's framework on teacher learning in PLCs will assist me to analyse research question one: What professional learning activities do grade 12 Life Sciences teachers engage in, in a professional learning community (PLC)?

Brodie (2013) also identified the following characteristics of effective PLCs:

- They are long term and developmental,
- They focus on artefacts of practice such as student thinking, tasks and instructional practices,
- They use actual classroom data,
- They encourage design and reflection on the part of teachers,
- They are job-embedded (school-based) and therefore blur the boundaries between teaching and learning about teaching, and
- They promote the development of professional learning communities (p. 5)

Correspondingly, Little (1993, cited in Brodie, 2013) also believes that:

> [t]he effectiveness of such professional development programmes is believed to lie in supporting teacher collaboration in order to produce shared understanding, a focus on curriculum and instruction, and being of sufficient duration to ensure progressive gains in knowledge (p. 5).

Therefore, the above characteristics of PLCs will enable me to analyse research question two: To what extent does this PLC serve as an effective PLC of grade 12 Life Sciences teacher learning?

This conceptual framework was used to interpret and make sense of the data.

2.9 Conclusion

This chapter outlined the literature relevant to the research study. Key concepts such as professional learning communities, community of practice and characteristics of effective PLCs were discussed. Next, teacher learning, collaborative learning and theories of teacher learning

were explained. To conclude, the conceptual framework that was adopted in this study to analyse data was discussed.

Chapter 3

Research design and methodology

3.1 Introduction

In Chapter Two, the literature review and conceptual framework aligned with teacher learning and PLCs was presented. The purpose of this study is to examine teacher learning of grade 12 Life Sciences teachers in a professional learning community located in the Harry Gwala District. This chapter explains the research design and methodology employed in the study. The chapter begins with a discussion of the interpretive paradigm and the qualitative research approach. This is followed by a discussion of case study research design. Next, the research setting, purposive sampling procedure, data collection instruments and data analysis procedure are outlined. This chapter concludes with a discussion of trustworthiness and any ethical issues of the study. This research study is guided by the following research questions:

1. What professional learning activities do grade 12 Life Sciences teachers engage in, in a professional learning community (PLC)?
2. To what extent does this PLC serve as an effective PLC of grade 12 Life Sciences teacher learning?

3.2 Interpretive research paradigm

Mertens (as cited in Mackenzie & Knipe, 2006, p. 2) defines a paradigm as a review whereby information is "collected, analysed and interpreted in some way in an effort to understand, describe, predict or control an educational or psychological phenomenon or to empower individuals in such a contexts". Cohen, Manion and Morrison (2011) maintain that the interpretive paradigm permits the researcher to comprehend the subjective world of the individual. Cohen et al. (2011) also contend that an interpretive research paradigm aim is to understand how participants see and understand the real world. On the other hand, Medina and Taylor (2013, p.3) maintained that the interpretive paradigm had been used by researchers, "in order to understand other cultures from the inside, to learn to stand in their shoes, look through their eyes and feel their pleasure or pain".

According to Scotland (2012), a research paradigm is explained in terms of its ontology and epistemology. Ontology is defined as the study of nature (Crotty, 1998, cited in Scotland, 2012). Researchers have to take a position regarding their perceptions of "how things really are and how things really work" (Scotland, 2012, p. 9). In contrast, "an epistemology is concerned with the nature and forms of knowledge" (Cohen et al., 2007, cited in Scotland, 2012, p. 9). "Epistemological assumptions are concerned with how knowledge can be created, acquired and communicated", (Scotland, 2012, p. 9).Mackenzie and Knipe (2006) assert that selecting a suitable paradigm for the study is challenging to a novice researcher because there are several academic paradigms to choose from: post-positivist, constructivist, interpretive, critical and pragmatist paradigms.

This research study is located within the interpretive paradigm. Cohen, Manion and Morrison (2011) contend that the main aim of the interpretive paradigm is to understand the subjective world of different people. Thus, in this study, knowledge about teacher learning in PLCs was constructed from teachers' points of view as they were participants in this study. Likewise, McKenzie and Knipe (2006) argue that interpretivists make sense of people's understandings and their reality thus is contingent on participants' views about their context in order to know the study setting. They further argue that interpretivists aim to understand people's feelings and their context.

The aim of this study was to understand teacher learning and professional learning activities that grade 12 Life Sciences teachers engage in, in a professional learning community and the extent to which the PLC is effective for teacher learning. Therefore, I consider the interpretive paradigm as a suitable paradigm for this study. According to Creswell (2003), the interpretive perspective views knowledge as subjective or inter-subjective and hence, it depends on participants' views about the place, object or phenomenon that is being studied. Correspondingly, Maree (2007) contends that interpretivists make meaning of the phenomenon through the participants' judgments of their societal context. Bertram and Christiansen (2014) agree with Cohen, Manion and Morrison (2000), Creswell, (2003) and Maree (2007) that an interpretive approach defines and interprets people's experiences in one setting.

Cohen, Manion and Morrison (2011) affirm that the notion of ontology in the interpretive paradigm is manifold; epistemology is socially constructed. Therefore, the interpretive paradigm is premised on the ontological belief that individuals make sense and meaning of their worlds (Neuman, 2000) and follow-on various realities in diverse societal and cultural contexts. Therefore, as a researcher, I believe that the interpretive paradigm is most suitable to make sense of and analyse in-depth and descriptive data collected from this study.

3.3 Qualitative research approach

A qualitative research approach was used in this study which helped to generate descriptive data to examine the types of professional learning activities that occur in the PLC as well as the extent to which this PLC is an effective PLC. Qualitative research makes use of naturalistic methods that search for understanding the observable fact of interest (Patton, as cited in Golafshani, 2003). Maree (2007) describes a qualitative approach as:

> [r]esearch that attempts to collect rich descriptive data in respect of a particular phenomenon or context with the intention of developing an understanding of what is being observed or studied (p. 50).

He further argues that its focus is based on the way people view and comprehend the world and make sense of their familiarities. In the same way, Medina and Taylor (2010) assert that a qualitative research approach entails gathering a variety of information in relation to human experience and feelings and interprets it according to a diverse individual's point of view.

In the same way, Luttrell (2010) elaborates that the emphasis of qualitative research is on participants interpreting their own lived experiences and understanding their context and practice. In addition, Bertram and Christiansen (2014) contend that the qualitative approach can be connected with the interpretive perspective because its idea is that peoples' behaviour is dependent on the context within which they live. According to Patton (as cited in Golafshani, 2003) in a qualitative study, the researchers acknowledge their involvement in the study. He further asserts that since the real world is subject to change, the researcher must be there during the research process to identify and record any changes before and after it happens.

Similarly, Denzin and Lincoln (2000, cited in Ponterotto, 2005) assert that a qualitative approach refers to a wide range of processes planned to describe and understand the experiences of research participants in a context-specific situation. In addition, Taylor and Bogdan (1998, cited in Ponterotto, 2005) attest that qualitative research outcomes are normally expressed in everyday language and frequently include participants' opinions of a psychological experience.

Maree (2007) contends that qualitative research promotes understanding of the procedures, social and ethnic environments and behaviours, and also facilitates exploring the "why" questions of research. Above all, Holloway & Wheeler (1996, as cited in Maree, 2007) maintain that qualitative researchers usually learn about people or organisations through interacting and observing participants in their context and further focus on their denotations and explanations. Correspondingly, Yin (2011) maintains that a qualitative approach helps the researcher to understand the phenomenon in its real world setting where the partakers are studied to perceive the way they survive and flourish in their own environment.

Therefore, Maree (2007) contends that the qualitative researchers put more emphasis on the quality and depth of the data collected rather than on quantifiable data in quantitative research. Additionally, Polkinghorne (2005) posits that the qualitative approach focuses on unfolding and expounding human understandings. Furthermore, Ponterotto (2005) suggests that the qualitative approach is an empirical research method that involves the collection, analysis and interpretation of data. Moreover, Dudwick, Kuehnast, Jones and Woolcock (2006, cited in Choy, 2014) contend that the qualitative approach refers to a variety of information gathering and analysis procedures that use purposive sampling and semi-structured, open-ended interviews. In addition, qualitative researchers start with an assessment of oneself and reflections about himself/ herself located in the situation and acknowledge the social nature of their position.

3.4 The strengths of a qualitative research approach

Yauch and Steudel (2003, cited in Choy, 2014) assert that a qualitative approach to a social survey has the potential to search for essential standards, opinions, and assumptions. Choy (2014) highlights that in a qualitative approach; the investigation is subjective and open-ended, permitting the participants to raise matters that trouble them. Correspondingly, Maxwell (2013) attests that a researcher is able to gain first- handed information about experiences of participants through broad and direct open ended questions. That means in qualitative research, the

researcher usually does not have a fixed, limited set of questions to study (Yauch & Steudel, 2003, cited in Choy, 2014).

On the other hand, Maxwell (2013) maintains that researchers' internal motivation and personal interest stimulates the research study. He further asserts that motivation and strong interest in a particular study helps a researcher in completing the research study.

Another strength indicated by Creswell (2014) is the way in which data is collected. "Revisions can be made along the way as new experiences emerge giving the researcher the ability to construct themes and patterns that can be reviewed by participants" (Miles, Huberman &Saldana, 2014, p. 9). Human reasoning is the greatest strength.

3.5 The weaknesses of a qualitative research approach

Choy (2014) contends that a qualitative approach has the following weaknesses: Firstly, qualitative research is time-consuming, and a specific, significant issue might be overlooked. Secondly, researchers' clarifications are one-sided, for this reason focuses on: individual understanding and information impact the observations and decisions. In addition, (Yauch & Steudel, 2003, cited in Choy, 2014) maintains that since the qualitative approach is normally open-ended, the participant has more control over the content of the collected data. Furthermore, Choy (2014) asserts that it results in data which is subjective. Therefore it requires a thorough examination procedure such as classification, recoding, analysing and so forth. Lastly, it needs expert researchers to effectively bring all the available main facts about the case to be investigated (ACAPS, 2012, cited in Choy, 2014). Consequently, in this study, I selected a small sample of six teachers in order to obtain in-depth information through semi structured interviews and observations of grade 12 Life Sciences teachers meeting in a PLC.

3.6 Case study research design

A case study is defined in various ways by different scholars. Rule and John (2011) affirm that there are numerous definitions of a case study. Firstly, Bertram and Christiansen (2014) define a case study as a methodical and in-depth learning of one particular case in its context. Correspondingly, Bromley (1990, cited in Maree, 2007) defines a case study as a methodical

investigation into an occasion or set of related occasions which aims to define and explicate the phenomenon of curiosity. Baxter and Jack (2008) assert that a case study helps to explore a phenomenon by means of range of data collection methods in its own context. Baxter and Jack (2008) further assert that a case study is an in-depth research study of single or multiple cases. It might be one individual or a cluster of people, like a group of teachers.

Taylor (2010) describes a case study as a holistic and in-depth exploration of a case in its setting. Likewise, Yin (1994) argues that a case study is an observed research approach that examines an event in its context chiefly, when the restrictions are unclear amongst the experience and situation. In short, qualitative evidence is presented as text/written description. Baxter and Jack (2008) further argue that the use of different methods of data collection allow researchers to perceive many qualities of a phenomenon for a better understanding. Thus, in this study, I observed the professional learning activities of teachers in the PLC and conducted semi-structured interviews with each of them.

Cohen et al. (2011) argue that there are a few types of case studies such as explanatory, exploratory and descriptive case studies. According to Baxter and Jack (2008) According to Baxter and Jack (2008) an explanatory case study is a type case study used by a researcher who wants to answer a question that required clarification of the presumed contributory relations in real-life interventions that are too complex for the survey or experimental strategies.

On the other hand, Yin (cited in Baxter & Jack, 2008, p. 548) defines a descriptive case study as a case study that is used to "describe an intervention or phenomenon and the real-life context in which it occurred".

Baxter and Jack (2008, p. 548) argues that an exploratory case study is used to "explore those situations in which the intervention being evaluated has no clear, single set of outcomes".

Hence, in this study I adopted an exploratory case study research design. In this research study I observed activities that occurred within the PLC in order to examine the types of teacher learning in the PLC. An exploratory case study is most suited for this study because it helped in observing

teacher learning of teachers in their professional learning community. Below is the description of the research setting.

3.7 Research setting

This study was conducted in the province of KwaZulu-Natal within the Harry Gwala District in a cluster of schools around Kokstad and Umzimkhulu area. This cluster consists of six teachers; three teachers are from schools in urban areas while the other three teachers are from schools in rural areas.

In this cluster, most of the schools were under resourced as a result of the inequities of the previous apartheid government system. The selected schools for the study were not the same in terms of resources. Two of them were well-resourced with two schools that were semi-resourced and the last two were under-resourced schools. Two of the schools have well-resourced life science laboratories with all required resources for life sciences practical experiments and examinations. The remaining four schools have under-resourced life science laboratories which did not have enough materials for practical activities. The school population is composed of learners from different socio-economic backgrounds. The majority of the learners are from poor family backgrounds and some are orphans living in an orphanage. Some learners are living in informal settlements exposed to many social challenges such as drug abuse, diseases and child-headed households. Learners receive meals as part of the feeding scheme from the provincial education department while some receive food parcels from social departments.

The reason for selecting this cluster for my study is because it was convenient as I live and work in the area and it is convenient for me to reach all the participants. Secondly, Life Science is offered from grade 12 for more than five years in the selected schools. In addition, selected teachers have been teaching Life Sciences and participated in the PLC for two years and more. The next paragraph explains the purposive sampling strategy.

3.8 Purposive sampling

I adopted a purposive sampling strategy for this study so I could select six grade 12 Life Sciences teachers. Purposive sampling is described as a form of sampling where the researcher "makes specific choices about which people, groups or objects to include in the sample" (Bertram & Christianson, 2014, p. 60). Similarly, Cohen, Manion and Morrison (2011) contend

that purposive sampling refers to purposeful selection of a group of people that will be involved in the study. The sample size is frequently small which does not aim to generalise hence; the targeted group does not represent the wider population but itself.

Purposive sampling is suitable for this study because it has allowed me to purposefully select six grade 12 Life Sciences teachers. The following criteria were used to select the six grade 12 life sciences teachers: they had to be qualified Life Sciences teachers, from the same district, have been teaching grade 12 life sciences for more three years and have participated in clusters activities. The instruments and procedures used for collecting data are described in the next section.

3.9 Data collection methods

In this study I adopted semi-structured interviews and observations to collect data.

3.9.1 Semi-structured interviews

Interviews are mostly used in qualitative research in a small scale study. An interview is defined as a one-on-one conservation between an interviewer and an interviewee (Bertram & Christiansen, 2014; Maree, 2007). Therefore, interviews help the researcher to obtain participants' knowledge, ideas and how they see the real-world. Similarly, Lauer (2006) defines an interview as a tool to conduct a survey through a verbal conversation between two or more people. Interviews are mostly used by researchers to collect qualitative information. Leedy and Ormrod (2010) assert that semi-structured interviews consist of predetermined research questions.

Kang, Orgill and Crippen (2008) assert that interviews are the key if the researcher is to discover what and how teachers learn. Denzin and Lincoln (2008) agree that interviews are a powerful instrument used to understand humankind. This method will help me to understand the way grade 12 Life Sciences teachers learn in their cluster meetings. DiCicco-Bloom and Crabtree (2006) outline the different types of qualitative research interviews which include structured, semi-structured and unstructured interviews.

I employed semi-structured interviews (Refer to Appendix 4). Patton (as cited in Cohen et al., 2011) refers to semi-structured interviews as a type of interview where the stated subject is known by both the interviewer and the interviewee, and interview questions are organised in

advance however, the classification of questions are done during the interview. Moreover, semi-structured interviews are frequently used when the scholar aims to inquire intensely into a topic and to systematically understand the responses provided during the process. The semi-structured interview frequently asks open - ended questions and probes the answers which provide in-depth data. Additionally, Smith (2015) argue that semi- structured interviews help researcher to engage in a dialogue with participant and also help in probing when interesting information rise from the response of the participant. Thus this method helped me in probing or asking for clarity when necessary. The next section describes observation as a method of data collection.

3.9.2 Observations

Observation is one of the qualitative data collection methods that are adopted in this study. Maree (2007, p. 83) describes observation as a "systematic process of recording the behavioural patterns of participant, objects and occurrences without necessarily questioning or communicating with them". Maree (2007) further contends that observation allows the researcher to acquire an in-depth understanding of the phenomenon being observed.

Correspondingly, Polkinghorne (2005) affirms that observation helps the researcher to collect data directly from the participant, and also enables the researcher to observe the participant's actions, facial expressions, body language and other non-verbal motions. This method will help in verifying data collected through semi-structured interviews. Therefore, as a researcher I observed learning activities during clusters meetings and how grade 12 life sciences teachers engaged in these cluster activities. I observed three cluster meetings using a pre-designed observation schedule (Refer to Appendix 5).

3.10 Data analysis

Data analysis and transcribing is seen as a vital part of any research study because it allows the researcher to make meaning of collected information (Hill, 2012). Similarly, Cohen et al., (2011) posit that data analysis entails making good judgment of collected information from the research participants' view point. According to Cohen et al. (2011):

> [d]ata analysis involves organizing, accounting for and explaining the data; in short, making sense of data in terms of the participants' definitions of the situation, noting patterns, themes, categories and regularities(p. 461).

Analysis refers to the systematic process of "separation of a whole into its parts, for the purpose of a study" (Bertram & Christiansen, 2014, p. 115).Rowley(2002)further asserts that data analysis of supplied information is supported by probing, sorting and put into a table the data to interpret.

The data collected through semi-structured interviews and observations were analysed using thematic analysis. According to Braun and Clarke, (2013 cited in Ngulube, 2015, p. 9) thematic analysis is a technique "for identifying themes and patterns of meaning across a dataset in relation to a research question". Thematic analysis was employed for coding data and categorizing it into themes. Firstly, I transcribed data from the semi-structured interviews and PLC meeting observations and coded it. I coded data from semi-structured interviews and observation using colour coding. Rossman and Rallis (2012) define coding "as a process of organising the data by bracketing chunks (or text or image segments) and writing a word representing a category in the margins". In the same vein, according to (Creswell, 2014; Merriam, 2009) coding may be defined as the method of organising unprocessed data into sections of transcription before finding meaning in the data. Collected information ought to be structured in one way or another (Bertram & Christiansen, 2014). I proceeded by classifying the data collected from participants into categories. Data was grouped into categories according to their similarities and differences. In addition, data was read and re read by the researcher to gain a sense of it's the general meaning and also to reflect on its overall meaning. I further identified key ideas and trends from data given by the participants. I grouped similar/ common ideas that emerged several times from the data and grouped them into categories. All ideas were grouped together according to categories in order to find their in-depth meaning. Themes emerged from the categories which helped in summarising key issues according to the research questions.

3.11 Trustworthiness

Guba and Lincoln (1994) suggest the concept of trustworthiness is essential in research study. They argue that for trustworthiness to be sustained there should be lengthy meetings with the participants, repeated observation of emerging themes, and enough triangulation of raw data and the results. In addition, Bertram and Christiansen (2014) posit that trustworthiness is mostly used in interpretive research. Furthermore, Bertram and Christiansen (2014) contend that

trustworthiness is requirement to be measured effectively for all qualitative research studies. There are principles that need to be followed such as credibility, transferability, dependability and confirmability to ensure trustworthiness. Therefore, in this study, I considered the significance of credibility, transferability, confirmability and dependability to ensure trustworthiness of the study.

Bertram and Christiansen (2014) contend that credibility refers to the extent to which the findings reflect the correct reality or participants experiences. According to Gaborone (2006), credibility refers to data that is without fault and misrepresentations. To ensure credibility in this study, semi-structured interviews were conducted to obtain in-depth information and further observations allowed me to collect accurate data. Since, I employed two methods of data collection, namely, semi-structured interviews and observations; this enabled me to collect in-depth data.

Alternatively, Gaborone (2006) describes the authenticity of the information gathered and suggests that it is researchers' responsibility to make sure that information collected is authentic. In addition, Bertram and Christiansen, (2014) contend that to enhance credibility some mechanical means to record data should be considered such as to record information rather than writing down notes to be able to transcribe accurately . For this reason, I used an audio-recording device to capture the actual responses of the participants. Participants also received the transcribed interview to verify whether documented information was correct and accurately reflected their responses during semi-structured interviews.

According to Bertram and Christiansen (2014), transferability refers to the degree to which the study can be reassigned to another context. In a qualitative research study, the findings cannot be generalised to other contexts. Accurate information requires generalisation in order to maintain the study occurrences (Petty, Oliver, Thomson, Graham, 2012). In this study transferability was addressed through use of semi- structured interviews and meeting observation schedules as instruments for gathering information, data analysis so that in future other researchers can use the findings of the study in contexts that are similar to this study.

Bertram and Christiansen (2014, p. 193) assert that dependability refers to the process whereby the researcher reports the similarities and differences of the study with previous studies. Shenton (2004) suggests that in order to deal with reliability, it is assumed that the researcher needs to reiterate the work of a project using the same apparatus and approaches to obtain similar findings. Muza (2017, p. 48) asserts that data collected from the study should be seriously viewed continuously in order to find the degree of its validity.

Guba and Lincoln (1994) suggest that confirmability is the extent of a neutral stance or the way in which the results are produced by the participants where the researcher's interests do not influence the outcome. This can also be achieved by ensuring that the research process is transparent to the reader through provision of all employed research details (Bertram & Christiansen, 2014). Shenton (2004) contends that triangulation helps to ensure that there is nothing comes as the preference of the researcher and that researcher is not bias. To avoid biasness, I used semi-structured interviews and also used observation. Therefore, the researcher only depends on objective data to analyse the findings without adding subjective opinions. Moreover, interpreted data was verified by participants. Lastly, triangulation is seen as the powerful aspect to strengthen trustworthiness in qualitative research Triangulation refers to the collection of information using various forms of collecting data (Bertram & Christiansen, 2014). In addition, Kruger (2003) concurs with the above statement to say triangulation method such as use of interview conducted with participants (teachers) and observations of their actions in their school, document analysis and a literature control were the instruments utilised in the study to address trustworthiness. To achieve this, six grade 12 teachers were interviewed for the study and also PLC meetings were observed by the researcher.

3.12 Ethical issues

According to Naidoo and Kopung (2016) a researcher should consider ethical issues such as the rules and regulations in doing research. In the same way, Creswell (2012) asserts that researchers should be conscious of ethical issues in their research. In my study, I firstly requested permission to conduct research in schools from the Department of Education in KwaZulu-Natal and permission was granted to start my research (Refer to Appendix 7). Secondly, I applied for ethical approval from the University of KwaZulu-Natal Research Ethics Committee. I received

the ethical clearance from the University of KwaZulu-Natal(Refer to Appendix 6).I further informed my participants about the purpose of the research study, the data collection instruments and duration and requested them to participate in my study voluntarily via an informed consent letter. I explained to them that participants' information was to be strictly confidential. Brynard, Hanekom and Brynard (2014)contend that every researcher should consider ethical issues in every study such as confidentiality of the results and outcomes of the research. In addition, Maree (2007, p.42) asserts that researchers need to consider the "protection of participants' identity" and the ethical policy of the institution where the research takes place needs to be understood by the researcher. Moreover, Bertram and Christiansen (2014) maintain that it is vital for researchers to ensure that they consider ethics, especially when research involves people.

In the same vein, Maree (2010) contends that before a research study begins and people engage in any form, the consent and ethical clearance must be signed. The researcher must follow/consider all ethical rules to be followed throughout the research process. For the purpose of my study I also requested permission to observe cluster meetings from the school principal where teachers meet and life sciences subject advisor as a facilitator and responsible person for organising meetings. The school principal and subject advisor signed consent forms.

Participants were also informed that their participation was voluntary and that they could withdraw from the study at any time. To protect the identity of the participants their names and names of their schools were changed. Pseudonyms were used to ensure anonymity. The interviews were recorded with the permission of the participants. Participants were also told that all the acquired information was secured and protected by the researcher (Refer to Appendix 3).

3.13 The role of the researcher

The role of the researcher is to collect and examine information and come up with conclusions about the results from the collected information. As a researcher I went to the school where PLC meetings took place and observed what was actually taking place during the meetings. As an observer I was not part of the activities took place I was just an overall observer and recorded them. During the interviews I conducted one on one conversation with six grade 12 Life sciences teachers in their schools. I have been teaching Grade 10 life sciences for the last three years however, currently I am not teaching life sciences. Therefore, as a researcher I am not one of the life sciences teachers who teach grade 12 in the district. Participants were not afraid to be

transparent in sharing their experiences because I am still new in the field compared to them. Therefore, I had no experience about cluster activities undertaken by grade 12 teachers in their previous meetings. Since I was not teaching life sciences, I hoped that my position did not influence the study.

3.14 Conclusion

This chapter began with a discussion of the interpretive research paradigm and qualitative methodological approach as well as justification as to why they were suitable for this research study. The strengths and weaknesses of the methodological approach were also outlined. Case study research design was also explained, in general, and the exploratory case study research design adopted in this study was described. The research setting and purposive sample were discussed. This was followed by the description of the data collection instruments and procedures, and also thematic data analysis used. This chapter concludes with a discussion of trustworthiness and ethical issues. In the next chapter, I present the results and findings of the study.

Chapter 4

Data presentation and analysis

4.1 Introduction

In Chapter Two the literature on PLCs was reviewed and the research methodology and design was discussed in Chapter Three. In this chapter, the data collected is presented and analysed and the findings from the research are described. The data was collected from six grade 12 life sciences teachers through semi- structured interviews and through observation of three PLC meetings. All teachers who participated in this study were from the same district (Harry Gwala District of KwaZulu-Natal) but in different schools of the same geographical area. The research study focused on the professional learning activities that grade 12 life science teachers engage in within a professional learning community (PLC) located in the Harry Gwala District. The aim of the study was to answer the following research questions:

1. What professional learning activities do grade 12 Life Sciences teachers engage in, in a professional learning community?
2. To what extent is the PLC an effective PLC of grade 12 life sciences teachers?

The first part of this chapter describes the biographical profiles of the six grade 12 teachers who were participants in the research study. The second part describes the teachers' understanding of the concept 'PLC' and the purpose and implementation of PLCs in their district. This is followed by a discussion of the types of learning activities that occurred in the PLC. This chapter concludes with a description of the effectiveness of the PLC by examining responses of participants and observations during PLC meetings by the researcher. Participant's responses are presented in italics.

4.2 Biographical profiles of the participants

Six grade 12 life sciences teachers were participants in this study. Three of them were female teachers and the other three were male teachers. All participants were from different schools with

different backgrounds. Four teachers teach in semi-resourced schools, while two teachers taught in under- resourced schools. All participants were given pseudonyms to protect their identity and to make sure that their confidentiality and anonymity were respected.

Biographical profiles of each participant are presented outlining their gender, teaching experience in general and also their experience in teaching grade 12 life sciences, their current post level, educational qualifications, the reason for choosing life sciences as a teaching subject, interest in teaching life sciences as well as the challenges they experience when teaching the subject.

4.2.1 Participant one - Nomonde

Nomonde is a female, post level one qualified teacher who majored in life sciences and physical sciences in the FET Phase. Her educational qualifications include a Senior Teachers Diploma (STD). She started teaching life sciences and physical sciences in 2005. She had been teaching grades 10- 12 for thirteen years at the time of the research study.

Nomonde said that she had a passion for teaching life sciences. She indicated that life sciences is based on nature, it gives her knowledge about nature, how to love nature, how to teach the subject, how to deal with nature, and lastly, teach how to solve problems biologically. Alternatively, Nomonde said that teaching life sciences is a challenge because learners tend to show negative attitudes towards it since there are difficult concepts to learn and pronounce. However, she confirmed that her passion and positive attitude towards life sciences helped her to explain those concepts to learners and further share her passion towards the subject with learners.

4.2.2 Participant two- Yonela

Yonela is a female teacher who started teaching as a profession in 2008. She is teaching life sciences at FET Phase and Natural Sciences at GET Phase. She has been teaching life sciences to grade 10 and 11's for the past ten years but had eight years of experience teaching grade 12 at the time of the research study. She obtained a Bachelor of Science Honours in Animal Sciences and a Postgraduate Certificate in Education (PGCE) in FET Phase Life Sciences and GET Phase Natural Sciences. She added that her *"Bachelor of Sciences Honours in Animal Sciences is more of agricultural part*".

Yonela indicated that, "*life science is a realistic subject and is dynamic"* and that is the reason she enjoys teaching it. She further explained that "*it is realistic subject where learners are being taught something that happens within their bodies and also around them in their society"*. Yonela shared that she loved teaching life sciences for the following reasons:

> *I love teaching life sciences because sometimes it is going to change the learners' behaviour. Learners mind set and sometimes it is going to improve their critical thinking, sometimes it is going to improve the way that they question, being able to formulate hypothesis may be training them to become young scientists*.

On the other hand, Yonela has been challenged with teaching life sciences due to the lack/shortage of resources. Therefore, she added that the way teaching and learning happened in her school is not effective. She had this to say:

> *Teaching is more theoretical than practical*. *It is not easy to conduct practical with learners due to the shortage of resources*. *As a teacher, you feel somewhere, somehow it does not give true reflection of the learner because the practical we hardly do them because of the resources and the staff.*

4.2.3 Participant three - Azile

Azile is a male teacher who started teaching in 2000. He has been teaching grades 10, 11 and 12'sbiology for eighteen years at the time of research study. He started teaching life sciences grade 12 in 2010, so it was about eight years ago at the time of the research study. He is a post level one teacher. His educational qualifications include a Bachelor of Science degree and a Postgraduate Certificate in Education (PGCE) with majors in biology and geography.

Azile further indicated that he liked teaching life sciences for the following reasons:

> *It explain everything that happening in nature, as far as our environment, our bodies understanding why nature behaves the way it does because it's fascinating… life science is interesting. I like usually explaining things that appear like miracles to learners when I explain them to kids they get fascinated because in the beginning they would think that this is a miracle but when I explain that they would understand that is just forces of nature that I have explained.*

However, Azile had a challenge in teaching the section on evolution in grade 12 life sciences. When he was asked about what he didn't like about teaching life sciences, he responded by saying:

> *Is that part of evolution, where when I explaining some other items life sciences learners feel like I'm probable flinching into their religion, especially the Christian side and you see when you are teaching that part of evolution there are some learners that are deep, deep in their religion, especially Christians, they feel offended so handling it is not easy.*

4.2.4 Participant four - Bongiwe

Bongiwe is a female, post level one teacher who started teaching in 2008. She has been teaching life sciences to grades 10 and 11 in FET Phase and natural sciences at GET Phase at the time of the study. She had four years of experience in teaching grade 12 life sciences. She likes teaching life sciences. In her educational qualifications she obtained a Bachelor of Science degree with biological sciences majors and a Postgraduate Certificate in Education (PGCE) with majors in life sciences FET Phase and natural sciences and mathematics in GET Phase.

Bongiwe chose to teach life sciences because it was her major subject at tertiary level when she was doing her biological sciences degree. Teaching as a profession was not her first choice as a career, but she opted to do it as a second choice since she was not selected to do medicine. She also indicated that she liked teaching life sciences because, "*it broaden my mind about human biology"*. Alternatively, she highlighted that teaching life sciences sometimes is a challenge since it had difficult terminologies. In her explanation, she said when she was dealing with the learners in the classroom where she finds it difficult to explain to them the concepts of life sciences since most of the concepts were not originally English words. She further highlighted that she spent a lot of time in trying to explain the concepts which are not in English as such; it becomes an obstacle for the learners to understand easily. Lastly she said, *"because these words are not English words most of them so that is the only challenge I find very difficult in teaching life sciences".*

4.2.5 Participant five - Lwando

Lwando is a male, post level one teacher who started teaching in 2012. He has been teaching life sciences to grades 10 and 11 for the past six years, at the time of the research study. He taught grade 12 life sciences from 2016, which means he had two years of experience teaching grade 12 at the time of the research study. In his educational qualifications, he obtained a Bachelor's degree in Education (agricultural economics) and majored in Agricultural Sciences. Lwando indicated that he loved teaching life sciences although he did not choose to teach life sciences. He further explained that: "*I didn't choose life sciences, the thing is in our school, and we had already have teachers for agricultural sciences. So, they gave me life sciences".*

In addition, when he was asked about what he likes about teaching life sciences. He mentioned many things in his response. Firstly, he explained by saying he enjoyed teaching life sciences because it focuses on theories that are scientific that explain nature and the problems that people are faced with. Secondly, he enjoys teaching life sciences, especially on a scientific level and that was the main motivation for teaching the subject at grade 12 level. Thirdly, he indicated that as a life sciences teacher you get to understand yourself not only psychologically but also physically, because they study about many things including different brains and systems that makeup the human body. In his explanation he also noted that:

> *You get to understand how life works; you also get to understand how different ecosystems work in sort of trying to bring a balance to the nature. Remember that in life sciences we teach about ecosystem and those ecosystems once you get to understand them, then you know for the fact that you are not alone in this world and you are not the only one that matters there, even the smallest insects also matter, because they bring about balance to your life as well, so that's what I enjoy the most about life sciences. It teaches you a lot about life.*

4.2.6 Participant six - Andile

Andile is male teacher and started teaching grades 10 and 11 life sciences in 2006. He has been teaching grade 12 life sciences for 11 years at the time of the study. He was a Head of the Department (HOD) for science in his school. He obtained several educational qualifications: a Bachelor of Science (B.Sc.) degree and majored in biological sciences, a Postgraduate Certificate in Education (PGCE) and majored in Mathematics GET, Technology GET and Life Sciences

FET, a Bachelor of Education Honours (BEd Honours) with majors in Natural Sciences education and a Masters of Business Administration (MBA).

Andile loves teaching life sciences and explained:

> *Life Sciences is a dynamic subject, there are constantly new developments being made in this field. Life Sciences is about being investigative, thinking critically, always asking questions, and learning for life. I don't know what's more interesting than that.*

At the same time, he also confirmed *"There are challenges but there is nothing I do not like".*

4.3. Life Sciences teachers' understanding of a PLC

This section describes grade 12 life sciences teacher understanding of PLCs and the purpose of the PLC. Most participants had a good understanding of a PLC although they described it differently. According to Nomonde a PLC is a platform that is used to develop teachers, specifically on how to teach the subject, it gives teachers confidence in teaching and also helps teachers to develop content knowledge through sharing of ideas.

She further emphasised that as teachers, they acquire knowledge about how to explain difficult concepts in classrooms. Her understanding of a PLC resonates with Aubusson, Steele, Denham, and Brady (2007) who describe a PLC as a site where a group of professionals (teachers) within the profession meet and share their views to train one another for positive change and improvement of learners' performance in their schools.

In addition, teachers share strategies about how to teach life sciences to make it easier for learners to understand. In the same way, Yonela described a PLC as a platform but she believed that a PLC was meant for professionals residing in a certain geographical area. She further highlighted that teachers meet and discuss issues or topics to enhance their professional knowledge. Yonela's understanding concurred with the view of Brodie and Borko (2016), that PLCs offer a chance for teachers' learning and thinking as a group to improve their teaching. Similarly, Darling-Hammond and Richardson (2009) also claim that PLCs provide a continuing course for teachers to be trained about their work and reflect on new knowledge gained in their specific context, sharing their individual knowledge and expertise.

On the other hand, Azile suggested that:

> *A PLC is just a grouping of teachers who teach one subject or similar subject where they just share the ideas on how to handle maybe learners with barriers, challenge that they find in their teaching and also develop one another*.

Bongiwe agreed with Azile that a PLC is where teachers gather for common activities such as workshops, moderations and all other relevant issues that affect teachers in their teaching and learning in the classroom. Azile's understanding corresponds with Owen (2014, cited in Brodie & Borko, 2016) who describes PLCs as "professional learning spaces where teams of teachers become co-learners and facilitators as part of their professional growth and development" (p. 138).

Lwando claimed that a PLC was meant for teachers to meet and capacitate each other as peers. Similarly, Andile understood it as a collaborative community of teachers working together towards a common goal of helping learners to pass. He pointed out:

> *The purpose is to have scheduled meetings among teachers where they meet and have discussions on the subject content and assessments. Collaboration and collective learning to share practices, share beliefs, share leadership support, focus on learning for both teachers and students, promotes mutual trust and respect and reflection.*

Lwando and Andale's views are similar to Vescio et al. (2008, cited in Brodie & Borko, 2016) who contend that PLCs have the potential to equip teachers who participate in activities related to their work and provide learning that improves their ability to do work.

Therefore, all six participants understood PLCs as a platform where teachers meet for teacher learning, professional development and equipping one another through discussions as groups. They further noted that PLCs helped teachers to exchange ideas that helped learners to improve their results.

4.4. Teacher's views on the purpose of PLCs

My aim was to gain the participants views of the purpose of the PLCs. All participants shared their views through semi-structured interviews on the purpose of PLCs, with four participants focusing on teacher development and teacher learning while the other two participants included

the improvement of learners pass rate in their responses. Teachers were able to express their views openly. Below are the responses of participants highlighting their views on the purpose of PLCs. Nomonde explained the purpose of PLCs as, "*I think, it is for teacher development and gives teachers more knowledge in science content"*. In the same way, Yonela supported her statement and said, "*Basically, I think is to improve the professionalism in teachers, for example if its life science related then it's also empowering teachers on content and sharing ideas"*.

However, Azile suggested that, "*it's more about sharing ideas how to develop each other because we are always learning continuously and we are learning from each other"*. In addition he explained that as teachers they faced a variety of challenges during teaching and learning:

> *And we teach learners that are different and the challenges that we face are different, so coming together sharing ideas is so important. And the other thing is: we didn't do the same curriculum; there are some gaps even amongst as some other teachers, so when they come together they try to bridge those gaps.*

Bongiwe agreed with Lwando that teachers shared ideas and skills. Bongiwe explained:

> *In my view I think PLCs are meant for equipping educators on how to teach life sciences successfully and effectively through these activities that are being done there including those a moderations, discussion about the challenges that we meet and also the solutions that we should apply in order to make the learners to pass.*

According to Bongiwe, the aim of a PLC is, "*to capacitate and make sure that we share skills as peers so that when we go back in our schools we are able to explore more strategies instead of using one strategy"*.

Lastly, Andile's views about the purpose of a PLC were based on both teacher learning and improvement of learners' pass rates:

> *I think the purpose of the PLC is to have scheduled meetings among teachers where they meet and have discussions on the subject content and assessments. Collaboration, collective learning, sharing practice, sharing of beliefs, sharing of leadership support, focus on learning for both teachers and students, promotes mutual trust and respect and also reflection.*

4.5. Types of professional learning activities within PLCs

This section presents data collected to respond to research question number one: What professional learning activities do grade 12 Life Sciences teachers engage in, in a professional learning community? The following discussion describes types of learning activities shown in data collected from participants and observation of the meetings. Themes emerged from the data collected from the research which were used to describe and analyse the findings such as collaboration and sharing ideas with colleagues, memo discussions, setting cluster papers, lesson presentations and group discussions, moderation of exam papers, and doing practicals. I then grouped them into three major themes: assessment activities, content knowledge discussion activities and pedagogical content knowledge demonstration.

Firstly, I conducted all semi- structured interviews with participants before the observation of the PLC meetings because teachers normally meet towards the end of the term for memo discussions and moderations. For content workshops, they meet every first week of each term and during school holidays. In the next part of this chapter, identified themes for research question one are described and analysed and are supported with responses from participants.

A key finding in response to research question one was that teachers engaged in the following learning activities: assessment activities, content knowledge discussion activities and pedagogical content knowledge demonstration. In the next section, the analyses on how and what teachers do during assessment activities such as memo discussions, setting cluster papers and moderation of exam papers are outlined.

4.5.1 Assessment activities

4.5.1.1 Memo discussion

During a memo discussion teachers discussed different topics and analysed each question according to the cognitive levels and also identified unfair and ambiguous questions. During one of the PLC meetings I also observed a memo discussion where teachers met to discuss the term one examination paper that was set at the provincial level. The meeting was planned in advance and conducted by the subject advisor for life sciences. Most teachers were punctual and prepared to discuss their views on how and what was fair and unfair to learners. Responses of the

participants also revealed that memo discussion is done every term in the district. Two of the six participants mentioned that memo discussions take place in the PLC meetings.

Yonela indicated that they discussed the memorandum for provincial question papers. When she was asked about the material required when attending meetings she responded that if it is a memo discussion, basically the subject advisor presents to everyone the proposed memo. Then, they go through the questions and check the proposed answers. They further check if the answers are correct because sometimes memorandums come with wrong answer. Lastly Yonela confirmed that as teachers they decide on how they are going to mark learners like how are they going to award marks.

Similarly, Nomonde agreed with the above description and explained:

> *[d]uring memo discussion we discuss about different topics and analyse each and every question with their cognitive levels and also add the question paper and identify unfair questions during memo discussion*.

I also observed that teachers meet with their subject advisor for memo discussions during PLC meetings. During my observation I also noted that teachers meet quarterly. Teachers met for memo discussions of common assessment tasks set at provincial and cluster levels only. These common assessments help learners to learn the style of questioning applied by the national examiners. During the discussion, teachers were comparing their arguments with what was said in the previous meeting by their advisor. The above findings indicated that meetings were continuous. The above statement was linked to one of the characteristics of PLCs by Darling-Hammond et al. (2009) when they suggest that PLCs should be rigorous, continual, and related to practice. The above findings also linked to Stewart (2014) who recommended that teachers should include development of classroom based common assessments to measure learner progression.

4.5.1.2 Setting cluster papers

Data collected also revealed that teachers set question papers together for the cluster in the PLC meetings. Out of the six participants two of them noted that setting of cluster papers is one of the activities that they do in their PLC meetings.

Andile highlighted that teachers set papers as a cluster. He said, *"We also set common cluster papers such as practical tasks, tests and assignments for learners"*. In addition, Bongiwe confirmed that teachers set papers individually prior to the cluster meeting and then come together and set one paper. She said:

> *[e]ach and every teacher set his or her own paper and we come together with all the papers and we edit them, and then make one question paper from all these question papers that each teacher brought.*

She also noted that this criterion helped them to complete the paper without spending a lot of time on it. The above finding shows that teachers also focus on setting assessments (Brodie & Borko, 2016). Scholars suggest that teachers should also discuss threats to the requirement that assessments are valid and reliable, such as "identifying the re-use of previous year's papers where solutions are available on the internet and common tests are set on work that they have not yet taught their learners" (Brodie & Borko, 2016, p. 100). The above statement indicates that a finding from the study shows that there is a need for improvement in setting common tasks in the PLC. Teachers were concerned with time as they were not willing to spend more time in setting papers. In contrast, Bloxham, Hughes and Adie (2016) maintain that assessment of learners' activity is essential part of any education system. They further states that setting excellence assessment task that creates realistic indication of learner accomplishment and "that can be consistently and reliably judged by those assessing the work is a contentious and complex task" (p. 3).

4.5.1.3 Moderation of exam papers

Data collected indicates that teachers do moderation as one of the learning activities during PLC meetings. All six participants supported this in their responses during the semi-structured interviews. Yonela described moderation during PLC meetings as follows: if it's moderation, they are supposed to be moderating, checking whether others were doing the marking correctly or not, the authenticity of the marking and also that they do check what and how others teachers marked. Teachers also bring some learners class work books and revision books to see how

others have been doing in their schools, how they have been teaching the learners and revising. Similarly, Bongiwe shared this response about moderation:

> *If it is moderation we are expected to bring the learners scripts in order to be able to check we done the marking correctly. For example if we are meeting for moderations as a teacher you are sitting down marking, remarking what the other educator have been, has already marked so that you can check for mistakes.*

Nomonde agreed with Bongiwe in that teachers exchange papers and remark papers for each other. She pointed out that during moderation, teachers exchange papers among each other as they do remarking and then they identify the mistakes the teacher makes while he/ she was doing the marking. Lwando also stated that:

> *In moderations, we bring exam guideline so that we remind ourselves that what exactly we are supposed to do like a, put emphasis on during our teaching and learning process.*

Azile also highlighted that as teachers for moderations, they were moderating each other.
Lastly, Andile indicated that they participated in moderation during PLC meetings. With regards to resources he was expected to bring to the PLC meetings, he pointed out:

> *Orange pens for moderation, textbooks, question papers, draft Memoranda, educator files, learners' portfolio files, CAPS document, exam guidelines, calculators, USBs, or CDs. We also bring past question papers, we also bring other additional resources such as videos to help with the setting of question papers.*

Brodie and Borko's (2016, p. 149) findings share similar sentiments in that "group discussions are collegial, open, and different opinions are respected". They further state that "members of the groups interact freely within the workshops and outside workshops" (p. 149). Therefore, this discussion indicates that moderation of exam papers was one of the learning activities that grade 12 Life Sciences teachers engaged in during PLC meetings.

4.6 Content knowledge discussion

4.6.1Collaboration and sharing ideas with colleagues

The data collected from semi-structured interviews and observation of meetings revealed that teachers collaborate and share their experiences in the PLC. Teachers shared ideas about how they taught learners with different learning abilities, overcrowded classes and challenging topics. Teachers were able to share challenges that they came across during their teaching and learning freely. They also shared ideas about how to conduct practical tasks in schools with limited required resources.

During the observation of the PLC meeting, I also found that teachers shared teaching skills in a developmental manner. Those who were from high performing schools in life sciences shared the strategies they implemented to achieve good quality results. Dlamini (Pseudonym), an experienced teacher demonstrated the (discussion method) as a teaching strategy that enhanced learner's understanding when teaching the structure of the ear. He demonstrated the lesson to teachers as if he was teaching learners. Most teachers were interested and they also participated and observed the practical task conducted during the meeting as if they were learners. Teachers also indicated that it was not easy for them to teach the ear and other organs such as the eye and the brain to learners. Through some ideas from other teachers they learnt how to conduct such lessons. Novice teachers learnt new teaching strategies from expert teachers. Subject advisors encouraged experienced teachers who achieve very good results to share their knowledge and strategies about how they teach life sciences in their schools, and how they have achieved very good results over the years.

Teachers from high performing schools were given topics or practical tasks to present voluntarily by the subject advisor. Teachers who were not willing to share in front of other teachers were encouraged to share their strategies with teachers from lower performing schools. The subject advisor also suggested that teachers with challenges should bring forward their problems to be discussed because different teachers have different problems. Therefore, some of their problems may not be discussed if they do not share them. Teachers shared ideas in small groups.

During the semi-structured interviews all participants mentioned that they shared ideas with their colleagues in their PLC meetings. They explained the different ideas shared with

colleagues and the following discussion elaborates on the different types of learning activities that took place in life sciences PLC meetings. During the interviews Nomonde mentioned that in their meetings they shared tricks and strategies on how to teach life sciences in the classroom to make it easier and understandable to learners. She also highlighted that as teachers they bring their problems first. They share their problems and challenges that they encounter during teaching and learning in their classrooms.

Nomondo's response indicates that she shared her challenges and strategies in teaching life sciences. [Teachers who have been teaching life sciences and achieving good results (high performing schools in life sciences) come and explain to other teachers how they teach to achieve good results. The subject advisor also helps teachers by organising expert teachers to attend meetings and demonstrate their strategies in teaching difficult sections in life sciences. New teachers are also equipped through these meetings. The main aim of the meetings was to improve the life sciences pass rate.] She said, *"During PLC meetings I share content challenges, such as: in some instances learners are struggling to pronounce biological terms since they are so difficult to pronounce and to understand"*.

Correspondingly, Yonela's response indicates that in the PLC meetings teachers meet for various activities. Yonela agreed with Nomonde that teachers shared ideas about how to present different topics to make them easier for learners to understand. She also reported that during the meetings, teachers who achieve good results in the subject share ideas on how to they teach their learners. She further explained that there are teachers who attend life sciences meetings at provincial level who bring back the information to other teachers at cluster level. For example teachers were taught on how to set practical tasks, how to set examination question papers, and how to analyse different concepts. In addition, Yonela indicated that since they teach learners with different learning abilities in their schools, sometimes they share how to overcome those problems. In her response she said:

> *Sometimes mostly we share for those that are struggling learners so now there is a new term for them they call progressed learners. So, basically it's a how do you teach progressed learners and the best way to teach.*

Yonela further reported that she found discussing with other teachers how to teach as the most important activity. According to her report, teachers sometimes they know the content but how to present it to learners is a challenge. She cited an example by saying:

> *Sometimes we are taught for example I can give an example of an eye whereby one teacher would say for my learners for them to understand the eye I do like this and sometimes they, the way they do it is funny and interesting so that the learners they remember and also sometimes the teacher they come up with acronym nouns for doing things.*

According to Azile, teachers shared ideas about how to conduct practical tasks with learners and also shared experiences on how to deal with learners with barriers. Azile concurred with Yonela in that teachers share skills on how to teach learners with learning difficulties. In his response, he referred to those learners as learners with learning barriers by saying:

> *Teachers who teach one subject or similar subject they just share the ideas on how to handle or teach maybe learners with barriers, challenge that they find in their teaching and also develop one another.*

Bongiwe confirmed that teachers share challenges in teaching and also share possible solutions to their challenges that they encounter during teaching and learning. She also explained that sometimes in their classrooms, they have a huge numbers of learners per class, which is not a normal condition to teach in. Therefore, they also share ideas on how to overcome those challenges.

In addition, Lwando also mentioned that when teachers in the PLC needed support in terms of development they shared their experiences. They provide advice and support to each other so that learners achieve better results. He emphasized this by saying:

> *We also touch on strategies if we maybe see that there is a teacher who is lacking or struggling in terms of learner performance. Then we would come up with advice… and capacitate each other.*

Likewise, Andile indicated that teachers shared various ideas in the PLCs. He believed that most of the ideas shared improved learning for both teachers and learners. When teachers shared ideas they learnt new information and strategies resulting in learners performing very well. Andile

said, *"a collective learning to share practice, share beliefs, share leadership support, focus on learning for both teachers and students, promotes mutual trust and respect, and reflection"*. He also noted that lesson sharing sessions, teaching methodologies/strategies, and how to accommodate various learning styles using multiple intelligences were implemented.

Andile also mentioned that teachers collaborate as colleagues, form small groups and discuss content. He said:

> *Collaborative learning whereby teachers are grouped in small discursive groups to facilitate more understanding of the content. In our meetings we have discussions on problematic topics. They help bridge the gap between education theory, policy and practice, creating spaces for addressing practical issues and connecting pedagogical practice with subject content knowledge.*

In addition, during my observations, I noticed that teachers shared their experiences and skills about teaching life sciences learners. They also discussed the challenges they encountered during teaching and learning in their schools. The subject advisor also invited teachers from other districts who have achieved very good results in previous years to share their skills with other teachers. Teachers were able to share their ideas on how to teach learners with different learning abilities.

The findings are in agreement with Dana and Yendol-Hoppey (2015) where they found that during PLC meetings, teachers meet and collaborate about a precise contextual learning through raising questions related to their local context, working together and coming up with solutions. The results were further linked to the findings of Darling-Hammond and Richardson (2009) who argue that PLCs provide continuous learning where teachers learn about their work together as colleagues, investigate, and reflect on new practices in their specific situation, sharing their individual understanding and capabilities. Similarly, Stoll et al. (2006) assert that PLCs involve a group of teachers collaborating, sharing ideas, and reflecting on their teaching experiences in a progressive manner in order to learn from one another. Richmond and Manokore (2010, p. 559) argue that "PLC's are characterised by participants who share a common vision and learn from each other". According to Ning, Lee and Lee (2015) teacher collaboration refers to the teachers

as professional collaborating together and co-operating in their practice and activities to achieve similar goals in educational system. Therefore, all participants validated that collaboration and sharing of ideas was one of the activities that took place in PLC meetings.

4.6.2 Presentations and group discussions

Data collected indicated that there were presentations and group discussions in the PLC meetings. From observations, it emerged that teachers do lesson presentations to help each other to improve learner performance in their schools. This resonates with Borko and Borko (2016) who acknowledge the significance of collectivity (group discussion) and state that teachers gain knowledge through participation in discussions with others. In addition, they indicate that teachers working in groups to reach a common objective are more liable to be victorious than single teachers working on their own. Findings in this study indicated that teachers also discuss various topics that are problematic to other teachers and learners as well. Nomonde said: "*we present lessons on different topics and the subject advisor is there to guide us".* She also mentioned that during the meetings they also discussed challenges they experienced with other teachers. Conversely, Bongiwe noted that in the PLC meetings there are presentations. During presentations, teachers form small groups and select one topic to discuss from each group. Each group selects one teacher who will present and the other teachers pretend they are learners. She noted that*, "during those presentations you find that there are new ideas that you get in that activity on how to improve your teaching and understand as a life sciences teacher".*

From the above views, it is evident that teachers meet for group discussions and presentations in the PLC. According to Snow-Gerond (2005, cited in Mhlanga**,** 2014) PLCs promote an open conversation where queries are asked and uncertain matters are valued and supported.

4.6.3 Development of teachers' content knowledge

It emerged from the data that four of the six participants focus more on the subject content, and teachers learn new knowledge, skills or ideas about teaching certain topics. Nomonde had this to say*:*

> *For teacher development and gives teachers more knowledge in science content. It is a platform that develop us as very much teachers, gives us confidence to teach this subject and also since there are difficult concept. We get to know the content deeply.*

Presentations help us in gaining more knowledge about life sciences content, discussions, analysis, as we analyse different topics.

Nomonde also noted that their meetings were very effective because she learnt a lot. She explained that the PLC was effective because it contributed to her development and improved her content knowledge and ability to explain difficult concepts to learners. She said*:*

[t]hey are so effective to me because they develop us very well and I know content better than before, I know how to present it and explain difficult concepts and make them easier to be understood by the learners.

Bongiwe concurred with Nomonde and said that PLCs equipped teachers with the skills to teach learners content that found difficult in the examinations which in turn, improved learner performance. Bongiwe further explained:

They are very effective, they are very positive because they equip us as educators on the teaching strategies and we are able to share the challenges and get positive feedback from other colleagues so they are effective because we always learn something new from the PLC meetings.

Andile highlighted that when PLC meetings focus on content, it equips them with new content knowledge in topics such as Biotechnology and Evolution and practical demonstrations.

Andile further explained that all the meetings are aimed at professional development of educators ranging from organisational skills, communication skills, teaching strategies, learning styles, assessment: blooms taxonomy; tests, practical's, assignments, projects, exam setting, memos and rubrics, pre-moderations, memo discussions, marking process start with dummy scripts, post moderations, excursions and team building. She also noted that she, *"feels more knowledgeable and more confident to teach. Therefore, according to my view, these meetings are more effective".*

With regard to the effectiveness of PLCs, Yonela summed it up very clearly, "*They are very effective".* Azile expressed similar views about the effectiveness of PLCs. Azile acknowledged that PLCs are quietly effective because each time they go there they come out with material that

they are going to use such as past papers. They also learn skills on how to put learners in groups so that they can learn together. Azile further acknowledged that:

> *Putting them in groups, they do presentation in groups depending on their level of understanding so these learners have been grouped together for example those that are slow they are together being slow so and they don't feel like someone is dominating them.*

The above findings concur with Darling-Hammond and Richardson (2009) when they assert that PLCs also intend to improve teacher knowledge and implement extra operative instructional teaching and learning within schools in the form of groups as colleagues. Jita and Mokhele (2014) assert that PLCs improve content knowledge. In the same vein, Aubusson, Steele, Denham and Brady (2007) describe a PLC as a site where a group of professionals (teachers) meet and share their views to train one another for positive change and improvement of learners' performance in their schools. Participants also noted that teachers demonstrate practical activities as part of the learning activities that take place in the PLC meetings, which is discussed next.

4.7 Pedagogical content knowledge activities

4.7.1 Doing practical tasks

Out of six participants two of them indicated that they conduct or demonstrate practical activities in the PLC. Azile said:

> *Sometimes it could be on practicals to share ideas on how to do practicals and actually sometimes we can have teachers participating doing practical themselves before they take the practicals to their learners. The teachers do them first and understand them before they take them to the children.*

Bongiwe also explained that they engaged in practical tasks during PLC meetings, obtain feedback and learn how to perform practical tasks so that they can do them effectively with learners when they return to their schools

She further confirmed that if they are doing practicals in a PLC meeting, then the teacher is expected to engage/participate fully in that practical and do the activities if its hands on and

answer questions that are being asked at that moment**.** Lastly**,** she supported her statement by saying, "the *practical tasks that we do there they are also very useful because it gives you a, its gives one a skill on how to apply the practicals effectively to the learners".*

These responses indicate that teachers who engaged in practical tasks during the PLC meetings very useful, although this was only mentioned by Azile and Bongiwe. Therefore, this suggests that doing practical tasks and demonstrations facilitated teacher learning and teaching equipping teachers with the necessary knowledge and skills to effectively conduct these practical tasks with their learners at school.

The following section discusses the themes related to research question 2: To what extent does this PLC serve as an effective PLC of grade 12 life sciences teachers?

This section focuses on understanding the extent to which the PLC serves as an effective PLC. Data emerged from semi-structured interviews and observation of the meetings. To analyse the data I was guided by the characteristics of successful PLCs by Brodie (2013) as a conceptual framework. Darling-Hammond et al. (2009) provide four strategies of effective PLCs as:

> It should be intensive, ongoing, and connected to practice; it should focus on student learning and address the teaching of specific curriculum content; it should align with the school improvement priorities and goals and it should build strong working relationships among teachers. These principles helped in analysing the data collected for the study (p. 9).

4.7.2 Improved in teacher instructional practices

Lwando, referred to his experience in teaching life sciences. He indicated that there were some improvements in his teaching and learner performance as:

> *Well, they have helped. For instance, my learners now they are passing, because so far I, have seen an improvement in myself first that is also been transferred to learner performance.*

The data collected from the participants showed that their teaching instructional practices improved very much. Five participants confirmed that their teaching improved due to participation in PLC meetings. For instance, Lwando said his teaching has improved quietly a lot in teaching life sciences:

I could see that as a reflection in the quality of results that I produce with the learners because I could see that there are more learners who are able to pass and understand life sciences as results of me attending life sciences PLC.

Correspondingly, Yonela noted that her teaching improved quite a bit. Firstly, she highlighted that she had previously relied on text books when teaching learners, but now she hardly use them at all. She indicated that she learnt a lot from the PLC because after attending the meetings she have realized that it is very possible to teach life sciences without a text book. Teaching exactly what the learner is supposed to know and give them background information of these learners. The learners that they are teaching are not English speaking learners as English is their second language which is a learning barrier. Lastly, Yonela indicated, "*using the material that I get from these workshops it has helped me in teaching life sciences".*

In the same vein, Azile concurred with Yonela to say his teaching has improved through the implementation of PLCs in the district. Andile indicated that he feels more knowledgeable and more confident to teach now. These findings correspond to Seo and Han (2012 cited in Shange, 2014) when they confirm that in PLCs "teachers constantly glance for information to empower themselves and the new knowledge helps them to improve their practices" (p. 16).

Bongiwe elaborated that her teaching skills improved in many ways such as by using teaching strategies that were learnt from the PLCs. She said, *"The presentation skills where you allow learners to do presentations on each topic independently and another one the peer marking during assessment it's one of the teaching strategies"*. She also indicated that another teaching strategy learnt in the PLC is the one whereby she used abbreviations to teach certain topics "*For example, maybe if you are talking about DNA replication we help learners to for in order for them to remember".* Shange (2012) in the same way argues that teaching is successful when teachers permit learners to work together with them freely which have the tendency of allowing them to open up and come out of their shells.

They also use abbreviations since there is the challenge of scientific terminology in life sciences and also a challenge of the syllabus which is very long where learners tend to forget the concepts. She further believes that learners forget sometimes because they don't understand them. In order to help them with that they use abbreviations in order to summarise each topic.

For example, the DNA replication and other topics, so by using abbreviations, it helps them to remember more easily. Bongiwe further explained that she also learnt how to use the peer teaching strategy and said:

> *[i]s where by now we take learners which are in a certain level for example a level seven learner we use that learner to guide others in class because sometimes a learner can easily reach another learner because they have this language that they understand easily when another learner is helping another learner.*

So they form groups in the class where they divide learners according to their different levels of understanding (low, middle and high performing learners) so that the one who understands better can explain to the learners who are a bit slower in understanding.

The above findings are linked with Darling-Hammond and Richardson (2009) who argue that PLCs must focus on improving instructional teaching strategies, and identifying challenges. They further state that teachers within the PLC must construct their implementation open to all teachers within the PLC.

In the same way, Brodie and Borko's (2016), findings confirmed that PLCs provide learning for teachers and thinking as a group in order to improve their teaching. Vescio et al. (2008, cited in Brodie and Borko, 2016) also assert that PLCs have the potential to allow teachers to participate in activities related to their work and provide learning in order to improve their ability to do their work (instructional practices). Jita and Mokhele (2014) state that clusters enhance content pedagogical knowledge. Brodie (2013) suggests that PLCs should be job-embedded (school-based) in order to overcome the boundaries between teaching and learning about teaching.

Findings in this study concur with the findings in the study conducted by Richmond and Manokore (2010) which shown that teachers involved in the PLCs had gained confidence in teaching and gained content knowledge. When participants were asked about the extent to which the PLC serves as an effective PLC, three themes emerged from their responses, namely: development of teachers' content knowledge; solving problems collaboratively; promoting mutual trust, respect and reflection and continuous interaction amongst teachers within the PLC.

4.8 Content knowledge discussions and features of the effective PLC

4.8.1 Solving problems collaboratively as PLCs

The participants indicated that in their PLC meetings, they solve problems together. They share their different challenges and help each other in a positive way. Experienced teachers together with the subject advisor provided solutions to other teachers. Two of the six participants described how they solve their problems collaboratively. Bongiwe cited an example of teaching overcrowded classes as one of the problems experienced by many teachers and discussed in length how to come up with possible solutions. Bongiwe affirmed that they met as colleagues and shared in detail their challenges, for example, how to overcome the challenge of a huge number of learners in class; instead of thirty is to one they teach more than sixty learners at a time. Then they get advice or good feedback from other teachers who have also experienced the same problems that they are facing. She noted that, "*we are able to apply such solutions and it becomes effective at the end of the day because we get good results".*

Similarly, Yonela agreed with Bongiwe in that they solve their problems together as teachers. According to Bongiwe each and every teacher tells other teachers about issues they have difficulty with. By doing so, everyone is able to share problems freely. Servage (2008) asserts that a PLC is one of the models characterized by teacher professional learning which is critical to improved student learning; this professional development is most effective when it is collaborative and collegial; and this collaborative work should involve inquiry and problem solving in authentic contexts of daily teaching practices (p. 63). In the same vein, DuFour (2004, cited in Brodie & Borko, 2016) asserts that PLCs create room for joint meetings to resolve learning difficulties.

All activities revealed by the findings of this study concur with the findings from the ISPTFTED (2011) when describing expected PLCs activities. Firstly, they maintain that PLCs allow a group of teachers to engage in a variety of activities such as curriculum orientation, analysis of learner results, learning how to interpret and use curriculum support material, and also working together to learn from video records and other learning materials (p. 14). Secondly, they argue that PLCs

help teachers to integrate their own knowledge with the latest research- based knowledge about content and practice (ISPTFTED, 2011, p. 14).

4.8.2 PLCs promote mutual trust, respect and reflection.

Four of the six participants mentioned the reflective culture during PLC meetings. Participant's responses were linked to one of the characteristics of successful PLCs as mentioned by Brodie (2013). Andile indicated that the PLC promoted a reflective culture which encouraged teachers to express their views to others freely and share their knowledge and skills. Andile explained:

> *They promote a reflective culture because teachers are able to reflect on their content knowledge and the teaching skills. Secondly, each term we have accountability sessions whereby each teacher presents his or her own analysis of results and explains what work and what didn't work and how to improve next term.*

Likewise, Bongiwe said that in PLC meetings everyone was free to share their challenges regardless of race or gender which created a positive environment for everyone. This indicates that there was respect and trust amongst one another. Bongiwe noted:

> *It's a positive environment during the PLC meetings where all educators whether black or white or whatever race is that you are, you are able to express yourself and share your challenges, your own challenges to me. I find it a positive environment that is very helpful to each educator.*

In addition, teachers reflected on their high or low performance without any fear in the meetings. Andile confirmed that there is a reflective culture because when you go for those workshops sometimes they are required to reflect on leaner performance from their schools. He said:

> *You would be asked to say how to your pass percent or sometimes subject advisor just tells you this is your pass percent. What do you think are the challenges that lead you to have this low pass percent? Or the advisor may ask someone, can you tell us the strategies that you applied in order to such high pass percent? So you are always reflecting on your performance.*

Yonela also elaborated that teachers were willing to open up and share their weaknesses in the content. In contrast she indicated that there were some individuals who tend to be reserved

because they don't want to been seen as teachers with no content knowledge in the PLC. She explained that teachers are able to respect and trust each other enough to the extent that they were able to mentor one another. She further asserted that teachers were able to open up because they had also come up with a strategy whereby if a teacher was challenged, he/ she could ask someone who has more knowledge in that specific area to go and teach his/ her class. Then the teacher would be part of the learners in the class which is going to help the teacher. Yonela said:

> *So, I think the teacher can reflect or among themselves to say this is what I know and this is where I need help and this is where I don't need help. Those some teachers they tend to be reserved because they don't want to appear as if they don't know, but not necessarily that they don't know, our understanding differs, depending on topics and interests.*

According to the above information, teachers respect and trust the ideas of other teachers during PLC meetings. Most teachers were able to reflect on their challenges, content knowledge, teaching and learner problems. In my observation, the facilitator of the meetings who was the subject advisor encouraged teachers to open up in order to develop themselves. She was able to identify teachers who were novices and lacked some information and those who were the experts in their field and group them according to their understanding. Those who were knowledgeable in specific topics presented and shared their knowledge and skills with others. Those who were not capable in presentations or lacked experience in a specific area were encouraged to listen to the expert teachers. In that way, every teacher was respected and there was mutual trust given to one another.

The findings from data collected through semi-structured interviews and observations shared similar sentiments with Jita and Mokhele (2014) where they reported that clusters provide teachers with the opportunities to collaborate, share ideas and reflect on their experiences. Correspondingly, Nwagbara (2014) concurs that a PLC's aim is to obtain excellent education by sharing and reflecting on teacher experiences, teacher support and the provision of school-based professional support as part of teacher development. In addition, Brodie and Borko (2016) maintained that trust enables teachers to share their ideas that are relevant about their weaknesses and their strengths. They further claim that "trust can be regarded as a foundation of real collaboration" (p. 144)

4.8.3 Continuous interaction amongst teachers within the PLC.

All participants indicated that they meet every term in the PLC, however, their responses did not clearly indicate the actual number of PLC meetings per term. Below are their responses.

Nomonde said: "*I think three times in a term"*. In addition, Yonela noted:

> *Normally, it's twice or three times. Sometimes it's twice or three times per term but sometimes it can even extend to five times depending on need and time of the year.*

On the other hand, Azile confirmed that on average, they met twice a month but it differs with the levels (cluster, district, provincial level); sometimes they have got more gatherings in clusters unless it is at district level. He said, *"Sometimes we may have one per term maybe a major workshop where teachers from different circuit maybe gathering to share ideas".*

Bongiwe concurred with Azile, "*Usually, they met for moderations once a term and workshops once a term. Then is usually maybe twice a term that's how often they met for the PLCs".*

In contrast, Lwando noted that teachers meetings were continuous but without a planned interaction program. Lwando asserted that:

> *It depends on the meetings that we have, if there is a matter in hand that needs us to meet. It is not like they have a program, there was no a program to fulfil or follow in place that instructs them to meet. But they meet any time if there is a need.*

At the same time she indicated that, previously, they had what is so called JIT (Just in time) workshops and they worked effectively. According to Lwando JIT workshops were government programs conducted in each province whereby subject advisors would call them in one central place.

Therefore, they met as teachers and discussed content whereby teachers would be skilled in terms of the content and understand it. Lwando further reported that the government saw the need for teachers to be capacitated since most of teachers do not understand life sciences content. They teach in classes without the knowledge of content and that would show in the learners' results because learners become confused. Lwando acknowledge that:

So those JIT workshops were very good. Therefore, those workshops were planned by the government. But now are no longer there hence, we meet via what sups and those platforms are not like effective.

Andile said: "*We normally meet once per term".*

The above responses indicated that teachers do not meet according to the year plan or program in hand. They met when there was a need to do so. Sometimes they met through a WhatsApp invite from their subject advisor or whenever there was a need to meet and come together as a cluster.

My observation noted that teachers met three times and more per term. Firstly they attend subject orientation workshops at the beginning of the term which is normally conducted by the subject advisor. Secondly, teachers also met for setting cluster question papers and memo discussions after the common papers were written by learners. Thirdly, teachers come together for moderations of a selected five percent of marked learners' scripts. Lastly, teachers met for team building workshops whereby expert teachers from other districts were invited by the subject advisor to train other teachers oh how to teach life sciences topics and how to conduct practical tasks.

Similarly, Darling-Hammond and Richardson (2009, p. 3) argue that PLCs provide continuous opportunities for teachers to work together as colleagues, to learn new practices in their specific situation, and sharing knowledge. Stoll and Louis (2007 cited in Brodie & Borko, 2016) describe PLCs as a helpful system for continuous professional teacher development. In addition, Brodie and Borko (2016) argue that one of the PLCs' principles is to offer continuous and collective interaction between teachers that deepens professional learning.

4.9 Conclusion

This chapter focused on the presentation of detailed data generated from the semi-structured interviews of six grade 12 Life Sciences teachers and observation of three PLC meetings. The data was structured according to the two research questions. The first section presented data that emerged from the learning activities that took place during the PLC meetings. Participants described a range of learning activities. The second section presented data from participants about the extent to which the PLC served as an effective PLC of grade 12 life sciences teachers.

Participants expressed their views in detail. Chapter Five will present the conclusion, summary of findings, limitations and recommendations for future research studies.

Chapter Five

Discussion of findings, recommendations and conclusion

5.1 Introduction

The purpose of this study was to examine teacher learning of grade 12 Life Sciences teachers in a professional learning community located in the Harry Gwala District. Chapter Four presented and analysed the data generated from semi-structured interviews of six participants and observations of PLC meetings. This chapter begins with an overview of the study, followed by a discussion of the findings, limitations of the study, recommendations and conclusion. The discussion of the findings in this chapter is structured according to the two research questions:

1. What professional learning activities do grade 12 Life Sciences teachers engage in, in a professional learning community?
2. To what extent is the PLC an effective PLC for grade 12 life sciences teachers?

5.2 An overview of the study

This study examined teacher learning of grade 12 life sciences teachers in a professional learning community located in the Harry Gwala district. Chapter one described the focus, purpose, background and rationale of the study. A brief outline of key concepts and the conceptual framework was also presented. The methodological approach and research design was described. The research questions and objectives, and overview of the thesis were outlined.

Chapter Two presented the literature review and conceptual framework aligned with teacher learning and PLCs. Literature on professional learning communities, teacher learning and theories of teacher learning was discussed. The conceptual framework underpinning the study was also discussed.

Chapter Three explained the research design and methodology. The interpretive research paradigm and the qualitative methodological approach were discussed as well as justification as to why these were suitable for this research study. The strengths and weaknesses of the methodological approach were further outlined. The case study research design was also

explained, in general, and the exploratory case study research design adopted in this study was described. The research setting and purposive sample were discussed. This was followed by the description of the data collection instrument, procedures and thematic data analysis used. This chapter concluded with a discussion of trustworthiness and ethical issues.

Chapter Four presented and analysed the data collected and outlined the findings from the research study.

5.3 Discussion of findings

This section discusses the findings of the study.

Data generated from semi-structured interviews with six participants and observations of cluster meetings outlined several activities that occurred within the PLC. To address research question one, three major activities emerged from the data collected from participant interviews and observations, assessments, content discussion, and sharing new teaching strategies. A key finding of this study is that grade 12 Life Sciences teachers engaged in activities that focused on assessments, content discussion, and sharing new teaching strategies. Cansoy and Parlar (2018) concur that teachers within the PLC can create continuous learning through a set of activities. For research question one,

All six participants concurred that they mainly engaged in the following activities: assessments, content discussion, and share new teaching strategies. For assessments, the study revealed that teachers conduct memo discussions, setting of papers, and moderations of common tasks or exam papers. For content discussions findings from the semi-structured interviews and observations indicated that teachers spent most of their time trying to improve teachers' content knowledge in various ways such as sharing of ideas and collaboration with colleagues within the PLC. Teachers shared teaching skills through demonstrations by both expert and novice teachers. They also demonstrated practical tasks whereby teachers with a high level of expertise trained others on how to conduct practical work. Other teachers were expected to observe and participate fully, especially during hands-on practical work. Most participants revealed that they learnt a lot from other teachers. As a result, they conducted and implemented new skills in their teaching to improve learner performance (Bongiwe). Correspondingly, Cansoy and Parlar (2018) argue that

PLCs collaborate and also “emphasise colleagues' supporting and improving each other to make the school more effective and conduct activities towards enhancing student learning and achievement”(p. 16). Other researchers further concurred with the above findings for PLCs to provide the best consequence on student learning, “the focus should relate to the instructional core such as the relationship between teacher, student and content” (City, Elmore, Fiarman, &Teitel 2009, cited in Brodie, 2013, p. 6). In addition, (Boudett, City, &Murnane 2008, cited in Brodie, 2013) stated that PLCs should engage in problem solving such as teaching approaches relevant to teach learners with learning difficulties in order to help them achieve their goals.

I also observed that teachers shared different ideas and collaborated on how to teach different topics in life sciences. All participants during semi structured interviews noted that teachers participate in collaboration in the PLC. My observation confirmed that teachers met for collaboration with the subject advisor collectively. All participants pointed out that in most cases, they discuss their problems and share solutions with other teachers freely. They shared teaching strategies and solutions for their daily classroom challenges together. The teachers also indicated that sharing of ideas was most helpful in improving their knowledge and learner performance. Participants highlighted that they shared strategies on how to overcome teaching overcrowded classes, learners with difficulties in learning, and different teaching strategies. The study revealed that all activities occurred in PLCs were school-based and professional learning activities relevant to teaching. Brodie (2013) argues that as collaboration is very important for learning to happen, the fundamental aspect is the content learned once teachers gather in their PLCs. They also maintained that:

> [e]ffectiveness of such professional development programmes is believed to lie in supporting teacher collaboration in order to produce shared understanding, a focus on curriculum and instruction, and being of sufficient duration to ensure progressive gains in knowledge (p. 5).

The second activity identified was a memo discussion which is one of the assessments activities discussed. During the observation of the PLC meetings and semi structured interviews, two of six participants concurred that they meet for such discussions. During memo discussions, teachers were expected to bring question papers and marking guidelines to be discussed. They were expected to discuss different topics and analyse each question from the beginning to the

end of the paper. The subject advisor conducted and facilitated the meetings. She also made sure that teachers discussed important issues effectively and helped where there was a need to do so. With regards to the memo discussions teachers discussed fairness of the questions and added more relevant alternatives that were not included in the memo to accommodate expected responses from all learners.

Thirdly, it was highlighted that teachers set cluster papers themselves within the PLC. They set common tasks which enabled them to moderate each other after administering and marking the assessments. Two participants validated that they participated in setting papers for the cluster. With regards to setting cluster papers, each teacher set his or her own paper and they came together and combined them into one question paper which was brought to the meeting. Sometimes they used past question papers and edited them together in their meetings. Teachers were expected to include all levels of blooms taxonomy. Teachers submitted the question paper to the subject advisor for moderation. The subject advisor moderated the paper before it was written by the learners.

The fourth activity which was reported by all six participants was lesson presentation and group discussion. Participants highlighted that the above activity was the most important activity in their learning as teachers. They learnt content knowledge and skills on how to present lessons to the learners in the classroom. This is when teachers put more effort and more time in learning new content knowledge and pedagogical knowledge as well as from expert teachers. Teachers indicated that they learnt how to overcome classroom challenges and how to conduct practical tasks with their learners effectively and successfully. Cansoy and Parlar (2018) maintain that professional learning communities can be portrayed as work groups that focus on empowering teachers' capability, understanding, skills and practice, and support efforts for student learning.

During the group discussion, teachers discussed different topics in small subgroups and then selected one teacher from each group to present what they had discussed to the entire PLC meeting. Therefore, every teacher was given a chance to open up and show others how she/he taught the topic to his/her learners. Then all other teachers listened and pretended as if there were learners in the classroom. The subject advisor assisted the presenter in making sure that he/she was respected by the teachers. Most participants concurred that these presentations helped them

in improving their teaching skills. Therefore, new teachers benefited a lot from these discussions by mostly learning pedagogical content knowledge.

In addition, teachers mentioned that they learnt through the fifth activity was the moderation of exam papers which is part of assessment activities. During moderation teachers were expected to bring samples of marked scripts. They exchanged scripts and re-marked each other's scripts. After re-marking, the subject advisor moderated one script from all teachers and asked a few experienced teachers to assist where necessary. Teachers were expected to comment after remarking of each script for the development of the teacher concerned. The comments included the fairness during marking and whether learners were awarded marks fairly or unfairly by the teachers. Comments were given in a positive way that helped teachers to improve their marking skills. The subject advisor also used a projector to display a sample of a learner's unmarked script for teachers to mark and explain why they marked answers correct or incorrect. Later, the subject advisor explained the memorandum to them after their discussion and teachers gained more information from that.

The last activity indicated by two participants was the implementation or demonstration of practical tasks by expert teachers in the PLC meetings. This contributed to the pedagogical content knowledge learnt by teachers. Teachers shared their skills on how to conduct practical tasks with learners before they conducted them in their respective schools. Some of the schools had the challenge of limited resources and the lack of a library. Therefore, they learnt skills on what or how they could conduct practical tasks with limited resources. For instance, how to form learners groups and make sure that all of them participate equally.

The second critical research question aimed to understand the extent to which the PLC served as an effective PLC. In this section characteristics of effective PLCs by Brodie (2013) were used to analyse the data. Brodie (2013) identified six characteristics of successful PLCs, namely, they: (a) are long term and developmental, (2) focus on artefacts of practice such as student thinking, tasks and instructional practices, (3) use of actual classroom data, (4) encourage design and reflection on the part of teachers, (5) are job-embedded (school-based) and therefore, blur the boundaries between teaching and learning about teaching, and (6) promote the development of professional learning communities (p. 5).

Another key finding of this study is that the PLC partially reflected the features of an effective PLCs. Five of the above features of effective PLC were reflected in the findings of the study.

Firstly, data collected indicated that PLC meetings were developmental and long term (Brodie, 2013). Data collected concurred with the above statement in that teachers indicated that they learnt more information from the meetings and they learnt continuously from each other as they met more than once per term. In addition, all participants showed an interest in attending the PLC meetings for their professional development. Furthermore, participants indicated that they developed better skills because they now know the subject content better than before and also learnt how to present it to learners. This shows that teachers learnt both content and pedagogical knowledge during PLC activities.

The second characteristic, a focus on artefacts of practice such as student thinking, tasks and instructional practices appeared in most responses of the participants (Brodie, 2013).The participants indicated that the focus of the PLC meetings was based on teacher learning and improving learner performance. Teachers met for discussions of subject content, teaching strategies and how they could improve learner performance. Almost all participants indicated that their teaching had improved due to their participation in the PLC meetings and they learnt new information.

The element of instructional practice appeared in the data collected. Findings from semi-structured interviews revealed that teachers gained new strategies on how to teach life sciences. Bongiwe confirmed that she is implementing the peer teaching method which she didn't know before she attended the PLC meetings. In my observation, I also noted that teachers were taught how to conduct life sciences practical tasks. Participants highlighted that their learners were performing better than before since they met and shared their skills with other teachers. Others also indicated that learner performance had improved and learners were passing life sciences with quality results.

Thirdly, teachers discussed their classroom challenges. They learnt how to teach overcrowded classes, teach learners with different learning difficulties and also how to conduct practical tasks in schools with limited resources. Therefore, the third characteristic, namely, the use of actual

classroom data was evident. Teachers shared their daily classroom problems and received advice and solutions.

The fourth characteristic of a successful PLC is that they encourage design and reflection on the part of teachers. The data collected through observation, showed that teachers were encouraged to reflect on how they taught specific sections in life sciences. Teachers shared different strategies and skills on how to conduct lessons. Teachers revealed that they solved problems collaboratively in the PLC. The observations indicated that teachers with experience in teaching life sciences shared solutions which were supported by the subject advisor. Most teachers reflected on their performance and challenges. Few teachers did not share their problems because they did not want to appear as teachers who do not know the subject content.

The fifth characteristic of effective PLCs is that it should be job-embedded or school-based and therefore, blurred the boundaries between teaching and learning about teaching. This was based on what actually occurred in the PLC. The data collected indicated that teachers discussed teaching and learning challenges and solutions. They focused on their profession as teachers. Lastly, data collected supported that teachers met continuously. Participants validated that they met more than once per term. They also indicated that they met whenever there was a need to do so. This shows that the PLC was effective since they promoted professional development of teachers.

5.4 Limitations of the study

The study was limited to six grade 12 life sciences teachers teaching in the same district in different schools. Therefore, teachers who teach other grades were not examined since I wanted to examine grade 12 teachers in particular. The study was also limited to life sciences teachers only, so other subjects were not included in the study. The duration of the study was not long which I believe could have influenced findings of data collected through semi-structured interviews and observations of three PLC meetings in one district. So, the findings of the study cannot be generalized across the country because the study was conducted in a small-scale setting of the province.

Therefore, the results of the study are limited to the group of six grade 12Life Sciences teachers who participated in the study and their district. As a researcher/ teacher teaching grade 10Life

Sciences in the same district, it is possible that my presence could have influenced responses of some participants. However, to avoid bias I explained my position in the study to ensure trustworthiness.

5.5 Recommendations

The findings of the study were in relation to the professional learning activities that occurred in the PLC and the extent to which the PLC served as an effective PLC. The study showed that teachers participated in various activities that enhanced their understanding within the community. Most of the activities helped them to improve their content knowledge and skills, and how to teach it to learners. Therefore, teacher participation in PLCs is highly recommended. It is also recommended that it should be compulsory for new teachers to attend PLCs in order for them to gain more knowledge and skills to improve instructional practice from expert teachers.

Most teachers indicated that facilitators of the meetings normally were experienced teachers and the subject advisor. Therefore, it is recommended that the department of education support PLCs as a compulsory practice for all teachers to attend and share creative strategies and apply their skills. A further recommendation is that experts from other fields or provinces be invited to share their expertise during PLC meetings as teachers may be motivated to listen to the other people in the PLC meetings.

5.6 Conclusion

The study revealed that teachers learnt better through interaction with other teachers during group discussions in PLC meetings. This study further showed that teachers need to participate in PLCs even though they were trained in various institutions for their professions. The study highlighted that teachers learnt through several activities in the PLC. The study found that grade 12Life Sciences teachers engaged in activities related to assessments, content discussions, and sharing new teaching strategies. The study further highlighted that PLCs were inclusive for teachers who lacked knowledge and needed help in developing themselves professionally. This study helped to understand teacher learning activities that occurred in PLCs. All activities were regarded as useful by the participants in their learning as life sciences teachers. The study found that the life sciences PLC could be regarded as an effective PLC, to some extent, since it displayed most features of effective PLCs as discussed by Brodie (2013).

5.7 References

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Appendix 1 - Informed consent for subject advisor

Private bag x 509
Kokstad
4700
29November 2017

The Subject advisor (Life Sciences)
Harry Gwala District
Kokstad
4700

Dear Subject Advisor
Re: Request for permission to observe PLCs meetings for Life Sciences.

I am pursuing Masters in Education at the University of KwaZulu-Natal. I am conducting a research project titled "**Examining Teacher Learning of Grade 12 Life Sciences teachers in a Professional Learning Community located in the Harry Gwala District"**.

I humbly request your help in this research project by being granted permission to observe PLC meetings. The participants in my study will be grade 12 Life Sciences teachers from schools within a cluster.

Teachers will be expected to respond to each question in a manner that will reflect their own personal opinion. The schools' or the participant's identities will not be divulged under any circumstance. All teachers' responses will be treated with strict confidentiality. Pseudonyms will be used (real names of the participants and the institution will not be used throughout the research process). Participation is voluntary; therefore, participants will be free to withdraw at any time without negative or undesirable consequences to them. The participants will not, under any circumstances, be forced to disclose what they do not want to reveal.

Observations will be written down during PLC meetings by researcher only if the permission is obtained. Data will be stored at my supervisor's office in the University of KwaZulu-Natal in a locked cupboard for a maximum period of five years, thereafter it will be destroyed.

You may contact my supervisor, the Research Office or me should you have any queries or questions:

Supervisor:
Dr Jacqui Naidoo
Tel.0332605867
E-mail: NaidooJ@ukzn.ac.za

UKZN Research Office
Mr. P. Mohun
HSSREC Research Office Ethics
Tel: 031 260 4557
E-mail: mohunp@ukzn.ac.za or hssrec@ukzn.ac.za

My contact number:
Cell: 0795199908
E-mail:rubelat@hotmail.com

Your positive response in this regard will be highly appreciated.

Yours faithfully

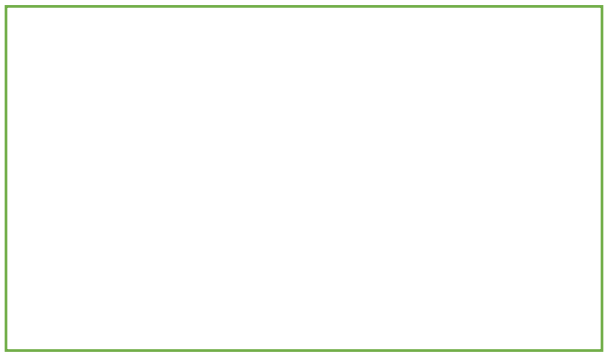
Thanduxolo Rubela

Declaration

I…… (Full names of the subject advisor) of..……(District name) hereby confirm that I have been informed about the nature, purpose and procedures for the study :Examining Teacher Learning of Grade 12 Life Sciences teachers in a Professional Learning Community located in the Harry Gwala District. I have received, read and understood the written information about the study. I understand everything that has been explained to me.

Signature of subject advisor …….Date……

Official Stamp



Appendix 2 - Consent form for school principal

Private bag x 509
Kokstad
4700
29 November 2017

The Principal
P. O. Box 261
Kokstad
4700

Dear Principal
Re: Request for permission to conduct research in your school.

I am pursuing Masters in Education at the University of KwaZulu-Natal. I am conducting a research project titled "**Examining Teacher Learning of Grade 12 Life Sciences teachers in a Professional Learning Community located in the Harry Gwala District"**.

I humbly request your help in this research project by being granted permission to conduct my study in your school. The participants in my study will be grade 12 Life Sciences teachers from your school and other neighboring schools within a cluster. They will be required to participate in individual interviews that are expected to last between 30 to 60 minutes at the times convenient to them which will not disturb teaching and learning. Follow-up interviews may be conducted if necessary. Each interview will be voice-recorded.

Please note that the school and participants will not receive material gains for participation in this research project. Teachers will be expected to respond to each question in a manner that will reflect their own personal opinion. The schools' or the participant's identities will not be divulged under any circumstance. All teachers' responses will be treated with strict confidentiality. Pseudonyms will be used (real names of the participants and the institution will not be used throughout the research process). Participation is voluntary; therefore, participants will be free to withdraw at any time without negative or undesirable consequences to them. The

participants will not, under any circumstances, be forced to disclose what they do not want to reveal.

Voice recording of interviews will only be done if the permission of the participant is obtained. Data will be stored at my supervisor's office in the University of KwaZulu-Natal in a locked cupboard for a maximum period of five years, thereafter it will be destroyed.

You may contact my supervisor, the Research Office or me should you have any queries or questions:

Supervisor:
Dr Jacqui Naidoo
Tel.0332605867
E-mail: NaidooJ@ukzn.ac.za

UKZN Research Office
Mr. P. Mohun
HSSREC Research Office Ethics
Tel: 031 260 4557
E-mail: mohunp@ukzn.ac.za or hssrec@ukzn.ac.za

My contact number:
Cell: 0795199908
E-mail:rubelat@hotmail.com

Your positive response in this regard will be highly appreciated.

Yours faithfully

Thanduxolo Rubela

Declaration

I……(Full names of the principal) of ……(School name) hereby confirm that I have been informed about the nature, purpose and procedures for the study :Examining Teacher Learning of Grade 12 Life Sciences teachers in a Professional

Learning Community located in the Harry Gwala District. I have received, read and understood the written information about the study. I understand everything that has been explained to me and I consent voluntarily for the school to be part of the study.

…….. ……

Signature of Principal Date:

School stamp

Appendix 3 - Letter to participants

Private bag x 509
Kokstad
4700
29November 2017

Dear Participant

REQUEST FOR PERMISSION TO CONDUCT RESEARCH

My name is Thanduxolo Rubela, a Master of Education (MEd) student in the School of Education at the University of KwaZulu-Natal (Pietermaritzburg Campus). As part of my degree fulfillment, I am required to conduct research. I therefore kindly seek your permission to participate in my research study. The title of my study is **"Examining Teacher Learning of Grade 12 Life Sciences teachers in a Professional Learning Community located in the Harry Gwala District".**

You will be interviewed for approximately 30-60 minutes at a time convenient to you which will not disturb teaching and learning. You may be requested to do a follow-up interview if necessary. Each interview will be audio-recorded. Responses will be treated with confidentiality and pseudonyms will be used instead of the actual names. You will be contacted well in advance for interviews, and you are purposively selected to participate in this study. Participation will always remain voluntary which means that you may withdraw from the study for any reason, anytime if you so wish without incurring any penalties. There will be no financial benefits that you (participant) may accrue as a result of their participation in this research project. Your identity will not be revealed under any circumstance/s, during and after the research process. All the responses will be treated with strict confidentiality. Pseudonyms will be used to represent the school and your name. Data will be stored at my supervisor's office in the University of KwaZulu-Natal in a locked cupboard for a maximum period of five years, thereafter it will be destroyed.

You may contact my supervisor, the Research Office or me should you have any queries or questions:

Supervisor:
Dr Jacqui Naidoo
Tel.0332605867
E-mail: NaidooJ@ukzn.ac.za

UKZN Research Office
Mr. P. Mohun
HSSREC Research Office Ethics
Tel: 031 260 4557
E-mail: mohunp@ukzn.ac.za or hssrec@ukzn.ac.za

My contact number:
Cell: 0795199908
E-mail:rubelat@hotmail.com

Your positive response in this regard will be highly appreciated.

Yours faithfully

Thanduxolo Rubela

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 withdrawn from the project at any time, should I so desire.

I hereby provide consent to the following data collection activities (please tick):

	YES	NO
Interviews	☐	☐
Audio recording of interviews	☐	☐

Signature of participant	Date
……..	……

Appendix 4 – Interview Schedule

INTERVIEW SCHEDULE FOR GRADE 12 LIFE SCIENCES TEACHERS

1. What is your gender?

Male ☐

Female ☐

2. What is your present position?

Principal ☐

Deputy Principal ☐

HOD ☐

Teacher ☐

3. What are your educational qualifications? What subjects did you major in?
4. How many years of experience do you have as a teacher?
5. How many years have you been teaching grade 12 life sciences?
6. Why did you choose to teach Life sciences out of all the subjects?
7. What do you like about teaching life sciences? Explain
8. What don't you like about teaching life sciences? Explain
9. What is your understanding of professional learning communities?
10. In your view, what is the purpose of PLCs?
11. How often do you attend professional learning community meetings?
12. What types of learning activities take place in life sciences Professional Learning Communities (PLCs) meetings?
13. Describe the activities that take place during life sciences PLCs meetings.
14. What are you expected to bring / do prior the life sciences PLC meetings?
15. What are you expected to do/ have you been doing in life sciences PLC meetings?
16. Which activities do you find most useful? Why?
17. What activities in life sciences PLCs help you to improve your understanding as a life sciences teacher? Describe these activities

18. What teaching strategies are you implementing currently in your classroom as a result of your involvement in PLCs? Have you used the material/skills obtained through the PLC in your classes for teaching? Explain.
19. To what extent do the life sciences PLC meetings you attend function as effective PLCs?
20. To what extent do you share your content and classroom challenges at PLC meetings? Give examples
21. Describe the solutions to these challenges you get from the PLCs?
22. How do PLCs promote continuous teacher learning?
23. To what extent does PLCs promote a reflective culture among teachers?
24. How has your teaching of Life Sciences improved as a result of attending PLC meetings?
25. What do you think is lacking in the PLC meetings? Explain
26. What do you think you still need to learn to become an expert as a Life Sciences teacher?
27. What can be done to improve teacher learning at PLC meetings?
28. Is there anything more that you would like to tell me about PLC meetings? If yes, please feel free to share it.

Appendix 5: Observation Schedule

DATE:	Program?

Prompts and comments:

Planning and understanding

Purpose/ objective of the PLC meeting clearly outlined?	Presenters/ Facilitators were knowledgeable?
Planning and organization of PLC meeting	Handouts
Outcomes of the meeting	Key activities done:
	Content topics/teaching strategies/assessment discussed
Teacher learning activities done	Teaching experiences and teaching strategies shared
Additional information, if any	

Appendix 6 –Ethical clearance

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

20 March 2018

Mr Thanduxolo Rubela 215076526
School of Education
Edgewood Campus

Dear Mr Rubela

Protocol reference number: HSS/0179/018M
Project title: Examining Teacher Learning of Grade 12 Life Sciences teachers in a professional learning community located in the Harry Gwala District

Full Approval – Expedited Application

In response to your application received on 1 February 2018, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....

Professor Shenuka Singh (Chair)
Humanities & Social Sciences Research Ethics Committee

/pm

cc Supervisor: Dr J Naidoo
cc. Academic Leader Research: Dr SB Khoza
cc. School Administrator: Ms Tyzer Kihumalo

Humanities & Social Sciences Research Ethics Committee
Professor Shenuka Singh (Chair)
Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Telephone: +27 (0) 31 260 3587/8350/4557 Facsimile: +27 (0) 31 260 4609 Email: ximbap@ukzn.ac.za / snymenm@ukzn.ac.za / mohunp@ukzn.ac.za
Website: www.ukzn.ac.za

Appendix 7 – Gatekeeper's permission

education

Department:
Education
PROVINCE OF KWAZULU-NATAL

Enquiries: Phindile Duma | Tel: 033 392 1063 | Ref..2/4/8/1416

Mr T Rubela
Private Bag X 509
Kokstad
4700

Dear Mr Rubela

PERMISSION TO CONDUCT RESEARCH IN THE KZN DoE INSTITUTIONS

Your application to conduct research entitled: **"EXAMINING TEACHER LEARNING OF GRADE 12 LIFE SCIENCES TEACHERS IN A PROFESSIONAL LEARNING COMMUNITY LOCATED IN HARRY GWALA DISTRICT"**, in the KwaZulu-Natal Department of Education Institutions has been approved. The conditions of the approval are as follows:

1. The researcher will make all the arrangements concerning the research and interviews.
2. The researcher must ensure that Educator and learning programmes are not interrupted.
3. Interviews are not conducted during the time of writing examinations in schools.
4. Learners, Educators, Schools and Institutions are not identifiable in any way from the results of the research.
5. A copy of this letter is submitted to District Managers, Principals and Heads of Institutions where the Intended research and interviews are to be conducted.
6. The period of investigation is limited to the period from 11 January 2018 to 30 June 2020.
7. Your research and interviews will be limited to the schools you have proposed and approved by the Head of Department. Please note that Principals, Educators, Departmental Officials and Learners are under no obligation to participate or assist you in your investigation.
8. Should you wish to extend the period of your survey at the school(s), please contact Miss Phindile Duma at the contact numbers below
9. Upon completion of the research, a brief summary of the findings, recommendations or a full report/dissertation/thesis must be submitted to the research office of the Department. Please address it to The Office of the HOD, Private Bag X9137, Pietermaritzburg, 3200.
10. Please note that your research and interviews will be limited to schools and institutions in KwaZulu-Natal Department of Education.

Harry Gwala District

Dr. EV Nzama
Head of Department: Education
Date: 15 January 2018

KWAZULU-NATAL DEPARTMENT OF EDUCATION
Championing Quality Education - Creating and Securing a Brighter Future
Postal Address: Private Bag X9137 • Pietermaritzburg • 3200 • Republic of South Africa
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Tel.: +27 33 392 1063 • Fax.: +27 033 392 1203• Email:Phindile.Duma@kzndoe.gov.za •Web:www.kzneducation.gov.za
Facebook: KZNDOE....Twitter: @DBE_KZN....Instagram: kzn_education....Youtube:kzndoe

Appendix 8 – Editing letter

Proofwrite Solutions

WRITE - EDIT - RESEARCH - DESIGN

17th of January 2019

To whom it may concern

EDITING OF DISSERTATION FOR MR THANDUXOLO RUBELA

I have a master's degree in Social Science, Research Psychology and TEFL qualification from UKZN. I also have an undergraduate and honour's degree Bachelor of Arts in Health Sciences and Social Services from UNISA.

I have 15 years of teaching experience and have been editing academic theses for students from UKZN, UNISA, the University of Fort Hare, and DUT for the past seven years. I have further done editing, transcribing and other research work for private individuals and businesses.

I hereby confirm that I have edited Thanduxolo Rubela's dissertation titled **"Examining Teacher Learning of Grade 12 Life Sciences Teachers in a Professional Learning Community Located in the Harry Gwala District"** for submission of his master's dissertation in education at UKZN. Corrections were made in respect of grammar, tenses, spelling and language usage using track changes in MS Word 2010. Once corrections have been attended to, the dissertation should be correct.

Yours sincerely

Shuttleworth

Terry Shuttleworth (TEFL, UKZN, MSocSc, Res Psych, UKZN).

Appendix 9 – Turnitin report

Turnitin Originality Report
Thesis by THANDUXOLO RUBELA
From Postgrad chapters (Postgrad chapters)

- Processed on 17-Jan-2019 6:25 PM CAT
- ID: 1033324348
- Word Count: 21061

Similarity Index
8%
Similarity by Source
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http://theses.ucalgary.ca/bitstream/11023/2340/2/ucalgary_2015_sinal%20skelton_perri.pdf

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Submitted to University of Nottingham on 2018-01-12< 1% match (Internet from 08-Sep-2017)

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https://researchspace.ukzn.ac.za/xmlui/bitstream/handle/10413/9409/Nene_Florence_Zandile_2013.pdf?isAllowed=y&sequence=1

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