Higher Education teachers' use of social computing in their teaching: The case of the University of KwaZulu-Natal

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Supervisor: Prof Wayne Hugo

DECLARATION

Submitted in fulfilment of the requirements for the degree of Doctor of Philosophy (Higher Education) in the Graduate Programme in the School of Education, University of KwaZulu-Natal, Pietermaritzburg, South Africa.

I, Rosemary Diane Quilling, declare that

1. The research reported in this thesis, except where otherwise indicated, 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

To the colleagues, cohort leaders and members, friends, and family members who supported me when times were tough. Thank you so much, you may never know how much it meant…

Craig and Sue, who co-taught with me, and were generous with their time

Jill, for that one visit … just when I needed it; when we spoke about a model for innovation

Wayne, as my supervisor, … you were always supportive. How did you not lose patience with me?! I am ever grateful that you kept my eye on the ball and challenged me,

Sue, you deserve a special mention and thanks ☺

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My family need the most acknowledgement and yet no words would seem sufficient to recognise the many years of patience, consideration and sacrifice they have endured.

Keagan and Kendra: I hope the snappy, stressed mom will now leave…

unfortunately I can't guarantee it ;)

Gary: I have reached for more, and achieved more because you are in my life, my best friend, the greatest support and anchor to my life. Thank you for always challenging me to do just that little bit more than I think I want to … Another shared success. Thanks!

And to Mom, you know what you and your support mean to me…

I just wish Dad was here to share this.

All of this, achieved through a practical faith that has guided my life.

Amen

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Abstract

Educational technology literature explores the reasons Higher Education (HE) teachers provide for why they use (or do not use) social computing (Web2.0) applications in their teaching. Reasons are often provided as lists of factors impacting use, rather than systemic, context-based explanations of how patterns of use or non-use have developed over time, are instantiated, and shift in specific instances. This case study, based at the University of KwaZulu-Natal (UKZN), South Africa; focuses on 18 HE teachers. The context is challenging, complex and in a state of systemic flux; providing sufficient reasons for teachers to choose <u>not</u> to innovate in teaching. When the study data was produced, the institution had experienced an institutional merger (eight years prior), reorganisation into a college structure (within a year) and was plagued by annual student protests related to student access.

A critical realist approach was used as the underlabourer for the study. Teacher use of social computing is represented by an innovation reinforcement cycle of Commitment, Effort and Results. Mechanisms operating at each point in the cycle provide micro-points of interaction or system delays. HE teacher agency is articulated through the use of individual tactics and processes based on social capital. Processes, represented by system causal loops, illustrate the dynamics within the social teaching (and learning) arena and interactions with the institutional structures and processes. The ‘Circuits of HE Teaching Power’ framework represents the flow of power through institutional standing conditions, processes of systemic and social integration, and influences the arenas of negotiation in which actor agency operates. The circuit is completed when actor agency influences standing conditions. Underlying institutional and academic social norms are reinforced through obligatory passage points (OPPs) which seek to govern and control behaviour. Outside the institutional boundary, external forces may influence, and be influenced by, processes of both social and system integration. This theoretical framing is focused on being able to integrate an explanation of processes at both the individual and systemic levels, indicating its relevance at the operational-, tactical/management- and strategic/policy-level. This explanatory framing can also be used as a methodological device: from the individual teacher micro-scale to the institutional macro-scale, as well as at a variety of levels of abstraction, ranging from the transitive empirical and actual layers to the potentially more intransitive layer of the Real.

Abbreviations

AL	Academic Leader. Academic head of a discipline, UKZN
ANT	Actor Network Theory
BL	Blended Learning
CDA/ cda	Critical Discourse Analysis
CHE	Council on Higher Education, South Africa
CI	Classroom Instruction
CoP	Community of Practice
CR	Critical Realism
CS	Computer Science
DDD	Dominant Discipline Discourse
DHET/ DoHET	Department of Higher Education & Training, South Africa
F2F	Face-to-Face, contact teaching
HDI	Historically Disadvantaged Institution
HE	Higher Education
HEQC	Higher Education Quality Committee, CHE, South Africa
ICS	Information & Communication Services, UKZN
IPO	Input, Processing, Output (cycle)
IS	Information Systems
IS&T	Information Systems and Technology
ICT	Information & Computer Technology
IT	Information Technology
LMS	Learning Management System
MCQ	Multiple Choice Question
MOOC	Massive Open Online Course
MRT	Motives, Resources and Tactics
NGO	Non-Governmental Organisation
NPM	New Public Management
OER	Open Educational Resource(s)
OPP	Obligatory Passage Point
PA	Positional Autonomy
PBL	Problem-Based Learning

PC	Personal Computer
PCK	Pedagogical Content Knowledge
PM	Performance Management
PSET	Post-school Education and Training
PU	Productivity Unit, research productivity measure at UKZN
Q&A	Question & Answer (activity)
QPA	Quality Promotions & Assurance unit, UKZN
RA	Relational Autonomy
RQ	Research Question(s)
RR	Relational Realism
RSS	Really Simple Syndication (feed)
SA	South Africa
SC	Social Computing
SMS	Short Message Service
SNS	Social Network Site e.g. Facebook, Twitter, Ning
SoTL	Scholarship of Teaching and Learning
T&L	Teaching & Learning
TA	Teaching Assistant
TI	Teaching Innovation
TMSA	Transformational Model of Social Activity
TPACK	Technological, Pedagogical and Content Knowledge
TWL	Teaching WorkLoad. A UKZN WAM policy
UK	United Kingdom
UKZN	University of KwaZulu-Natal, South Africa
UNISA	University of South Africa
US/ USA	United States/ United States of America
UTLO	University Teaching and Learning Office, UKZN
VLE	Virtual Learning Environment
VOIP	Voice Over IP (Internet telephony)
WAM	Workload Allocation Model
WoM	Word-of-Mouth

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1 Introduction

> *It is this triple convergence – of new players, on a new playing field, developing new processes and habits for horizontal collaboration- that I believe is the most important force … Giving so many people access to all these tools of collaboration, along with the ability through search engines and the Web to access billions of pages of raw information… (Friedman, 2006, p. 211)*

1.1 Introduction: Focus of the Study

Globally, academic staff in Higher Education (HE) institutions are being placed under ever-increasing pressure to meet institutional requirements to perform as both teachers and researchers (see e.g. Becher & Trowler, 2001; Friedman, 2006; Weiler, 2005). Debates on the way in which educational systems have responded to this challenge are relevant in that they impact the way teachers go about their teaching. Some educationalists place content knowledge centre stage and as a result the teacher is also placed in a privileged position. The alternative position is where the learner is placed at the centre. Young and Muller (2010) suggested the two views of education should be brought into dialogue.

In order to serve the educational needs of growing numbers of students, efficiency and effectiveness of teaching comes under scrutiny. Computers have the potential to increase efficiency, effectiveness, reproducibility and reliability of data and information: Because of this, they have become a functional necessity in business, and many other areas of life (Carr, 2003). Unsurprisingly, then, the use of technology in teaching, while not without its tensions and challenges, is already well established (Lowendahl et al., 2010; Unwin, 2007). However, because the use of technology in teaching is well established, this does not necessarily mean that it is well understood. It is thus important to go beyond describing the interaction and to consider the underlying mechanisms and tendencies which could be relevant to the outcome.

In addition, 'technology' embraces such a large spectrum of devices and applications, that the scope of this study has been limited to HE teachers' use of 'social' computing, in order to gain some purchase in the vast and shifting landscape of a variety of technologies. However, the level of theory development in this area is also "still low" (Schlagwein & Prasarnphanich, 2014, p. 123). The main focus has been on adoption and use of specific technologies by students and teachers with few attempts to theorise use based on individual characteristics or at an institutional level (Shen & Ho, 2020). The term ‘social media‘, which is more commonly used, has a variety of definitions and “does not specifically imply computer-technology based devices; in fact it can even be seen as including physical notice- or bulletin-boards (Cohen, 2011). This study thus uses the term social ‘computing‘ to specify the vehicle for social engagement as being computer-based or digital technology: “Social computing is (thus) found at the intersection of computer networks and social networks” (Musser et al., 2003, p. 1). Social computing (SC) does not refer to a single technology but rather a range of technologies, that allow non-technical users to become not only consumers of information, but also contributors or producers of online information. These are also referred to as Web2.0 technologies (O'Reilly, 2005).[1] For a more detailed discussion of the meaning and history of the term ‘social computing’ refer to Appendix A*: The meaning and history of ‘social computing*.

There are three reasons why this technology is of specific interest in education: Firstly, the high penetration of mobile phones in South Africa (Rao, 2011) at 70% among youths (Gillwald et al., 2018, p. 7) and the potential increase in numbers of ‘techno-savvy‘ students (Bennett et al., 2012), a term popularised by Oblinger and Oblinger (2005); Secondly, as learning requires interaction, either with artefacts or individuals (Bell, 2011; Young & Muller, 2010), technologies tailored to this level of flexible use seem appropriate to an educational environment particularly when the screen has replaced the book as the main medium of communication (Kress, 2003). Finally, SC while attracting large numbers of users is still not well understood and thus is of interest in its own right (Bennett et al., 2012; Landry, 2010; Schlagwein & Prasarnphanich, 2014; Shen & Ho, 2020). By 2015, HE teachers perceived SC as being able to impact learning; but outcomes were not seen as significant and a third of teachers who taught online did not think outcomes were as good as they achieved in a conventional classroom (Straumsheim et al., 2015). Yet by 2018, 44% of HE teachers reported teaching online as compared to 30% in 2013 (Lederman, 2018, p. 1) and by 2019, 46% (Lederman, 2019, p. 1) [2]. The percentage of these teachers who believed

[1] Technology advances are such that further advances (beyond those known as Web2.0), such as the semantic web and use of location-based intelligence is already a reality. The intention is thus to consider ‘emerging social computing technologies’ potentially beyond those strictly defined as Web2.0.

[2] Figures post-2019 are not comparable with the pre-COVID 19 context and dataset of this study.

the outcomes achieved are comparable to face-to-face teaching are reasonably stable: slightly down, from 33% in 2017, to 30% in 2018 (Lederman, 2018, p. 1) but up to 32% in 2019 (Lederman, 2019, p. 1).

The imperative for use of technology in teaching is clear from a management perspective as, for example, the use of a Learning Management System (LMS) achieves distinct management objectives (Watson & Watson, 2007). The support of technology use can also be argued from a learner perspective and pedagogical position. There does, however, still appear to be tension, and evidence of resistance, around actual implementation by teachers in the classroom. There could be numerous reasons for non-use or low-use, and while these are important, this study is motivated from a practical position: While there may be many reasons to choose not to use a technology there are those who, in the face of a host of challenges, still elect to do so. Understanding these lecturers' teaching practice may help us to understand the phenomenon better, from a different perspective, than if we focused on those who find the reasons 'not to use' technology more convincing.

Because of the hype and theoretical speculation around emerging technologies it has become important for more empirical studies to be undertaken so that these phenomena can be better understood and theorised. Selwyn and Grant (2009, p. 82) suggested "it seems appropriate that the field of education technology begins to also ask questions which one could term as being 'state-of-the-actual' as opposed to being 'state-of-the-art', that is, questions concerning what is actually taking place when social software technologies meet education". This study responds directly to this call and focuses on the HE teacher as the unit of analysis. In part, this is a pragmatic decision based on the assumption that in most South African HE classrooms the teacher has authority and agency in terms of decisions e.g. the use of SC technology. This does not deny the agency of other individuals such as the learners, but it does suggest that the teacher has a position of potential privilege in the classroom.

1.2 The aim and significance of the study

The aim of the study is to untangle, and theoretically re-present, HE teachers' use of SC in their teaching, in order to theorise possible generative structures and mechanisms which lead to SC use. It is thus a response to the call to focus on theorising the underlying “knowledge practices” and “principles underlying those practices” (Howard & Maton, 2011, p. 194).

At the same time the study needs to accommodate the complexity inherent in an education system as well as that associated with the use of a software system. A tension thus exists between simplifying the problem domain via a traditional reductive approach to focus on the discipline-specific variables, and the need to embrace a transdisciplinary, inquiry-driven perspective that embraces complexity (Montuori, 2013). It is important, as the researcher, to be as transparent as possible in explaining the development of the study as it unfolded: to clearly delimit the boundaries of the variables, bodies of knowledge, assumptions, context(s), technologies and teachers included in the study in order to illustrate the elements of complexity. Simultaneously, however; the study needs to move beyond the focus on the “contextually-bound” (Mishra & Koehler, 2006, p. 1018) or “material elements … necessarily rooted in specific contexts” (Morrow, 2007, p. 11), to uncover ideas with the potential to draw together viewpoints which may have previously appeared unconnected, disjointed or limited in some way and provide insights of broader relevance.

The theoretical contribution of the study relates to the interplay between the structures and agents, context and mechanisms, and the way in which they present as tendencies and opportunities for SC use in HE teaching. This study thus contributes to the body of knowledge on teachers and their teaching and in so doing, contributes to the fields of educational technology and pedagogy. More generally, the knowledge gained with respect to how individuals use, or redefine the use of, SC in specific contexts contributes to the literature on the use of emergent technologies as Information Systems solutions in different sectors.

1.3 The literature context for the study

At the heart of this research is the assumption that learning is enriched when there is some form of dialogue embedded in the learning process; that learning is enhanced if it involves sharing, discussion and debate around ideas (Lave & Wenger, 1991; Scott, 2009). The study participants may, however, not share this view of learning. Thus it is necessary to consider the HE teachers' use of SC in their teaching in the context of their understanding of teaching (and learning).

In order to contextualise how this study has been conceptualised, four aspects within the reference literature are briefly introduced in this chapter: the HE teacher and their teaching; what is meant by 'use' of technology; SC technology and its links to teaching; and the findings from a few of the studies which have focused on SC use and teaching in HE.

1.3.1 Terminology: The HE teacher, teaching and use of technology

It is important to clearly define the concept a 'HE teacher': an individual or part of a collective; academic tribe (Becher & Trowler, 2001) or a community (Wenger et al., 2002). The HE teacher may maintain membership in a number of communities and may use SC in many areas of their academic lives to strengthen communication, collaboration and relationships. This study will, however, only focus on SC use in teaching (Greenhow & Gleason, 2014).

What does 'teaching' mean? Teaching is "messy, indeterminate, provisional and situated" (Trigwell & Shale, 2004, p. 526). Morrow (2007, p. 14) suggested that "teaching is characterised as a practice. … To call something a 'practice' is to locate it in a history and a tradition; practices are not invented by individuals and anyone who engages in a practice must acknowledge that the standards of success and excellence are neither 'subjective' nor imposed by those with institutional and systemic power. They are interpersonal standards agreed by those in the community of practice." Trigwell and Shale (2004, p. 526) suggested "teaching enables learning of some specific content knowledge" but on its own is inadequate and they stressed that it is critical to consider "pedagogic resonance" or "pedagogic bridging". This requires thinking through the teaching and learning process in terms of the transformation of content as represented in the mind of the teacher, to the motivation and representation of that content in the learner's mind. But even when learning independently, the learning process happens within a specific social context (Brown & Duguid, 2002). It is not possible to analyse the pedagogic resonance aspect of teaching in this study. This would require a detailed engagement with the individual learners in the classes, which would increase the scope of the study, and volume of data handling required.

Teaching is constituted as practice, but a clear sense of what is meant by the use of technology also needs to be explained. In Information Systems research the terms ‘adoption’ and ‘acceptance’ of technology are used (Davis, 1989; Venkatesh et al., 2003). In addition, the idea that Information and Computer Technology (ICT) focuses on “transmission and transformation of information” (Dillon, 2004, p. 139) implies that there is an optimum design which can be achieved to deliver information. This view of technology has dominated in education. Within a HE institution, specific use of technology may be enforced, while other use may be self-motivated and voluntary. What is not taken into account is that a technology is not necessarily used in predefined ways and individual users may configure its use in intrinsically personal ways. Likewise, technology is not neutral but “both shapes and is shaped by practice”(Greenhow & Gleason, 2014, p. 394). Part of this shaping of individuals, technology and their environment, occurs because “centripetal social needs, which call people together, compete with centrifugal technologies that allow them to move apart” (Brown & Duguid, 2002, p. xix). The affordances of the technologies and the characteristics of the users interact in ways which allow both to co-evolve (Conole et al., 2011).

‘Use’ of SC in teaching is thus multifaceted and requires a detailed operational definition: use can refer to the way in which someone engages with the technology. This will include the purpose to which it is put but also the nature of the engagement and the extent of engagement. The purpose goes beyond functional use and introduces the process of meaning- or sense-making. Kress (2010, p. 137) suggested “an approach to communication and to the production of semiotic entities through design – whether as texts or as semiotic objects of any kind – presupposes familiarity with the affordances of all material involved, of the characteristics of the social environments in which the designed ensembles will be active and of the facilities and affordances of the media involved”. When dealing with SC, however, one is dealing with an ever-changing reality, where options can disappear, morph or be replaced within weeks, days or hours. SC decisions should thus be considered ‘beta’ approaches which may require a change of plan at short notice, are ‘satisficing’ rather than optimal (as a better option may present itself shortly…) and where decision costs are low. As a result the individual does not need to be highly invested in the particular technological solution.

1.3.2 Social computing: A rapidly changing landscape

While the terms 'Web2.0', 'social software' and 'SC' may be used interchangeably they are slightly different. Numerous technologies can be classified as Web2.0. Web2.0 tools, while they may include partial local implementations, apply the principles of cloud computing i.e. primarily hosting an application on the web, or an alternate server rather than hosting on a desktop. The nature of Web2.0 tools is varied but they do share the common aims of allowing individuals to produce their information in numerous formats, to publish them on the Internet, to allow comments and discussions around content, to draw content to themselves and to collaborate (Anderson & Rainie, 2008; O'Reilly, 2005). These include, for example, blogs, microblogs, video and photo sharing sites, social networking sites, RSS feeds, social bookmarking, wikis and 3D virtual worlds.

There are numerous perspectives from which SC can be viewed. According to Musser et al. (2003, p. 1), "social computing refers to using information systems as 'places' for social interaction as well as 'spaces' for data collection and manipulation". On the other hand, definitions may stress the potential social and power shifts which may occur as a result of these technologies: SC as defined by Forrester (an independent research company www.forrester.com) is "a social structure in which technology puts power in communities, not institutions" (Charron et al., 2006). They suggested that three tenets embodied in this definition are: (1) innovation will become a bottom-up process, (2) value will shift from ownership to experience, and (3) power will shift from institutions to communities. Thus the power in the concept is not about the technologies per se but rather about the new relationships that users will form, and the difference in their experiences, in the process of using the technologies. This research uses 'social computing' to refer to the Web2.0 technologies (and others) which allow for different and/or enriched experiences and facilitate the development of interactions and relationships (and hence communities).

1.3.3 Social computing and the HE research agenda

Wolhuter (2014) has illustrated how, in the period 2001 to 2010, e-learning and the impact of ICT on HE (regardless of the focus) only began to enter the agenda of international HE journals at position 19 (of 20 themes) and locally, use of technology in HE appeared at position 13. Technology use has thus only appeared on the global HE agenda in the last decade. In addition, this period was dominated by student-centredness in the HE research agenda which saw student learning and thinking rising higher on the priority scale (to number two) and the focus on teaching, dropping to number four (Wolhuter, 2014). Based on journal database searches during the preparation of the research proposal for this study (2011), it appeared the focus in published education articles had begun to shift from this dominant learner-centred focus to include the teacher, since late 2009 to early 2010. This study thus forms part of this shift in research focus toward teachers and teaching.

A survey of e-Learning Africa's database in 2007 (316 respondents) provides a backdrop of technology use in education in Africa (Unwin, 2008, p. 2): 42 African countries were represented, 37% were from HE institutions, 53% of courses using e-learning were from HE and 12% of respondents came from South Africa. Overall the study showed that there are a wide variety of these practices in Africa but that e-learning should be considered to be in its infancy in Africa. They suggested "the majority of those claiming to be using e-learning are not using an integrated formal learning management system at all, but are rather using basic digital technologies to enhance their learning, more often than not interpreting e-learning simply as accessing information from the Web" (Unwin, 2008, p. 5). The reports published in 2013 and 2014 did not focus on providing the same basic information as the 2008 report. The biggest constraint in 2013 was seen as being the limited bandwidth available and the concern that greater strides had not been achieved in providing Internet access in rural areas (Isaacs et al., 2013). In the 2013 report 18% of respondents indicated they used e-learning to "improve the quality of teaching" (Isaacs et al., 2013, p. 15). These figures were not explicitly available for 2014 (Wainaina et al., 2014). Of interest to this study is the attention given to social media in the 2014 report; with the most used applications being identified as Skype (70% of respondents), LinkedIn (70%), Facebook (82%) and WhatsApp (50%) (Wainaina et al., 2014, p. 65). The use of these media was identified as being for professional networking (80%), sharing information (78%), private communication (74%) and educational purposes (66%)

(Wainaina et al., 2014, p. 65). However, it is not possible to determine how much of this use is for personal gain (albeit in the professional arena) rather than being specifically focused on "being used to improve the quality of teaching". In 2014 technology was used for administration and management (25%), supporting classroom lessons (24%), sourcing educational content (22%) and teacher-student interaction (17%) (Manji et al., 2015, p. 55). In the 2015 report, social media rated amongst the nine most used ICTs in a classroom; projectors (22%) and laptops (22%) were the most commonly used, and social media (5%) one of the lesser used technologies (Manji et al., 2015, p. 55). The figures from 2013 and 2015 cannot be compared as they are aggregated in different categories. In addition, results should be viewed with caution as response rates may be low, e.g. less than half the participants (48%) responded to the question on "use of elearning technology" in the 2008 survey (Unwin, 2008, p. 2). The 2019 eLA report does not focus strongly on social computing use in education. WhatsApp is however mentioned as a more cost effective mechanism than other social media, such as Facebook, for enabling student access to content and sourcing funding for their education (Elletson & Stromeyer, 2019).

These reports suggest that firstly, the concept of e-learning may mean different things to different teachers (even amongst attendants of a focused conference), and secondly, use of these forms of technology-based solutions for teaching is potentially low in Africa. This flags a warning for the research design of this study as it is highly likely that the number of SC users among HE teachers is relatively small. This is echoed by Czerniewicz and Brown (2010) and Ng'ambi (2013) who see the use of technology largely being to support existing, potentially teacher- and content centred-, teaching in South Africa.

1.3.4 Studies of emerging technologies in HE teaching

HE teachers 'teaching' using technology, and SC in particular, are not well understood and in many cases 'teaching' is merely presented as the flipside to the coin that is 'student learning'. From the literature it appears that use of technology may vary on the basis of the knowledge structures that underpin the content knowledge of an academic field or discipline. In addition, the sense of comfort with, and feeling embedded in the technology, may play an important role.

Jump (2011) has provided a systematic review of 16 cases of lecturers' use of technology in their teaching in HE. She found that lecturers introduced technology in order to remove or change the boundaries of power (weaken classification), as a mechanism for controlling content and the pace of learning (strong framing), to support lecturer-centred teaching (strong classification and framing), and in an integrated context where students appear to have considerable control (weak classification and framing). Her use of Bernstein for analytic purposes has thus clearly highlighted differences based on the nature of the knowledge structure and discourse in specific contexts. Other studies suggest that differences may arise along disciplinary lines, where different disciplines use technology in different ways (Ajjan & Hartshorne, 2008; Arbaugh et al., 2010). Until approximately 2011, despite a great deal of activity in the area, there appear to be a limited number of empirical studies and in particular those applying a critical lens (Bennett et al., 2012).

A useful illustrative example is a New Zealand study of six tertiary level teachers and their use of technology in their teaching (Lawrence & Lentle-Keenan, 2013). The findings provide a personalised insight into the individual teacher experience that is not evident in other broader-based studies. The findings show that several of the teachers used their own experience of technology to explain their teaching practice and focus on available information that supports their existing beliefs, rather than information that may challenge their positions. Contrary to some of the literature they cited, Lawrence and Lentle-Keenan (2013) found teachers did not uncritically migrate their offline teaching practice into the online setting. Tension associated with the role of the institution was clearly articulated as they all felt the pressure to provide web-based teaching while the institution did not provide adequate support and guidance. Teachers felt they are left "pretty much on their own" lacking a clear institutional strategy (Lawrence & Lentle-Keenan, 2013, p. 18). Additional tension arises between subject matter experts and the instructional design unit who are perceived to begin infringing into the domain of the subject expert.

The literature around technology in education and specifically blended learning, emphasises that technology can provide great potential for higher education but has neglected to highlight the challenges which lecturers face in making the transition to technology as part of their practice (key references are provided in Ocak (2011)). The definition of blended teaching (and learning) is "murky" as there are differences of opinion of the percentage of a course that should be presented online to qualify as "blended" (Ocak, 2011, p. 690). In this study the term is used generally to refer to any combination of F2F and online teaching/ learning. Ocak concluded that lecturers find blended teaching a complex process with challenges relating to the actual instructional processes as well as due to community concerns and technical issues. The Ocak (2011) study employed a quantitative methodology, using a survey to focus on the broad perspective of technology and related challenges. His study can be seen to represent a typical example of many of the existing studies focusing on HE teachers' use of technology, with the focus on a deficit model (i.e. what is wrong). Underlying this account (and others like it) appears to be the assumption that technology-enabled learning is 'best' and that if we could achieve the 'perfect technology solution', all problems related to teaching will be resolved. While this statement itself is an over-simplification of the author's stance, this thread of thinking is present in the wider literature.

There may be a difference in views of technology based on how comfortable one is with the technology and the degree to which it has become part of daily life. Initially, HE teachers may feel, when using technology, like 'digital immigrants' compared to their perception of their students as 'digital natives' (Jones et al., 2010; Kolikant, 2010; Prensky, 2001). The digital immigrant/ native discourse has been criticised as having a generational aspect which is not supported by research and is thus disputed in academia. Its powerful resonance has however popularised its use which endures in the media and business (Thomas, 2011). Prensky (2009), Thomas (2011) and White (2009) all argued for a more nuanced understanding of the potential divides that separate 'users' and 'non-users'. Prensky (2009, p. 1) argued that "digital wisdom" should become the goal: "referring to both the wisdom arising *from* the use of digital technology to access cognitive power beyond our innate capacity and to wisdom *in* the prudent use of technology to enhance our capabilities".

1.3.5 South African studies of emerging technologies in HE teaching

A few South African studies (2010-2013) are useful to provide a local view of the issues noted in the global context. A substantial research study by Czerniewicz and Brown (2010), using a nested survey and including four series of surveying over five years, provides useful insights into the teaching-learning relationship in the presence of technology. They concluded that relationships between teachers and their students have not been altered and that the technologies are being used to strengthen or reproduce traditional teaching activities. They found students were not social software users: 71% hardly ever publish and only 41% upload content. Czerniewicz and Brown (2010) thus, in contradiction to other studies, did not find a blurring between academic LMS and social software boundaries and suggested "such findings underline that the 'knowledge power' remains with the teachers" (Czerniewicz & Brown, 2010, p. 147). Of interest though is that they see boundaries around content and curriculum weakening with students using ICTs to access web content in ways which are meaningful for them. Access is being determined by connectivity not by location specifically as a result of cell phone penetration in the market. Note for instance the teaser posed by their quote from one student: "The lecturers don't extensively use [the LMS], so the students also use other forum such as Facebook and SMSes" (Czerniewicz & Brown, 2010, p. 150). This quote suggests that students are actively seeking options, which more specifically suit their needs, even if their teachers are absent from these spaces.

A 2011 study, surveying 262 educators across 22 South African HE institutions, determined that the emerging technologies are used to support research (75%), sharing of resources (68%) and use of open educational resources (60%) (Ng'ambi, 2013, p. 655). The list of technologies identified as being used most in innovative ways is dominated by learning management systems (24%), with few identifying specific Web2.0 applications such as blogging, podcasting/ vodcasting and microblogging (between 3-8%) (Ng'ambi, 2013, p. 655). Ng'ambi highlighted that the majority of respondents used these technologies to support prescriptive learning with a limited few using the technologies in transformative ways.

Bozalek, Ng'ambi, et al. (2013) referred to data collected in the same August-September 2011 time frame with 242 respondents across 22 institutions, mostly from South Africa; with 57% of respondents drawn from the Western Cape region and none of the respondents being from UKZN. Their definition of emerging technologies is based on functional use rather than based on the nature and features of the technology. They found respondents' primarily explore technologies because of personal interest and passion and because they are supplied by their institutions. Respondents report better interaction and communication with students, positive feedback from students and thus an indirect impact on teaching and learning. The two main institutional limitations are access to the Internet and computing equipment while lecturers' are challenged by "lack of time/ time management" and "lack of colleagues support due to fear of change, resistance" (Bozalek, Ng'ambi, et al., 2013, p. 431). Students' participation is limited due to lack of skills and "lack of motivation (especially if no marks allocated)" (Bozalek, Ng'ambi, et al., 2013, p. 431).

Ng'ambi (2013) and Bozalek, Ng'ambi, et al. (2013) both employed mixed methods in their study and focused on a 'bigger picture' view of the use of technology in teaching and learning. Their South African studies provide a regional, systemic perspective with the focus on identifying factors of interest. This PhD study is limited in scope to a single institution, using a qualitative approach, to focus on determining the role of structures, mechanisms and processes that arise and perpetuate over longer time frames, and which may result in the tendencies being observed in these larger studies.

1.3.6 Conceptual drivers for the study

The literature has thus highlighted the definition of the key concepts of teaching, and what it means to be a teacher, as well as defined 'use' of technology and 'social computing'. In addition, an introduction to the current state of e-learning internationally, in Africa and South Africa has been considered.

The literature has highlighted the lack of studies focusing on the nature of, and influences on, individual lecturers' HE teaching. The bulk of the research has been from the learner-centred perspective and has thus focused on learning, rather than teaching. In particular, studies on technology use in teaching have focused on groups or communities of teachers and have often resulted in descriptive accounts of use that highlight the deficits i.e. why technology is not being used or is constrained. This body of knowledge appears to have a subtext that suggests perhaps an ideal educational technology solution is possible that will suit everyone… *if only the teachers could identify it* … Authors do not intend this; but rather it seems a logical conclusion that it should be possible to determine a 'best' solution, based on the dominant narrative around technology in HE. There are challenges in approaching this topic from the disciplinary perspectives of Education and Information Systems: Education is focused on the educational outcome i.e. "educating" students. This limits the research attention paid to the teachers in teaching, as they are reduced to ONLY their role in the teaching-learning dyad rather than the focus being placed on their role in the Academy as a whole and how the agency exercised in teaching impacts, and is impacted by, this broader context. Similarly, the focus of Information Systems is on the technology and how it is able to serve the user needs and specifically on optimising the efficiency and effectiveness of processes. These disciplinary perspectives thus result in 'the teacher using technology' being viewed from a simplified and somewhat reduced perspective.

At a meta-paradigmatic level this study takes an integrative transdisciplinary approach in that it aims to include the complexity of the teachers' position by taking a topic-, or inquiry-based perspective rather than focusing only on the dominant disciplinary discourse (DDD) in educational technology (Montuori, 2013). An integrative transdisciplinary approach does not however, exclude the role of the disciplinary specialisations in the research domain but rather aims to complement the insights offered by the specialised fields in the related disciplines of Education and Information Systems (Montuori, 2019). The complex role played by both education and technology in individuals' lives and society at large, makes these knowledge areas particularly suited to integrative transdisciplinary studies (Bernstein, 2015; Montuori, 2019).

Transdisciplinary research is seen as having radical roots and is thus considered a critical theory research approach (Toomey et al., 2015). One of the original aims of transdisciplinary research was to focus on 'conscientisation': to consider the power differentials which exist within relations and to reflect on ways to create awareness of inequalities and explore mechanisms to develop relations which are more reciprocal and based on trust (Toomey et al., 2015). There are few empirical studies in the area of SC technologies in education which approach the topic from a critical position (Bennett et al., 2012).

The introductory review of SC presented illustrates that the term itself refers to a complex suite of applications, which is highly fluid and emergent, and which can be employed in numerous combinations and forms. Its very flexibility however allows for a multitude of affordances and presents the HE teacher with a wealth of opportunities. Attempts to theorise the structures and mechanisms underlying SC use are limited (Schlagwein & Prasarnphanich, 2014).

1.4 Paradigmatic positioning

While there is much activity in the area of SC in HE, there are few empirical studies and a limited number that specifically view the use of technology through a critical lens (Bennett et al., 2012). This research is post-positivist, located within the critical realist (CR) paradigm (Bhaskar, 2008). The three-layered ontology of CR consists of the Real, the Actual and the Empirical. The primary ontological position of CR is the existence of the domain of the Real, consisting of generative mechanisms and structures that are independent of our experience and knowledge of them. The Real may consist of a variety of types of entities which may be accessed and known in different ways and which present a range of potential opportunities. These entities may include a wide variety of 'things', as diverse as physical objects, feelings, practices, concepts, languages and structures which may have causal effects but which may not be directly perceptible. "The interaction of these structures gives rise to the events that occur or do not occur (the Actual) and a small subset of these are experienced and observed by humans (the Empirical)" (Mingers, 2004, p. 150). CR therefore espouses "ontological pluralism not in the sense of there being three 'different worlds' as Popper and Habermas suggested, but in the sense that the one 'world' contains many different kinds of entities" (Mingers, 2004, p. 150). As CR sees all studies as part of real, open, systems it acknowledges the complexity inherent in many natural and social systems and its discussion of causality is in terms of emergent tendencies rather than predictive capabilities (Bhaskar, 2008; Mingers, 2004).

This representation of reality provides a useful device for thinking about the research. CR serves as the 'underlabourer' or 'midwife' for this research (Bhaskar, 2008) as it highlights both the focus of the study (understanding the structures and mechanisms within the Real layer) as well as how, through a process of retroduction,[3] we are able to enter the study through the Empirical layer, and Actual layer in order to explore the Real. This layered view of reality serves three purposes: Firstly, it aids the process of developing the research question(s); secondly, it foregrounds the concepts which are likely to be required in the process of theorising, and finally it clarifies the nature of the data which needs to be produced to support the study. These aspects will be discussed in the following sections.

1.5 Key research questions

The aim of this study is to untangle, and theoretically re-present, HE teachers' use of SC in their teaching, in order to theorise possible generative structures and mechanisms which lead to SC use. The main research question is thus:

Why do HE teachers use social computing in their HE teaching, in the way they do?

This question leads to four key research sub-questions:

1. What social computing do HE teachers use in their teaching?
2. How do HE teachers use social computing in their teaching?
3. Why do HE teachers use social computing in their teaching?
4. How do generative structures and mechanisms manifest in the use of social computing in HE teaching?

The study focuses on SC as the research phenomenon. However, the broad definition of the term 'social computing' means that a specific understanding of the phenomenon is gained *in relation to* the participant and the context in which they operate.

1.6 Objectives

The objectives of the study were to:

1. Identify UKZN HE teachers who use social computing in their teaching
2. Select participants, from the UKZN HE teachers identified as using social computing
3. Determine an (initial) strategy for forming the cases, to be modified as necessary
4. Analyse each case per individual and, if necessary, as a group of individuals to
    - Determine what social computing is being used in their HE teaching

3. Retroduction refers to "the inference from a description of some phenomenon to a description of something that produces it or is a condition for it" Carlsson, S. A. (2011, 6-8 June). *Critical realist information systems research in action* Future IS 2011, Turku, Finland.

- Determine how social computing is being used in their HE teaching
- Determine the motivation and factors influencing the use of social computing considering their academic discipline and the relationship between content, pedagogy and technology in their HE teaching
- Determine what generative structures lead to the use of social computing in their HE teaching
- Determine what mechanisms lead to the use of social computing in their HE teaching

5. Identify the generative structures and mechanisms leading to social computing use in HE teaching at UKZN
6. Theorise the generative structures and mechanisms which lead to the use of social computing in HE teaching

1.7 Presentation of the study: Locating a point of entry into the study

A challenge experienced throughout this study was the difficulty of trying to determine what should be included into, and excluded from, the study itself. As HE teachers' interaction with social computing has not received extensive attention in the literature and because the concept of social computing, and social media in general, are not well defined, the two key elements around which the study revolves – HE teachers and social computing – have soft, almost permeable scope-boundaries. This has made the task of delineating what may be of relevance during the study more complex. This has implications for the process of determining relevant theoretical frameworks as well as the research design and data production strategies. The process of understanding the nature of these phenomena as well as their relation to each other is typified by a cycle of selecting well-founded and reasonable strategies to provide a point of entry and reassessing the approach if the assumptions do not hold true. Because this process has formed an integral part of the study, the thesis is written to reflect this chronological progression. This reflective approach is intended to clarify assumptions and choices made to simplify the study domain, or to explore its complexity, in the tradition of transdisciplinary research. The discussion of the theoretical framing and the research design which follow in this introductory chapter thus reflect the position as conceived at the start of the study.

1.8 Theoretical framing

Social computing use cannot be seen in isolation as it is embedded within a social context and may be impacted by individual and group dynamics as well as by how the teachers position themselves, and feel positioned by, their context: This could include conceptions of themselves as teachers and members of their discipline and/ or profession (identity) and their immediate sphere of engagement in HE including their interaction with their students and colleagues, institutionally, nationally and internationally. Thus their personal trajectory in using social computing may be influenced by both their own agency and that exercised by others, as well as the structures they may choose, are required, or are seen, to belong to.

Wenger's Social Theory of Learning (1998a) allows for the process of learning to be constructed as consisting of "doing" (developing a practice), "experiencing" (making meaning of), "belonging" (to a community), and "becoming" (constructing an identity related to the community). This process involves "mutual engagement" of community members, "sharing resources" and focused on "a joint enterprise". These constructs are useful as they underline the fact that communities "invite the interaction that makes them alive" (Wenger et al., 2002). When Charron et al. (2006) suggested social computing "puts power in communities" they highlighted the common element between Communities of Practice and social computing, i.e. they focused on harnessing, and enhancing, the inherent power which resides in a community of people with a shared interest. While this framing provides useful constructs such as those of identity and community, it provides little detail for understanding the HE teacher's practice in terms of their teaching and use of social computing.

In order to provide more detailed theoretical insight into a teacher's practice, the TPACK framework may be useful (Mishra & Koehler, 2006). This framework deals with the teacher's position in terms of the intersection of technological (T), pedagogical (P) and content (C) knowledge (K) which inform teacher practice. Knowledge relevant to each of these aspects of teaching with technology are important, but of particular interest are the areas of overlap between them. When these three areas of knowledge are drawn as overlapping circles in a Venn diagram, the interfaces between them, and how they influence each other, are highlighted as specifically important i.e. T-P, T-C, P-C and T-P-C knowledge. A person may be knowledgeable about the independent silos of knowledge (technology, pedagogy and content) but this is different to a person who has an integrated knowledge of how technology can play a role in a specific content domain, while employing a specific pedagogical approach. Figure 1 illustrates how the components of both the Social Theory of Learning and TPACK can be used to help explain the position of the teacher in relation to SC use in teaching. Figure 1 suggests that the teachers' practice is influenced by a variety of aspects of their identity (dark blue core) and the interactions between their technological, pedagogical and content knowledge (yellow sheath). The impact on students is further mediated through the SC platforms they choose to use (red sheath). Students in their classes (purple discs) may be differentially impacted as the class characteristics e.g. in terms of size and content may vary noticeably.

TPACK, however, deals with 'knowledge of' rather than the 'use of' a particular technology and thus is still a limited framing. It is also important to remember that because the technology, pedagogical approach and content relevant to each teaching event may vary, the explanation of a teacher's practice may also need to be multidimensional.

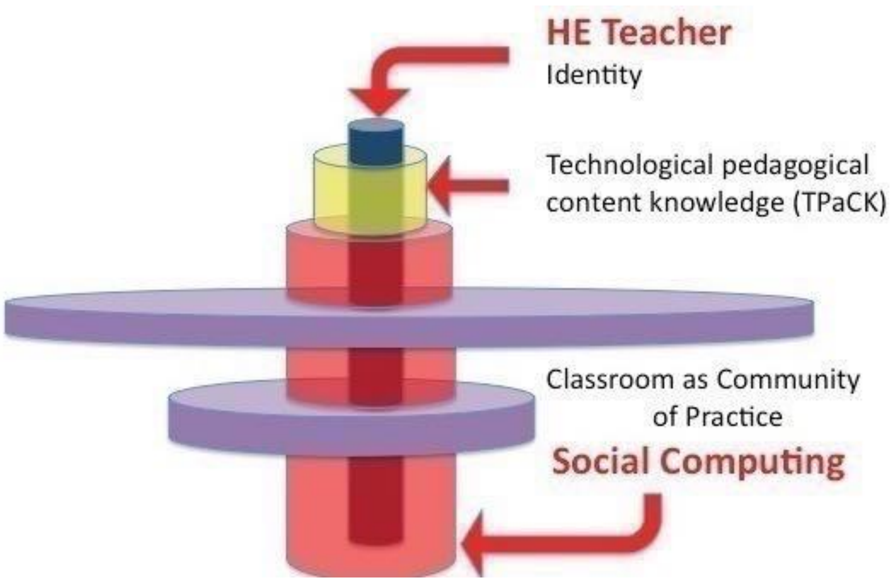


Figure 1: Theoretical framing for data production

Elements from both the Social Theory of Learning – often referred to as the Community of Practice framework, named after one of its main constructs (Wenger, 1998a, 2006) – and TPACK (Mishra & Koehler, 2006) remain useful in the process of data production.

1.9 Research design and methodology

This section introduces the overarching research design as initially conceptualised: the setting and preparing to enter the field, case selection, data production, data analysis, data validity and ethics and limitations of the study.

1.9.1 Research design

Understanding a HE teacher's use of social computing is multifaceted and requires qualitative exploration to produce detailed, thick data to enable the unravelling and representation of the dynamics involved. In order to achieve this, a case study approach was used.

Runeson and Host (2009, p. 134) presented a case study as "an empirical method aimed at investigating contemporary phenomena in their context". They also suggested a case study approach is useful where the boundaries between the phenomenon and its context are less defined. This research involves multiple cases, where each case serves as a unit of analysis and may represent a single HE teacher who self-identifies as using social computing in their teaching (Eisenhardt, 1989).

1.9.2 Setting and preparing to enter the field

The University of KwaZulu-Natal (UKZN) South Africa was selected as the site for the study (http://www.ukzn.ac.za). UKZN commenced on 1 January 2004, from a merger between the University of Natal and the University of Durban-Westville. The institution is comprised of four colleges (since 2014) and has five campuses over two cities but at the commencement of the study operated under an eight faculty structure.

This study is interested in those lecturers who use social computing in their teaching, as they represent an instantiation where, no matter the challenges they may be presented with, they have elected to implement these technologies. Selecting all cases from a single institution helps to develop a weak boundary for the cases. A detailed register of the use of social computing for teaching at UKZN is not available. In order to develop a list of potential participants, key players in the university teaching and learning and technology spaces were interviewed, for their specialist input. A total of 43 teachers' names were provided via purposive and snowball sampling, 18 of which identified as using SC in their teaching.

1.9.3 Case selection

The original case selection strategy followed the suggestion from Eisenhardt (1989) to perform purposive sampling with the intention to fill theoretical categories of polar types (opposites) and extreme cases. A decision on the number of cases could not be made until potential participants were determined.

In August 2011 UKZN had 1319 permanent and contract 'Instruction/Research Professionals' (Division of Management Information (DMI), UKZN, 29 August 2011). Teaching staff details were interrogated for teachers' location in a specific faculty (discipline or field) as a dimension for consideration during case study selection: High teacher numbers were recorded in the Humanities, Development and Social Sciences, the NRM School of Medicine and Science and Agriculture (200+). This is followed by Education, Health Sciences and Management Studies with less than 100 teachers in Engineering and Law. The selection of participants was intended to consider the different knowledge domains and pedagogies represented in the different faculties as these are known to influence use of technology (Ajjan & Hartshorne, 2008; Arbaugh et al., 2010; Becher & Trowler, 2001; Jump, 2011). Due to the nature of the academy, it is suggested that the rank or position that a HE teacher occupies could impact the communities of practice in which they have, and are currently, participating. Case selection thus also considered participants' level in the organisation: in 2011 47% were lecturers, 19% senior lecturers and 22% formed the professoriate.

During the list generation and commencement of the interview process, it became clear that theoretical sampling would not be viable and thus all 18 identified teachers were selected for interview.

1.9.4 Data production

As the study focuses on individuals' choices and motivations, interviews were seen as the best platform to produce data. Other sources were considered and are discussed in further detail in the research methodology chapter.

Selection of SC applications and their use, by a single teacher, can also vary greatly based on the teaching context and strategy. Thus, determining what is used, as well as how it is used, are two distinctly different questions. The theoretical framing suggests that it is important to determine how teachers view themselves, their use of SC and the communities in which they self-identify, as well as issues related to the academic discipline and teaching. The interviews explored potential differences in social computing use with different classes of students as well as probing perceptions of technology and motivations for use. This discussion included the teachers' views on the interaction between 'technology-, pedagogy- and content-knowledge', or the ways in which they saw these elements represented in their practice. It was also expected that interviews would include reflections on past and current use, and how this had developed.

1.9.5 Data analysis

Data production and analysis phases were interwoven. Qualitative analytical software tools were used, initially Atlas.ti and due to technical challenges, thereafter, NVivo 12 Pro.

Critical realism allows for analysis based on the three ontological layers. The retroduction process requires specific focus on observations and perceptions of events, as the outcome of the generative structures and mechanisms operating in the Real. As the Real can consist of tangible things, intangibles such as ideas, concepts, feelings, reasons, languages, meanings and norms, as well as practices and social structures, analysis aimed to elicit all potential forms and instantiations of these elements. Fairclough (2005) presented the case for critical discourse analysis (CDA) as an appropriate analytical tool within critical realist research. CDA stresses that discourse is shaped and limited by social structure, and individual's identities, relationships, and systems of knowledge and beliefs (McGregor, 2004). The analysis of the connections and interplays between these elements are an important part of unravelling the mechanisms operating in the Real.

1.9.6 Data validity and ethics

Data quality and ethical practices were legally ensured by the robust ethical clearance policy and its implementation committees at UKZN (protocol reference number HSS/1248/011D). Interview transcripts were checked twice because of challenges with technical terminology in the professionally transcribed interviews. Detailed audit trail information can be found in the research methodology chapter to provide details on the trustworthiness and reliability of the data and to allow for interrogation of researcher assumptions. An opportunity was provided for the participating HE teachers to provide input on the sections of the analysis pertaining to their input.

1.9.7 Limitations of the study

Limitations of this study were primarily linked to the data production process and thus were determined once the list of potential participants was available and at the point of case study selection. Theoretical sampling could not be used due to the list of available participants including only 18 HE teachers. It is possible other teachers were using SC at the time of data production but these did not emerge during the list generation process. In addition, only users of SC were interviewed which may create a limited perspective by excluding views of non-users which could have provided other relevant insights. The term ‘social computing’ may also be interpreted differently by different participants.

1.10 Conclusion

This introduction has provided a broad view of the study, specifically in terms of how literature and theory has underpinned its design. These areas will be further explored in Chapters 2, 3 and 4, respectively dealing with an introduction to educational technology use in HE, a focus on social computing applications and their use in HE teaching and the theoretical framing of the study. The research methodology chapter (Chapter 5) deals with both the research design and the implementation of the research method. This includes discussion of the data production process as well as providing insight into the research instruments employed. The data results and analysis are dealt with simultaneously as is commonly the case in qualitative research where this prevents unnecessary duplication of descriptions. Chapter 6 introduces the SC applications used by participant teachers and their reasons for SC use. Chapter 7 and 8, respectively discuss the individual and student factors influencing individual teacher use of SC, while Chapter 9 focuses on the processes that influence, and are influenced by, their SC use. Chapter 10 presents an institutional view of the influential mechanisms and processes. Chapter 11 provides a synthesis of the findings and Chapter 12 concludes the study.

2 Educational technology in Higher Education: An introduction

> *The work of professional educators consists in essence of two structural components: the experiential/linear component that embodies the practice … and the conceptual/ hierarchical component that provides the underlying theory … For the university lecturer, these can be conveniently given the shorthand of 'teaching' and 'pedagogy'. Whilst the teaching is visible, the underlying pedagogy may be less apparent. … It is, however, the pedagogy (composed of values, beliefs, theories and assumptions) that drives teaching and not vice versa.(Kinchin, 2012, p. E45)*

2.1 Introduction

It is not surprising that the use of computing technology is a popular research area within education considering its pervasive presence in all facets of our daily lives. "Over the last ten years, the proliferation of Social Media has represented one of the most significant phenomena in the history of Information and Communication Technologies"; however professional and teaching use lag behind personal use (Manca & Ranieri, 2016, p. 64). The perception of the role social media is able to play in education and how it can be employed to enhance the educational process is less clear. In fact, the rapid rate of change and development of technologies means the potential educational use for a specific technology or application is often not clear, nor fully researched, before the next release or replacement product, is made available.

Literature searches for this study have been supported by the UKZN portal of "Library databases and Journals" and full text accessibility to documents was improved by use of the SFX, Ex Libris journal search facility and the UKZN iCatalogue, supported by WorldCat (www.worldcat.org).

This chapter provides an introduction to educational technology by considering fundamental teaching and technology issues, their alignment and the influence of the broad environment.

2.2 Fundamental aspects of teaching

At the start of an undergraduate degree students are likely to experience delivery-mode or instructivist teaching, where the focus is on the teacher and the content being taught, rather than on the learner and their learning. However, as students learn about a broader range of content and their own focus and perspective of the information begins to sharpen, they begin to shift from a focus on "learning about, to learning to be" and their membership in relevant communities (Brown & Duguid, 2002, p. 221). Morrow (2007, p. 15) presented teaching as "the practice of organizing systematic learning" and in accordance with Morrow's suggestion, this study sought to uncover generative (formal), not merely transitive (material) elements of SC use in teaching.

Another aspect of teaching is the potential difference between the espoused teaching practice and the actual practice. A study of 1139 Taiwanese elementary school teachers revealed that while they espoused learner-centred beliefs about teaching they did not integrate this into the use of technology in their teaching (Liu, 2011). The views articulated by teachers may not be manifest in their practice. This presents a challenge in terms of the authority given to the data presented within the study.

There is also the dual responsibility to educate students and to be publicly accountable for the money invested in this teaching (and research). Technology has the ability to begin to open up and expose teaching spaces by making what was previously private, public. This may stifle academic endeavour or perhaps this interrogation of what teachers do, is overdue. Brown and Duguid (2002, p. 217) suggested that academic freedom should be protected because it is necessary:

> The degree provides a public front of respectability. Behind its broad façade, student and faculty undertake many activities that society directly values. The broad façade also includes some activities that may be socially valuable but are not easily valued in the market. The ability of the degree to shelter these activities from close scrutiny, immediate justification, and micromanagement helps provide society with more diverse and versatile candidates than it knows to ask for. If every detail of a student's learning were held to public account, a lot of valuable experimentation and improvisation would probably disappear.

Teaching is dependent on what one believes needs to be taught. While the curriculum is traditionally recognised as circumscribing relevant knowledge and skills that should be taught; Barnett (2009, p. 430) suggested that knowledge has 'receded' and been replaced by a shift to performativity in a variety of forms. This includes a move from a curriculum that is internally contemplated by the individual to one which is focused on outward performance and constrained to satisfactory performance. There have, however, been more recent calls to ‘recover knowledge’ (Young, 2009; Young & Muller, 2010).

If we are prepared to accept that what needs to be taught is negotiated, then it raises the possibility of multiple “knowledge worlds” (Serres, 1994,(De Beer, 2014, p. 27). Conceptually, it is suggested that an acritical approach be used that allows for all possibilities (De Beer, 2014). De Beer (2014, p. 29) suggested “the emphasis on space brings forward the space between knowledges, the space between disciplines, the connections and possibilities of connections and connectivity between knowledges, and between disciplines within this space, in the ‘between’ of knowledges and disciplines, and the relatedness or connectedness between knowledges, disciplines and the real. The challenge for teachers is that the conceptions of what constitutes knowledge has an important influence on their pedagogy. Teaching not only involves the specialist knowledge and skills of the subject area but also the way in which the subject is taught in terms of the regulative discourse of the subject (Jump, 2011). Teaching may thus be informed by a pedagogy ranging from a teacher-directed pedagogy, through a student-centred pedagogy (referred to as an andragogy), to a student-directed pedagogy (referred to as a heutagogy) (Cochrane et al., 2012).

2.3 Positioning the individual teacher

The ‘potentials’ of technology as perceived by individual lecturers are influenced by a number of factors. Many discussions which deal with the individual as a unit of analysis consider the nature versus nurture debate i.e. whether the way an individual thinks and behaves is a predetermined product of their genetic makeup (nature) or as a result of an enculturation process (nurture). There may also be a variety of external forces on the individual and their actions. Thus a teacher’s agency may be enhanced or constrained by factors related to their immediate (and broader) context. Use of technology will depend on teachers’ perceptions of the potential they represent.

2.3.1 Nature vs nurture debate

Becher and Trowler (2001) explained that early literature (1970-late 1980s) stresses the influence of being nurtured into an academic culture, while work in the 1990s stresses the role of broader societal structures such as gender roles. Literature in the 2000s emphasises personal and professional identity as being constructed and moulded by specific social contexts. It is suggested a variety of perspectives can be used to give meaning to data at the individual level (Becher & Trowler, 2001).

2.3.2 Regulation and agency

An individual's agency is enabled or constrained in numerous ways in society depending on how their behaviour is regulated. Lessig (2006, p. 123) suggested that constraints include the laws, academic societal norms, market forces such as financial, technological and staffing, as well as the 'architecture' or the essential structure of something e.g. how technology is designed, programmed and implemented. These regulators may work together, or against each other, to impact the individual. Of relevance to this study is that for social computing the 'architecture' is the computer 'code' (instructions embedded in hardware or software). Lessig (2006, p. 121) suggested "if in the middle of the nineteenth century the threat to liberty was norms, and at the start of the twentieth it was state power, and during much of the middle twentieth it was the market, then my argument is that we must come to understand how in the twenty-first century it is a different regulator – code – that should be our current concern". Some of the popular virtual learning environments (VLE) are learning management systems (LMS) that are functionally more geared towards teacher-centred (rather than learner-centred) approaches to teaching. The way in which they can be employed in teaching is thus already constrained at an 'architecture' level (Lameras et al., 2012, p. 143).

It should be stressed that individuals, although impacted by these regulators, have free will and thus can also choose to 'push back' against these regulators in an attempt to effect change and encourage a more personalised response (Lamont, 2009).

2.3.3 Academic discipline influences

2.3.3.1 Induction into discipline

Becher and Trowler (Becher & Trowler, 2001, pp. 47-48) explained how being inducted into a disciplinary community or 'tribe' involves "a sense of identity and personal commitment" and suggested a variety of lenses through which this process can be viewed: Postmodernists and neo-Vygotskians speak of 'constructing' a way of being rather than adopting an identity and stress personal, individual agency. An alternative context-specific socialisation suggests a "situated practice" where learning within a community of practice is seen as a systemic and collective process, "a product of people hammering each other into shape with the well-constructed tools already available" (Becher & Trowler, 2001, p. 49). Because identity is a fundamental and deeply personalised sense of self, people become very emotionally invested when their identity is at stake (Becher & Trowler, 2001). The result can be that teachers become defensive, reluctant to say what they think and remove themselves from a discussion. On the face of it, this behaviour appears contrary to the principles of free and open communication as the basis for intellectual progress.

Henkel (2005) suggested that while organisational boundaries in academia have weakened, disciplinary communities are still strong. "At both macro and micro levels the value of academic autonomy remains strong: perhaps not surprising, in view of its centrality in the concept of academic identity. However its meaning is changing. The rights of academics to determine their own agendas now must be set against competing rights… in a context where boundaries have either collapsed or become blurred" (Henkel, 2005, p. 173). She stressed that academics are reading the changes in the HE space and are not in general "helpless pawns in other's games" but are adapting and co-opting support to sustain their positions.

2.3.3.2 Discipline view of knowledge

There exist a number of dimensions along which academics' ontological, epistemological and methodological positions can be mapped.

Lamont (2009, p. 54), in her book *How professors think: Inside the curious world of academic judgment*, described epistemological styles as "preferences for particular ways of understanding how to build knowledge, as well as beliefs in the very possibility of proving those theories”. How teachers think about their content knowledge is fundamental to the way in which they believe it can, or should, be taught.

Figure 2 explains how the continua of methodological styles (reductivism – verstehen) and theoretical styles (scholarly significance – social significance) suggest four positions: A positivist who favours generalisability and hypothesis testing; a comprehensive style which values understanding (Verstehen), attention to detail and contextual specifics; a constructivist who ‘gives voice’ to various groups, values reflexivity and the role of the individual researcher; and the utilitarian who only values instrumental knowledge.

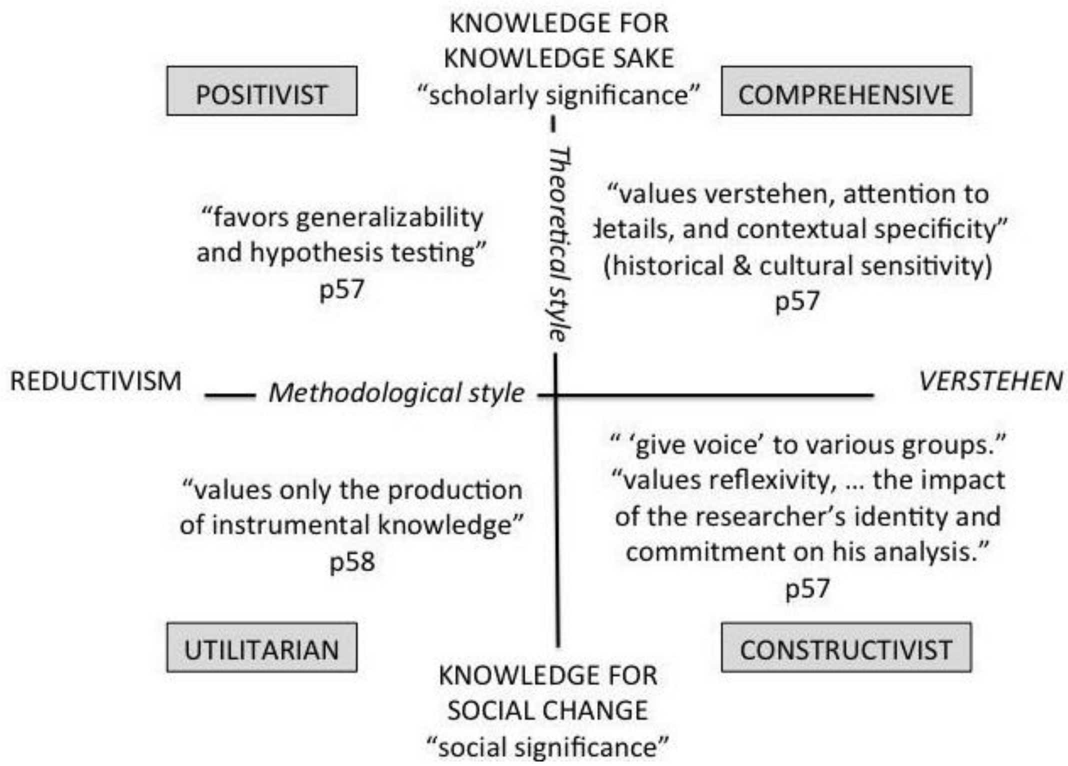


Figure 2: Lamont (2009, pp. 57, 174) epistemological styles (modified)

There are elements of similarity between the approaches of Lamont (2009) and Biglan (1973a) to classifying disciplines. Biglan referred to three dimensions along which academic disciplines can be classified (see Table 1): The first, represents the degree to which a clear paradigm exists i.e. ‘Hard vs soft’ approach to paradigmatic position where a ‘hard’ approach represents a single paradigm and implies greater consensus on content and method and ‘soft’ is more independent and 'idiosyncratic' in terms of accepted content and methods. The second deals with the degree to which the discipline is concerned with the application of knowledge to practical problems i.e. 'pure vs applied' and the third deals with whether or not the focus is on life systems or inanimate objects i.e. 'life system vs non-life system'.

Table 1: Clustering of academic task areas in three dimensions (Biglan, 1973a, p. 207)

Task area	Hard		Soft	
	Nonlife system	Life system	Nonlife system	Life system
Pure	Astronomy Chemistry Geology Math Physics	Botany Entomology Microbiology Physiology Zoology	English German History Philosophy Russian Communications	Anthropology Political science Psychology Sociology
Applied	Ceramic engineering Civil engineering Computer science Mechanical engineering	Agronomy Dairy science Horticulture Agricultural economics	Accounting Finance Economics	Educational administration and supervision Secondary and continuing education Special education Vocational and technical education

Biglan (1973b) used these as an analytical lens through which an academic department and its outputs can be viewed: a single paradigm allows for greater social connectedness especially in terms of research. Academics working in applied disciplines are more committed to service activities and have a generally more socially connected collegial structure than those in pure areas. Life system areas (such as education) are influenced by more role players because the results of the research have direct relevance, and may impact on a greater number of people. Of direct relevance to the methodology for this study are the conclusions Biglan drew in terms of research at an organisational level in universities. He suggested that data collected across a variety of fields should not be analysed without taking into account the specific characteristics of the fields in which the data was collected. The role of academic disciplines (and fields) is suggested as a necessary inclusion in conceptual models of online learning (Arbaugh & Rau, 2007). Similarly, if data is only collected in one, or a few, fields the results will not be generalisable to dissimilar fields. Another discipline-related aspect is the content knowledge of the teacher. If one assumes the academic discipline does not influence the technology-enabled pedagogy "one might conclude that as long as an instructor cultivates participant interaction, establishes a clear course structure, and engages in conduct to reduce the social distance between him/herself and his/her students, that instructor is qualified to teach anything from engineering to the liberal arts to business in an online setting" (Arbaugh et al., 2010, p. 38).

Arbaugh et al. (2010) also cautioned against ignoring disciplinary differences when performing comparison studies. In the early 2000s, research into business courses suggested subject discipline may not have as large an effect as the teacher's experience and how they teach. Hornik et al. (2008) studied 13000 students in 167 undergraduate courses (1997-2003). They found that online 'hard' disciplines with single paradigm focus e.g. hard sciences, nursing and health services, resulted in high student grades and fewer withdrawals than 'soft' disciplines such as social sciences, humanities, management information systems and political science. In 'hard' disciplines there were fewer withdrawals at advanced levels while for 'soft' disciplines fewer withdrawals occurred at the introductory level. The challenge appears to be in the complexity of the interactions between variables.

Lameras et al. (2012) categorised the use of the LMS according to the following dimensions: student- vs teacher-centred, epistemic status of the content, the relationship between the offline and online aspects of the course and the level of study. These categories show a development from a well-defined epistemic view of the content ('hard') in undergrad through to a less defined more negotiated view of content in postgrad. The role of the teacher also changes – from an 'instructor' to a facilitator (Lameras et al., 2012, p. 149 Table 2). Thus, there appears to be an ebb and flow in relation to when and how specific factors may more strongly influence the use of technology in teaching.

There are competing arguments for, and against, being able to use the nature of the paradigm(s) in a discipline as a basis for assessing suitability for online delivery. The fact that a single paradigm implies greater agreement on what should be taught (content) and the methodologies in the discipline, suggests suitability for online delivery compared to those disciplines where multiple paradigms may be employed and thus the content and methodology may be contested within the discipline. In practice, however, students and teachers report that the 'lean' communication available in online courses, and the lack of immediate 'classroom' feedback hamper the explanation of the complex concepts found in the 'hard' disciplines (Hornik et al., 2008). This did not, however, appear to impact student grades (Arbaugh et al., 2010).

2.4 Fundamental theoretical aspects of technology

There are numerous perspectives of the 'affordances' of technology: Some perspectives focus on the potentials technology may allow to be actualised, while others focus on the importance of an actor with a predetermined goal who triggers action (Pozzi et al., 2014). This study considers both of these aspects as an important part of the "affordances" of technology use. Affordances may facilitate our processes and meaning making but are equally able to inhibit what we can achieve and negatively hinder our practice, all of which serves to shape our identity (Kress, 2010, p. 165). Oliver (2013) warned against positioning technology deterministically, as the sole (or main) cause of change; this would be considered an over-simplified view of the interaction between users, their technology and broader social context. The challenge is that "technology is not simply encountered, but must be learnt, and that work is needed to make sense and use of it. Technology is no longer positioned as the cause of practice, but as the residue of practice; it is what is left over when the performance of a practice has ended, and what may be taken up as a resource in future practices" (Oliver, 2013, p. 35). 'Social semiotics' refers to signs which are continually remade within social activity where the relationship between meaning and form are motivated relations based on the interest and intention of the user. The 'aptness' of a technology is based on the intention of the user and their assessment of the ability of the signifier (technology) to serve as the carrier of the message (signified) (Kress, 2010, p. 54). Users thus exercise 'semiotic agency' when making a selection between a range of technologies, templates and features.

One of the fundamental benefits of Web2.0 technologies is the fact that they are readily accessible to the general population and have few barriers to access (O'Reilly, 2005). This includes the fact that they are often based on cloud storage i.e. the information is stored for free on an internationally accessible server, in effect using the web as a platform for computing. It is easily accessible by means of an Internet-enabled mobile phone and thus the barriers to engaging are reduced. In research focused on general affordances provided for HE teaching, Grosseck (2009) suggested compatibility with specific elements in teaching (constructivist approaches) and the existing context (social media use daily) is a distinct advantage. The fact that social computing presents an increase in the number of potential modalities available for teaching and allows for low risk testing of these practices without major changes in the basic teaching, can be a benefit and allow for focus on innovation rather than the technology itself. Nearly half of teachers (48%) see the ability to enhance active learning as an important reason to include technology in teaching (Straumsheim et al., 2015, p. 6).

The challenge presented by how technology is viewed can be represented as a tension between different positions: One position presents technology as an enabler of relationships and connections where an 'apt' technology allows for semiotic agency to be exercised by the users. Another, more negative view suggests the term 'technologies' is an appropriate descriptor because it captures "elements of calculation, distancing, and objectification/ subjugation of agency at play" (Marginson, 2008, p. 282). Another negative perspective was presented by Sandoz (2003), who discussed Baudrillard's view of simulations not only as a false reality but as a representation which signifies that the original reality has been replaced by simulacra.

Through the Critical Theory of Technology lens, Hsu et al. suggested that "technology is a two-sided phenomenon that involves the operator and the object. Where both the former and the latter are human beings, technical action is an exercise of power" (Hsu et al., 2013, p. 700). Specifically they stressed that, by this theory, technology development tends to be top-down rather than bottom-up emphasising that developers, as operators, create the 'need' for a form of technology. This is a one-dimensional system and is likely to cause resentment due to the power differential between the actors. Using examples such as government policy, and the published aim and focus for journals; they also highlighted the potential for the operators to not only be individuals but also structural elements in the system. In their conclusions they suggested that a possible mechanism to address this inequality in the relationship between the operator and the object could be the advent of Web2.0 technologies which "encourage participation, creation and sharing … including getting feedback from the broadly-based users, which constitutes a bottom-up process" (Hsu et al., 2013, p. 702).

The discussion of power differentials between objects and actors focuses attention on how the technology and the user are positioned and their relationship to each other. This relationship is however influenced by a broader context and specific environment in which it operates. Technology located in a specific geographic, social, political and economic context may exist as an entirely different entity from that located in another context. The subsequent subsections explore this aspect of educational technology research in terms of the impact of who performs the research, their paradigmatic position, and the scale at which they focus their research attention.

2.4.1 Country bias in educational technology research

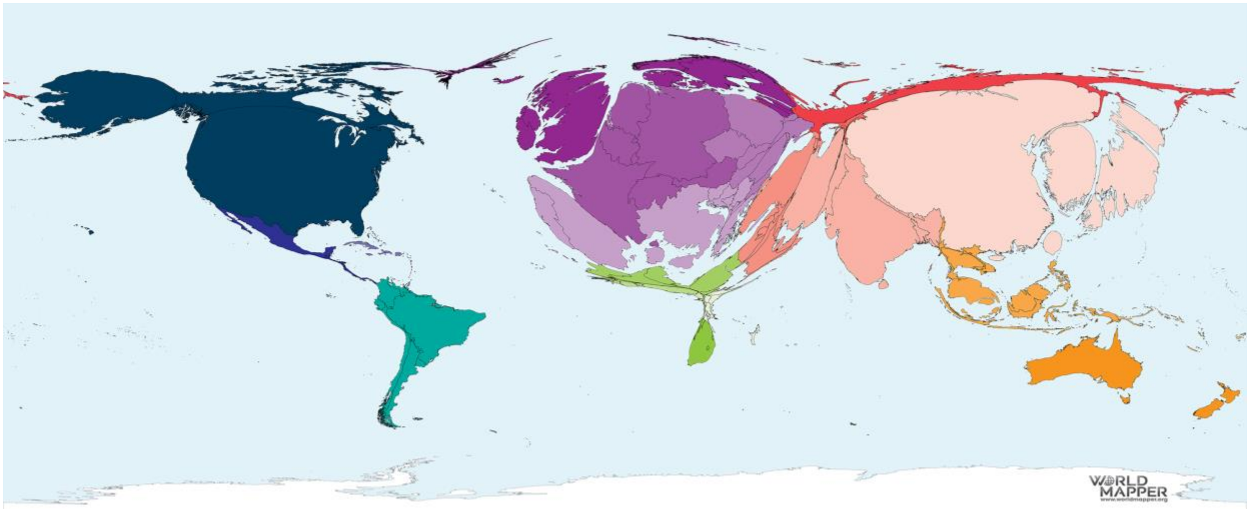


Figure 3: World scaled by the National Science Foundation (USA) Science & Engineering indicators (2016)

The country productivity profile created by Hsu et al. (2013) is based on the first author's affiliation. This presents an interesting global contribution perspective as there is a Western (including Australia) and Far East geographical dominance of the literature. The only exception is Turkey. There are no first author articles from South America, Africa and the Indian sub-continent. The only BRICS country represented in the journals is China. This is not totally unexpected, nor unusual, as this Western and Far East bias is persistent across broad areas of scientific research as evidenced by a 2011 map of Web of Science articles, based on first author affiliation (http://jalperin.github.io/d3-cartogram/) and the 2016 map of the National Science Foundation Science and Engineering indicators (see Figure 3, https://worldmapper.org/maps/science-paperspublished-2016/).

There is thus a strong, developed country author bias in the educational technology literature as presented within these journals (2000 - 2010). It would be interesting for Hsu et al. (2013) to publish the geographic dispersion of the sites studied to compare the locations of study to the geographic base of the lead authors in the research.

2.4.2 Meta-analyses: Educational technology in practice

Research interest in the use of specific technologies by HE teachers has recently developed. Initial studies focused on the general use of educational technologies and how technology can support learning. Meta-analyses are useful to provide an overview of the research domain as they consolidate information from numerous sources.

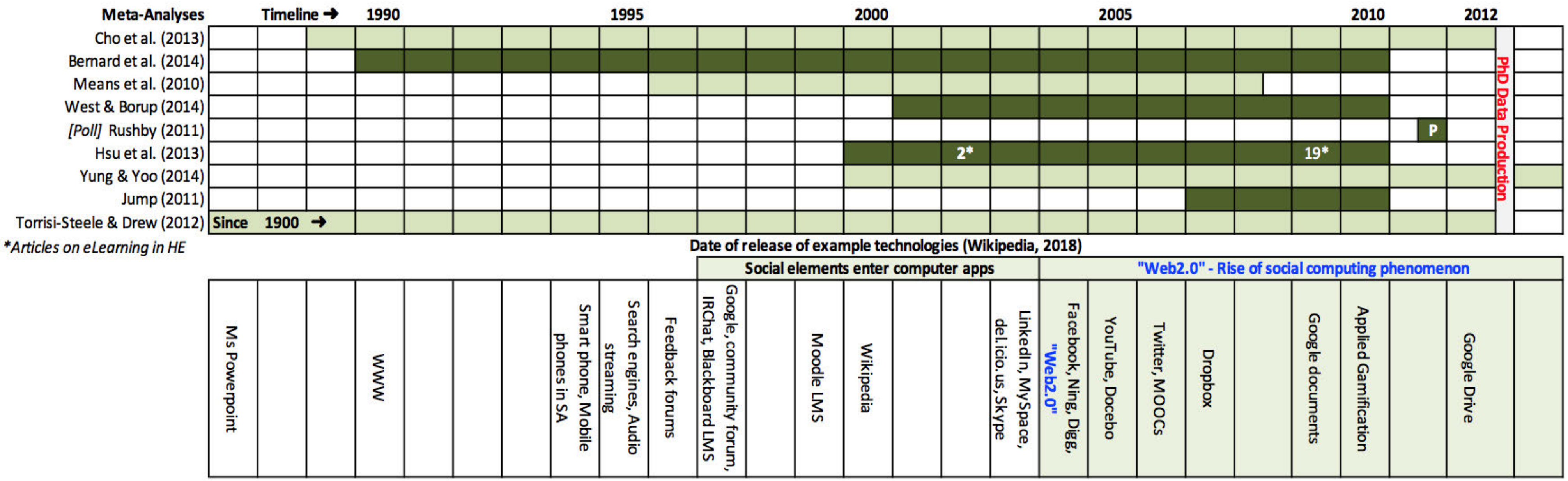
The meta-analyses (and a single poll by Rushby (2011)) discussed in this section very broadly represent a discussion which moves from the general to the more specific in terms of the focus of the studies themselves and the issues of relevance they raise that inform the current study. Overall the meta-analyses indicate that the role of technology is a well-established theme within the field of educational technology. Table 2 presents the time periods covered by the various studies, alongside a timeline representing the introduction of specific technologies. It should be noted that those technologies associated with SC only appear from 2004 e.g. Facebook and the term 'Web2.0' in 2004, and Twitter in 2006. Jung and Yoo (2014) stressed a lack of attempts to connect the findings from new studies with the existing knowledge in the area and agreed with Selwyn (2011a, p. 713) that "unlike most other fields of academic study, educational technology appears particularly resistant to viewpoints that contradict its core beliefs and values – not least the orthodoxy that technology is a potential force for positive change". Jung and Yoo (2014) suggested limited attention is paid to research methods employed. This is important in light of the fact that "research methods are not value-free or neutral, but reflect epistemological positions that determine the scope of inquiries and findings" (Kirkwood & Price, 2013, p. 536).

Cho et al. (2013), through their citation network analysis, have described the educational technology field as a clear, strongly cohesive and relatively self-sufficient community or island in the domain. However, the density of the network has decreased since 1990 as studies on the role of technology have begun to overlap with other areas of related interest making it less 'bounded' in nature. In their taxonomy of educational technology research, Hsu et al. (2013) highlighted the first appearance of 'E-Learning in Higher Education' in their data in 2004 (two articles) with an increased representation of 19 articles in the 2010 data (see Table 2).

They also identified a strong Western (including Australia) and Far East/ China bias in the researchers undertaking the studies (based on first author affiliations). This focused interest is demonstrated in the meta-analysis by Jung and Yoo (2014) focused on the Asia-Pacific region. Unfortunately the locations of the studies themselves were not recorded so it is unclear if the same bias exists in terms of the contexts studied.

Some of the meta-analyses focus on specific sub-themes such as the comparison between traditional classroom instruction (CI) and blended learning (BL) (Bernard et al., 2014; Jump, 2011; Torrisi-Steele & Drew, 2013). Blended learning consists of a combination of classroom and web-based education with possible 'blending' along numerous dimensions (Ocak, 2011). Torrisi-Steele and Drew (2013, p. 373) showed the majority of research focuses on "How to"-studies (69.4%) and to a lesser degree on student-centred issues (25.63%). An academic, or teacher-centred focus is lacking. The area of specific interest in this study is *why teachers use technology in the way that they do.* This links to what they refer to as "differential usage". Only one article of the 827 surveyed attempted to explore this, namely Woods et al. (2004) (Torrisi-Steele & Drew, 2013). Jump (2011) used Bernstein's classification and framing constructs to explain the relationship between the actors (teachers and students), the course content and the technology used and implied teachers have a fair amount of agency and freedom of choice. Her discussion of realisation rules and the influence of external control and performance measures; suggested that institutional and external structures and processes may impact the level of agency a teacher may practically exercise.

Table 2: Timeline indicating span of meta-analyses & release of selected educational technologies



Bernard et al. (2014) found little difference between the effect sizes of the CI and BL approaches, although they did report a wide variability between individual studies and suggest that these may be due to a wide variety of other variables. Plotting effect size against time showed little change in the effect of use of technology over time (Bernard et al., 2014). The nature of the technology available has little impact on outcomes (Means et al., 2010).

When considering the role of technology through a critical lens Hsu et al. (2013) stressed that a power differential is likely to exist between the operator and the object. Historically, technology has been introduced in a top-down manner with the developer creating the need (Jung & Yoo, 2014). This suggests a need for macro-level perspectives of national and organisational settings, asking questions about what technology "in which contexts, for whom and why" (Jung & Yoo, 2014, p. 9). The advent of social computing and Web2.0 technologies (Table 2, 2004 onwards) have however altered this dynamic and introduced the potential for the user to operate independently and exercise their agency in a way previously not possible. Social networking and Web2.0 do not feature as specific areas of research focus in the West and Borup (2014) study. The Rushby (2011, p. 887) poll of 1139 BJET academics highlights social networking and Web2.0 as amongst the top five issues "most important in learning technology at that time". West and Borup (2014) and Means et al. (2010) suggested it is important to understand how teachers use technology in their teaching practice as this phenomenon is poorly understood. Interestingly faculty over age 55 said it helped them develop better relationships with their students which contradicts the notion that technology is for young people. Experience with the tool is seen as the most significant factor for predicting positive attitudes towards use (Woods et al., 2004). Torrisi-Steele and Drew (2013, p. 379) stressed "understanding of academics' existing practice are thus critical not just for facilitating adoption, but for effecting connection to existing practice, the precondition to reflect, and subsequent transformation in practice".

This section (2.4), has highlighted numerous dimensions along which power differentials play out in educational technology use. This is not to suggest these are the only dimensions of power that are articulated and experienced, but rather serves as an introduction to the tensions which exist in this research space. These power dimensions relate to what is researched, where it is researched, who performs the research, their methodological approach as well as their assumptions about the position of technology in higher education teaching. The recognition that prior to the advent of Web2.0 the selection of educational technologies were a predominantly top-down process is an example of where power was situated in the system and how it can shift. This is particularly noteworthy considering that it is also highlighted that the educational technology thematic research area is consolidated in its thinking and resistant to viewpoints that contradict the core.

Jung and Yoo (2014) highlighted issues which they believed are not adequately represented in current educational technology research. Their list suggests three avenues of research: the first, the study of educational technology at the macro-level where institutional and national imperatives dominate and organisational change is potentially not only a reality but perhaps a necessity; the second, is at the level of the individual teacher (faculty member/ researcher) in terms of their perceptions, motivations and context; and finally, the technology applications themselves – what application, for whom and why? From a critical realist perspective, the study imperative can be stated as: To link individual studies to existing research via theory and model building to better understand and theorise the actors and agents associated with educational technology as well as to understand their interactions and links to underlying mechanisms and macro-level structures. Their argument strongly supports the importance of addressing the problem identified for this PhD study as well as the choice of an institutional level case study.

2.5 Aligning teaching and technology

Studies across numerous educational contexts point to a range of teaching approaches which can be mapped on two continua: from content-focused (information provision) to learning- or process-focused (communication-collaboration-knowledge building); and from teacher-centred to learner-centred (Lameras et al., 2012, pp. 141-142).

2.5.1 Dimensions of innovative pedagogies

Pedagogies that either already influence practice or have the potential to do so have proliferated and thus it is useful to apply a schema to consider their main themes, namely:

scale, connectivity, reflection, extension, embodiment, and personalisation (Sharples et al., 2015).

These can be used to draw together approaches previously reported by researchers. The approaches highlighted in the Innovating Pedagogy Open University reports are consolidated in Table 3 (Sharples et al., 2015), that illustrates pedagogies classified under these themes and refers to the annual reports in which they have been discussed. Sharples et al. (2015) also discussed specific teaching and learning techniques which can be used in teaching in general and can be supported by technology in innovative ways. They listed ten approaches which may already be in use or could be used in the future. While innovative pedagogies themselves are not the focus of this research, the way in which social computing may be used to implement or approximate these pedagogies makes them worth noting. The ten mentioned are: (1) Cross-over learning or learning in informal settings; (2) Learning through argumentation; (3) Incidental or unplanned learning while carrying out an unrelated activity; (4) Context-based learning where the context specifically enables learning from experience; (5) Computational thinking as a specific approach to problem solving and based on the decomposition of tasks into smaller tasks or the recognition of prior or known patterns; (6) Learning by doing science with remote labs; (7) Embodied learning based on body-within-context awareness; (8) Adaptive teaching tools which can recommend specific content or approaches to learning based on student experiences and responses; (9) Analytics of emotions which allow monitoring of student eye tracking and facial recognition as a feedback cue of their learning experience and allow learning applications to react accordingly, and finally; (10) Stealth assessment, where automatic data generation and collection of online behaviour allows for an assessment of the learning process.

Table 3: Pedagogy themes that have emerged from Innovating Pedagogy Reports (Sharples, et al., 2015, p.7)

Themes	Pedagogies (with year of report)
Scale	Rhizomatic learning (2012) MOOCs (2012, 2013) Crowd learning (2013) Citizen inquiry (2013) Badges to accredit learning (2013) Massive open social learning (2014)
Connectivity	Seamless learning (2012, 2013) Flipped classroom (2014) Bring your own devices (2014) Crossover learning (2015)
Reflection	Assessment for learning (2012) Learning analytics (2012, 2013) Learning to learn (2014) Learning design informed by analytics (2014) Learning through argumentation (2015)
Extension	Geo-learning (2013) Learning from gaming (2013) Event-based learning (2014) Learning through storytelling (2014) Threshold concepts (2014) Computational thinking (2015) Context-based learning (2015) Incidental learning (2015) Learning by doing real science (2015)
Embodiment	Maker culture (2013) Bricolage (2014) Embodied learning (2015)
Personalisation	Personal inquiry learning (2012) Dynamic assessment (2014) Adaptive teaching (2015) Analytics of emotions (2015) Stealth assessment (2015)

2.5.2 Classifications of technology use

Bernstein's work on recontextualisation "to understand the group in terms of relations to each other, the rules ordering their interaction and factors contributing to differences in power", shows pedagogy as "one discourse which embeds two discourses; these are instructional discourse, which is the specialist knowledge and skills of the subject being taught, and regulative discourse which determines the social order, relations and identity within a learning space" (Jump, 2011, p. 57). The common idea between these two lenses is that the process of teaching with technology is seen as a process of recontextualisation which is socially determined.

Jump (2011) focused on Bernstein's concepts of *classification* and *framing* as respectively dealing with "power relations" and "the control of instruction". These can be scaled on continua where, for example, strong classification delimits clear boundaries stressing what must be learnt (as opposed to what need not be learnt) while weak classification allows for the blurring of these boundaries. Likewise, strong framing suggests teacher-centred instructional methods while weak framing allows for a student-centred approach. Jump thus presented a way of looking at the relationship between teachers, students and the technology used in teaching, in terms of the four combinations in which these dimensions can occur. Of the 16 case studies identified, only 13 are explicitly assigned an approach in her discussion.

Three clear approaches to blended teaching are presented. The first approach, weakened classification and strong framing, blurs the boundaries between formal learning and everyday experiences and emphasises the competences students already have while still retaining lecturer control of the subject-specific knowledge (three studies). The second approach, strong classification and strong framing, is a clear teacher-centred approach (eight studies). This visible pedagogy maintains the traditional boundaries relating to authority over the content and its delivery, with the only boundary change being the timing of learning. This approach allows students to study at home and outside a confined timetable. The third approach, weak classification and weak framing, focuses on personalising the learning and the learning environment, differing from the first approach in that the control (framing) is less overt (two studies). Bernstein differentiated between visible and invisible pedagogies where a visible pedagogy is more explicit while an invisible pedagogy provides students control over selection, sequence and pace so that the control held by the teacher is "implicit and hidden" (Jump, 2011, p. 61). An approach involving strong classification (bounded content) and weak framing (student-centred) was not presented. This suggests that either strongly classified content requires explicit teacher control (strong framing) or that the use of technology is often associated with encouraging students to explore their existing competences and reduces the boundaries of power (weak classification).

A classification of learning technology by Laurillard (2002) according to use, results in five categories of teaching/ learning activities. These categories can be described as: Narrative media e.g. digital text, video and audio focused on "Acquisition"; Interactive media e.g.

digital library, weblinks focused on “Inquiry”; Communicative media e.g. discussion board, online chat focused on “Discussion”; Adaptive media e.g. Online simulation, a virtual laboratory, a quiz providing feedback with focus on “Practice” and productive media e.g. blogs, wikis, digital objects focused on “Production” (Laurillard et al., 2011).

Table 4: Outcome space: Referential and structural aspects of teaching using VLEs (Lameras et al., 2012, p.153)

	Referential (‘what’ of the conceptions)	Structural (‘how’ of the conceptions)		
		Teacher-focused/ content-oriented	Student-focused/ content-oriented	Student-focused/ process-oriented
A	Supporting information transfer	A		
B	As in (A) *and* supporting application and clarification of concepts	B		
C	As in (B) *and* supporting exchange and development of ideas, and resource exploration and sharing		C	
D	As in (C) *and* supporting collaborative knowledge-creation and development of process awareness/skills			D

This typology of learning with technology provides a useful tool for classifying teacher behaviour in terms of the activities stimulated and related learning objectives. Lameras et al. (2012, p. 153 Table 4) extended Laurillard’s classification of use of technology by mapping “what” form the interaction takes (referential dimension) and also “how” they are constructed (structural dimension) (Table 4).

A UK study suggested teachers’ perception of the potential of technology is mainly influenced by their belief of what constitutes good teaching practice in their own context (Brown, 2012; Manca & Ranieri, 2016). Brown (2012) highlighted that context-dependent discussions on teachers’ use of social computing in their teaching are rare and little attention is paid to them. Brown’s literature review suggested that researchers are more concerned with determining and implementing a universal best practice approach – in direct contrast with the suggestions of Biglan (1973b) and Arbaugh et al. (2010) – rather than considering the needs of teachers and students working in specific contexts.

Brown (2012) coded teachers’ perceptions of the potential use of social computing in HE teaching into three types: Teachers who saw the potential of technology in promoting student participation and learning, those who saw it could enhance distribution of, and access to, specifically selected or generated learning content and those who could see no potential for use in any facet of teaching.

2.5.2.1 Type 1 teachers: Stimulate active participation from students

Brown (2012) Type 1 HE teachers see the potential to engage learners and to promote authentic learning (Herrington et al., 2007). They see the potential for student group work or projects and informal interactions between learners resulting in a community of learners. Besides providing access to social learning networks these may also facilitate a connection between formal and informal learning, improve students' social capital, improve their independent learning skills, emotional perspective of their learning and improve motivation (Bozalek, Ng'ambi, et al., 2013; Brown, 2012; Chawinga & Zinn, 2015; Sharples et al., 2015; Sobaih et al., 2016). These more social learning spaces can also assist where students are not learning in their mother tongue (Bozalek, Ng'ambi, et al., 2013).

The focus of this study is on the use of social computing tools in ways that "enrich experience" and allow "the development of interactions, relationships and communities" as part of learning. This suggests a social constructivist pedagogical focus. The 'perfect storm' alignment of appropriate pedagogy, availability of social computing and mobile technology, and technology-aware students, has created a range of educational opportunities not previously available (Brown, 2012; Gachago & Ivala, 2015; Wheeler, 2015). Sobaih et al. (2016) however suggested many HE teachers are not aware of more appropriate social computing tools such as wikis and blogs but confine their focus to social network sites such as Facebook and WhatsApp. In addition, the practical reality is that learning experiences may be more individual-based rather than collaborative; and more passive rather than purposeful and active (Selwyn, 2015). Part of the problem is that many of the assumptions on which the proposed benefits are based are context dependent rather than ubiquitous; e.g. Internet access is a reality in regions such as America and Europe, but this is not the case in Africa (Selwyn, 2011b).

2.5.2.2 Type 2 teachers: Provide access to content resources

Type 2 teacher responses focus on the delivery of content (Brown, 2012). They stress the affordances of "any time, any place" that suit part-time students, those with commitments during conventional classroom times due to family or work responsibilities, students who have missed lectures, who want to enhance their understanding or notes, and who are distance students. Social computing also allows for flexibility in terms of providing access to guest speakers. Teachers stress that these tools are leveraged to allow access in ways not previously available e.g. to use the push features of technology to deliver material and to re-parcel and mash up information into more accessible and meaningful forms (Brown, 2012).

This social constructivist view of technology should not limit its benefits, as technology traditionally has focused on improving both efficiency and effectiveness of HE teaching (Gebre et al., 2015). Although not a focus of this study, these benefits are recognised as useful.

2.5.2.3 Type 3 teachers: No potential use in their teaching

Type 3 teachers in Brown (2012) study are teachers who do not see a potential use for social computing in their teaching. Some of these teachers mentioned contexts in which they could see its value, such as mapping out ideas when doing research or for subjects which had a different nature to their own. There is also evidence of authoritarian styles of management which may be resulting in a negative backlash, as mentioned by a participant in her study: "technology-driven, top-down agendas for changing education are not ultimately useful " (Brown, 2012, p. 54). Closer attention to teaching needs and the potential use of these tools in ways not already prescribed and suggested by specific pedagogical approaches may allow us to discover "that Web 2.0 has affordances we have not hitherto thought about" (Brown, 2012, p. 57).

2.6 Context related influences on HE teachers' perception of social computing

Teachers' perceptions of the potential use of technology use in teaching are influenced by a variety of context related factors at the global, national and institutional level.

2.6.1 Global influences

The potential of social computing can be assessed on numerous time horizons and scales of implementation. The New Media Consortium horizon reports (http://www.nmc.org/publications/) provide information on current and predicted trends in technology use in the HE sector.

Johnson and Adams (2011, p. 1 see figure 5), in their short list of topics across three Horizon projects, highlighted the potential presence and emergence of the use of social computing (see Figure 4 that follows). Social networking is a sub-category of SC including, for example, Facebook, Twitter and LinkedIn. In 2010 social networking was expected to be adopted in the Australia-New Zealand region within a year, and 'cloud computing' and 'mobiles', technologies that support social networking; are profiled in reports on UK HE and a global report (Johnson et al., 2011). Social computing in HE was thus expected to either already be established, or emergent in 2011-2012 as reflected in the NMC Horizon reports.

Short List Topics Across Three NMC Horizon Projects

Technology Outlook for UK Tertiary Education 2011-2016	NMC Horizon Report 2011 Global Edition	2010 NMC Horizon Report Australia-New Zealand Edition
Time-to-Adoption Horizon: One Year or Less		
Cloud Computing Mobiles Open Content Tablet Computing	Cloud Computing Collaborative Environments Electronic Books Mobiles	Cloud Computing Electronic Books Mobiles Social Networking
Time-to-Adoption Horizon: Two to Three Years		
Game-Based Learning Learning Analytics New Scholarship Semantic Applications	Augmented Reality Game-Based Learning Open Content Visual Data Analysis	Augmented Reality Game-Based Learning Open Content Virtual Worlds
Time-to-Adoption Horizon: Four to Five Years		
Augmented Reality Collective Intelligence Smart Objects Telepresence	Brain-Computer Interfaces Gesture-Based Computing Learning Analytics Semantic Applications	Gesture-Based Computing Semantic Web Telepresence Visual Data Analysis

Figure 4: Emerging technologies short list of the New Media Consortium Horizon projects (Johnson & Adams, 2011, p. 1)

In 2013, three of the ten innovations with the potential to "provoke major shifts in educational practice" namely MOOCs (Massive Open Online Courses), crowd learning and digital scholarship have clear links to social computing (Sharples et al., 2013). In the same year the eLearning Africa Report (Isaacs et al., 2013, p. 10) highlighted mobile technologies (27%) and social media (16%) as the top change drivers with national governments in Africa, who are also seen as the most important change agents for the continent.

By 2014 the NMC Horizon Report, 2014 Higher Education edition (Johnson et al., 2014) reflected social media and makerspaces as the two trends with the greatest potential for HE visionary leadership. This was due to social media's "rapid integrati(on) into every aspect of university life; with its maximum impact expected to manifest itself within the next year"(Johnson et al., 2014, p. 6). A year later the role of technology as a major force in practical aspects of HE teaching stressed two major trends, namely "increasing use of blended learning" and "redesigning of learning spaces" (Johnson et al., 2015, p. 2), see Figure 5.

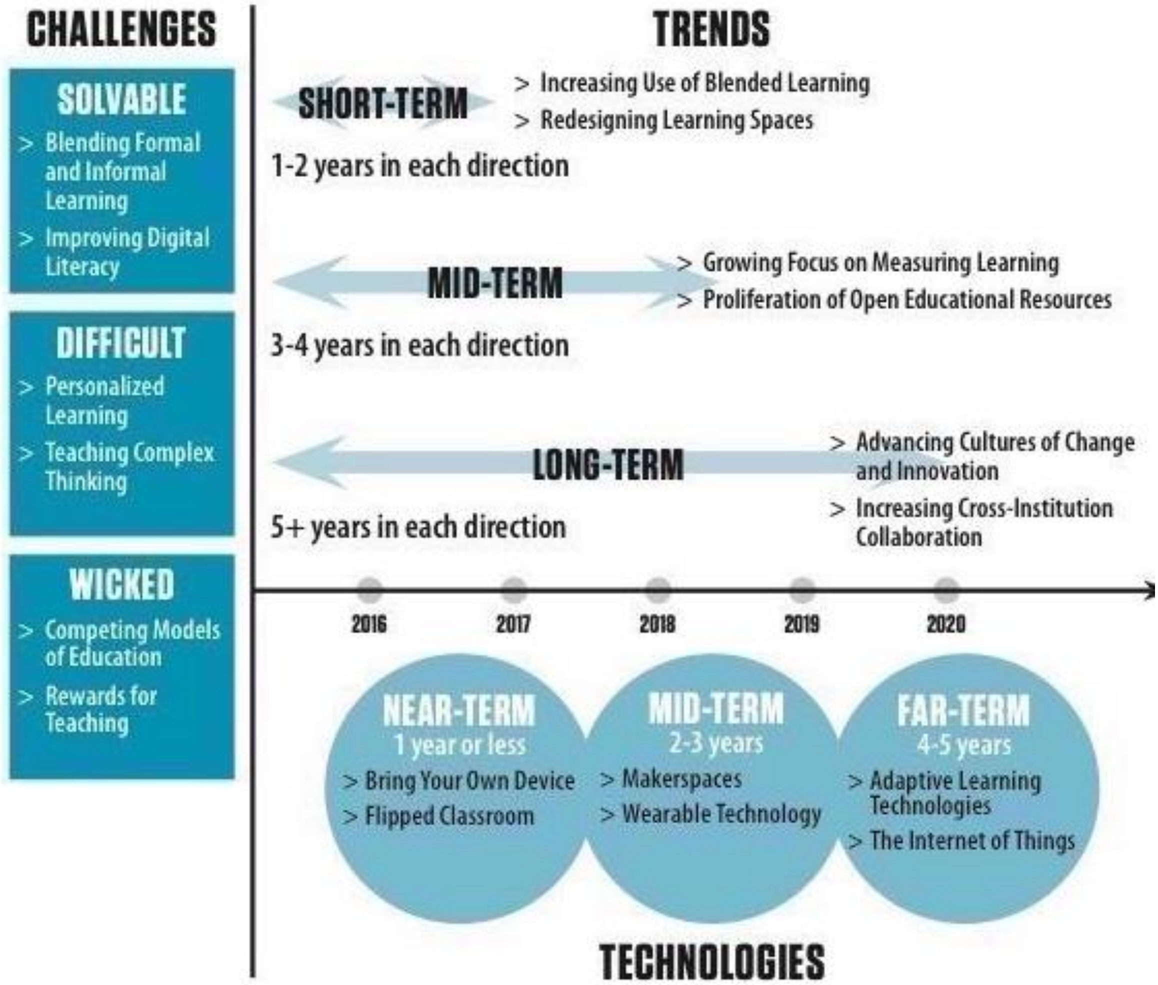


Figure 5: Infographic of topics from the NMC Horizon Report: 2015 Higher Education edition (L. Johnson, et al., 2015, p. 2 modified)

The reinvention of HE teaching as a result of technology is reflected in the perceived challenges: These include solvable challenges such as the blending of formal and informal learning; more difficult challenges associated with personalised learning and the "wicked" challenge of dealing with competing models of education. Of note, however, is the evidence of a shift in institutional issues with a growing focus on measuring learning and a "wicked" challenge of rewards for teaching.

The 2015 Gallup survey of 21 399 HE teachers and 885 technology administrators has provided a broad-based insight into American HE technology use (Straumsheim et al., 2015, p. 9). Tenured teachers are more negative about the potential of online courses to achieve the same learning outcomes as contact classes, as well as being negative about the quality of online courses; when compared to non-tenured teachers' views (Straumsheim et al., 2015). While those who have not taught online are very negative about achieving learning outcomes, with only 11-15% thinking similar outcomes are possible (Straumsheim et al., 2015, p. 14), the Gallup study respondents who have taught online were more positive. Nonetheless, roughly one in three teachers who teach online still did not think student learning outcomes are as good as in a face to face classroom: (Straumsheim et al., 2015, p. 14). These online teachers specifically criticised the quality of online teaching in terms of the inability to interact with students during class (74%) and the inability to reach at risk students (70%) (Straumsheim et al., 2015, pp. 17-18). The most positive responses came from 56% of online teachers who felt they could, at least, match the outcomes they can achieve in a traditional, contact classroom (Straumsheim et al., 2015, p. 14). HE teachers' perception of the impact of social computing on learning outcomes was less clear than their perception of its engagement potential. While Straumsheim et al. (2015, p. 6) study found that "most" faculty and technology administrators believed it has led to improved learning outcomes they suggested these were "somewhat", rather than "significantly", improved. Both tenured and non-tenured teachers were split on whether (52%), or not (48%), lecture time decreased in online courses. There was also agreement between tenured and non-tenured staff that face-time decreases, and more active learning techniques are employed, with the introduction of technology.

These reports are useful as they provide insights into the potentials being identified in the HE sector. They do not however explore issues of finer granularity such as the differential impacts on teachers and students of these envisioned shifts in practices. Neither do they consider what resources, skills or dispositions are required at both the institutional and personal levels to support these shifts (Ng'ambi, 2013, p. 652). Considering the conclusions of these reports are based on American and United Kingdom studies, Veletsianos (2011) warned that care must be taken not to over-generalise claims of use, or emergent use, across contexts or geographical locations. Chawinga and Zinn (2015, p. 82) stressed that "most lecturers know about" social computing technologies and their potentials and choose to use them differentially in their academic activities. Shelton (2014, p. 748) survey of 795 teachers indicated that their perceptions are strongly influenced by institutional and discipline-based differences. To explore teachers' perceptions of the role of technology (and social computing) it is thus important to consider numerous levels of normative response: the national-cultural, the institutional, discipline-based and individual response.

2.6.2 National influences

The lack of representation of research from South America, Africa and the Indian subcontinent, has already been noted (Hsu et al., 2013). Work by South African scholars and a few examples from elsewhere in Africa are included in the general discussion i.e. Tanzania (Lwoga, 2012), Egypt (Sobaih et al., 2016) and Nigeria (Onwuagboke & Singh, 2016). While national imperatives have a top-down impact on institutions, it is important to understand that institutions have an identity of their own. This may dictate how they are seen internationally and locally as well as how they choose to approach the use of technology in teaching and learning.

2.6.3 Institutional influences

HE institutions have their own motivations for providing online or blended learning. These include providing greater access to students, facilitating degree completion and being able to attract non-traditional students such as those unavailable to attend classes in a traditional face-to-face format or during conventional attendance university hours, either due to schedule problems or not having physical access (Wasilik & Bolliger, 2009). This increases the potential to enhance one's professional academic reputation and that of the institution as teaching and learning forms part of global ranking metrics. In a recent Times Higher education global ranking (2017), teaching formed 30% of the metric (Hussein, Arayici, et al., 2013, p. 1). Universities also promote blended and online learning as this is now expected as a teaching norm by university students (Scott, 2013). The reality however is that the gap between student use of social computing and that of HE teachers is widening (Bozalek, Ng'ambi, et al., 2013). In South Africa the impact of social computing on learning or the readiness of HE to engage with these technologies has only been researched to a limited degree (Bozalek, Ng'ambi, et al., 2013).

At an institutional level there may, however, be barriers to successfully offering technology enabled teaching and when implemented, institutions are not receiving the expected value (Hussein, Arayici, et al., 2013). This approach to teaching and learning requires more discipline on the part of students, as well as a shift in approach and acceptance of online delivery for teachers, and is plagued by the higher costs associated with development and delivery of online content as well as low retention rates in online courses (Ng'ambi & Bozalek, 2013; Wasilik & Bolliger, 2009). Ng'ambi and Bozalek (2013) have suggested that institutions may have limited agency as they are forced to cope with increasing student enrolments, a diversification of students and a decrease in available resources. In South Africa SC is seen as disruptive and there is an associated fear of change and loss of control (Gachago & Ivala, 2015) due to its "fluid nature" (Hussein, Arayici, et al., 2013). There are also concerns relating to safety (cyber-bullying) and security (privacy) and the loss of the "perceived safety of a closed classroom" (Gachago & Ivala, 2015, p. 20).

Institutions tend to be heavier users of specific technologies (Backhouse, 2013; Shelton, 2014). Shelton (2014, p. 748) study explicitly concluded that institutional policy should not focus on a harmonisation of approaches or a 'one size fits all' approach, but should rather allow for contextually aware solutions. This is opposite to the idea that the use of SC in a theoretically "perfect implementation" can "guarantee" teaching and learning success (Hussein, Arayici, et al., 2013, p. 1).

Theoretical attempts are made to migrate knowledge from other organisational contexts to explain technology use in HE. However, whereas in business the value may no longer be in the data itself, but rather in how the data is used (Hussein, Arayici, et al., 2013), in education the knowledge (or content) is core to teaching and learning (Kinchin, 2009). This discipline content (analogous to the 'data') is itself a more nuanced and potentially contested entity. An academic discipline is difficult to define, but those who have an "interest and involvement in academic affairs seem to have little difficulty in understanding what a discipline is, or in taking a confident part in discussions about borderline or dubious cases" (Becher & Trowler, 2001, p. 41). An academic is generally loyal to the wider subject area or discipline, which may then locally manifest as a loyalty to a department or discipline-based section. A department may operate quite differently to any institutional structures within which it is embedded (Shelton, 2014). Mishra and Koehler (2006) proposed that it is important to recognise the specific knowledge relating to how to use technology to teach specific content in accessible and pedagogically sound ways. The assumptions underlying approaches to technology developed in a business context should thus be carefully considered if used as a lens into the role of technology in education.

2.7 Conclusion

The teaching and technology contexts of relevance to HE teaching provide a sense of how these two facets are perceived in terms of how they may be brought into dialogue with each other. Of necessity, individual teachers, as the representative cases and unit of analysis are also presented in terms of how they are personally positioned in the teaching space. Likewise, broad categories of teachers using technology are discussed as well as global, national and institutional influences. This educational technology backdrop to HE teaching is intended to provide an insight into the context into which social computing is inserted. Chapter 3 provides a literature review of the social computing applications, how they are used and reasons for specific instances and patterns of use in HE teaching.

3 Social computing applications and their use in HE teaching

> *If there's one thing this and other surveys on social media have taught us, it's that faculty have very strong opinions about social media. Whether they see it as a huge waste of time with no redeeming pedagogical value, or powerful learning tools with the potential to engage learners in new and exciting ways, most give definitive answers in terms of what they believe and why. (Bart, 2011, p. 20)*

> *Underlying the pedagogic issues that were raised, there was a strong sense, in many of the responses, that emerging technologies provided expression to the passionate engagement of lecturers with their teaching practice. They responded at length, but in half formed sentences, ideas running breathlessly into each other. It seems that many lecturers, who use emerging technologies do so as an extension of their passion for teaching. (Backhouse, 2013, p. 353)*

3.1 Introduction

While a broad overview of educational technology use in higher education (Chapter 2) provides a context for this study, it is necessary to gain a more detailed and nuanced view from the literature of how this might present in daily higher education teaching. This requires a delimiting and narrowing of the focus of the literature to be explained in this selective thematic literature review. Five inclusion criteria for the content here have been considered.

Firstly, the focus of the chapter is on sources dealing only with higher education teachers. This means papers with a primarily student-centred focus or which deal with secondary education teachers have been excluded. The exceptions are (1) Lwoga (2012), Making learning and Web2.0 technologies work for higher learning institutions in Africa, C*ampus-Wide Information Systems*, 29(2), pp. 90-107, that focuses on ICT personnel; and (2) Ottenbreit-Leftwich et al. (2010), Teacher value beliefs associated with using technology: addressing professional and student needs, *Computers & Education*, 53, pp. 1321-1335. The former focuses on providing relevant ICT context in an African country and the latter focuses on the value beliefs of award winning teachers. Both papers were deemed relevant to the current study. Secondly, this study does not focus on a specific tool or computer application. By focusing on 'social computing', the study is more directly considering the nature of the technology use as flagged by the use of the word 'social' as indicative of a shared, collaborative, conversational or interactive learning process between and within groups (Selwyn & Grant, 2009). Papers focusing on a specific technology have not been included.

As Cho et al. (2013) have shown, the “role of technology” research has become more integrated with overlapping topic areas over time. It is thus possible that discussions of, for example, Facebook use in higher education, may make a contribution towards this study but it was deemed appropriate to focus on papers dealing with the broader range of technologies which are collectively known as social computing technologies. Thirdly, the definitions of these social technologies (e.g. Web2.0, social computing, social media) are “highly debatable” and although identified “as the key technology for the next decade, the actors from the educational field do not really know what Web 2.0 means” (Grosseck, 2009, p. 478; Ng'ambi & Bozalek, 2013; Selwyn & Grant, 2009). Social computing is thus best understood in terms of ambiguities and possible contradictions in terms of how it is viewed by different role players within HE (Selwyn, 2011b). The terms, ‘Web2.0’, ‘social computing’, ‘social media’ and their synonyms, are thus seen as referring to the same technologies. In addition, the idea that these technologies have fixed uses or roles is being challenged and it is now accepted that we may find they have affordances we have not previously considered (Brown, 2012; Ng'ambi & Bozalek, 2013). As a result of the ambiguity around the definition of technology and the potential that the technology is put to teaching uses other than those for which it is designed, papers which do not delimit the nature of the technology being used but focus on teachers and teaching, are included. An example of this would be the inclusion of LMSs in teachers’ reporting of their teaching. An LMS is not by definition a social computing technology but it can be used to facilitate socially constructed teaching and learning. Fourthly, this study, and hence this chapter, does not specify a specific mode of delivery of technology enabled teaching as a focus. UKZN is primarily a contact university although there are modules delivered over distance and fully online. The majority of the teaching is thus blended learning which has received less attention in the literature than faculty adoption of technology in general (Porter et al., 2016). Included sources thus cover blended, distance and fully online e-learning modes of delivery. The final inclusion criteria is based on the date of publication.

The focus of the chapter is on literature published since 2010 as Chapter 1’s meta-analyses have provided a comprehensive overview of literature up to 2010 (and in some cases a little later). There is a concentration of articles from 2010-2014 for two reasons: Firstly, the data for this study was produced in 2012 and the broader context within which these teachers were operating at that time is required for comparison purposes; and secondly, a metanarrative analysis highlights the top seven most internally referenced articles within *the teacher motivations for social computing use*-subgroup to be in the period 2009-2012 (Shen & Ho, 2020). The Shen and Ho (2020) review spanned from 1990 to 2017 and considered 4090 articles with an analytical core of 1030 articles. Their analysis indicates articles from this period currently form the key referential basis for this topic (prior to the advent of COVID-19). The themes for this chapter discussion include teachers' awareness of the role of the context in which they operate, potential of social computing, teachers' adoption of social computing and reasons for the patterns of use.

3.2 Adoption of technology

The advantages which can be gained by the use of technology in HE and the large amounts of money being spent on these initiatives have not resulted in widespread satisfaction with the outcomes (Kinchin, 2012). Despite the apparently widespread knowledge of the advantages, HE teachers show low adoption of blended learning and social computing in their teaching. Use of "some form of technology" is however higher, for example, in the USA (Georgina & Olson, 2008) and Nigeria (Onwuagboke & Singh, 2016). It is not unusual that social computing technologies follow conventional trends in technology uptake, including "hype cycles" of inflated expectations and "troughs" of disillusionment (www.gartner.com) leading to either longer term adoption or abandonment (Backhouse, 2013). However, the research into and understanding of this phenomenon of low uptake amongst HE teachers, and precisely how HE teaching and these technologies combine, has still to mature (Backhouse, 2013; Bower et al., 2014).

HE teachers are likely to hold very different opinions about various technologies and applications and thus the study of "general views" towards technology has limited use. Focusing on individuals' attitudes and use of specific technologies is more productive (Shelton, 2014). Numerous studies are available focusing on use of specific technologies or applications e.g. social network sites (e.g. Facebook), microblogs (e.g. Twitter) and instant messaging (e.g. WhatsApp). Few studies exist which focus on specific HE teachers and trace their use of a specific technology. There are also only a few studies which focus on an individual HE teacher and look at <u>all</u> the technologies they use in their teaching. The present study fits in to this latter group of research.

‘Social computing’ and ‘virtual learning environments’ take many forms. While these technologies are designed to offer specific affordances, they may be put to different uses and used in distinctly different ways to what was initially intended by the designers. Morgan (2011) noted that even if two instructors are using the same online application and teaching on the same course they may have vastly different views of the virtual space. This means they could have totally different approaches and practices which may even be in conflict with each other.

Researchers in this area of educational technology may not be explicit about the view taken of the affordances of technology in their studies. Schoonenboom (2014) is an exception, as she specifies her use of a basic affordances approach.

The increase in technology use in the classroom has been mostly related to provision of materials for content delivery, provision of grades and basic asynchronous communication (Ajjan & Hartshorne, 2008). These are also the features most often used within Learning Management Systems (LMS); rather than those geared towards collaborative engagement (Bower et al., 2014). It is important that learning is “designed” rather than activities merely being “incidental” (Bower et al., 2014). Social computing tools provide the opportunity for collaboration but collaboration will not necessarily improve learning even if explicit attention is paid to activity design. Laurillard’s (2002) framing of teaching and learning within a “conversational framework” requires HE teaching to be considered part of a dialogue: a dialogue between teachers and their students, and among students themselves with consideration being given to both the theoretical and experiential aspects of the interaction during instructional design. Social computing use should thus be intentional in supporting these objectives if this is the aim.

This section of the chapter will focus on actual use of social computing rather than the perception of their use (2.6 *Context related influences on HE teachers’ perception of social computing*, p.46). The characteristics of the HE teachers who appear in the literature as well as their use of technology, and social computing in particular, are considered. The reasons given within the literature of why they use these tools in the way they do, is explained in the section thereafter (section 3.5).

3.2.1 Context of social computing use: ‘Where’ and ‘who’ are these HE teachers?

The papers referenced in this section on social computing use in HE are tabulated in detail in Appendix B: *2008-2016 Articles dealing with actual use of technology in HE: Demographic analysis.* The appendix provides insight into the context and nature of the participants of the research studies covered. General trends are discussed in text and the full details are provided in a series of tables in the appendix.

Geographically, roughly a third of papers come from North America (10), Africa and the Middle East, including Turkey (12), and combined from the UK, Europe, Australia and New Zealand (8). There are no papers from the rest of Asia or South America. Blended learning is prevalent in Australia and New Zealand (Bower et al., 2014) and Turkey (Ocak, 2011). Creating blended learning is complex and involves more than combining two modes of delivery; a variety of conceptualisations of teaching and ways of teaching need to be employed (Ocak, 2011). The Africa and Middle East papers include two eLearning Africa overviews dealing with 42 African countries (Isaacs et al., 2013; Unwin, 2008), four papers from South Africa (Backhouse, 2013; Bozalek, Ng'ambi, et al., 2013; Chimbo & Tekere, 2014; Rambe & Nel, 2014) and papers from Turkey (Ocak, 2011), the Gulf States (Hussein, Aryaci, et al., 2013), Egypt (Sobaih et al., 2016), Nigeria (Onwuagboke & Singh, 2016), Tanzania (Lwoga, 2012), and Malawi (Chawinga & Zinn, 2015).

These 30 papers cover the period 2008 to 2016 with 18 being from 2013-2016 (2013=7, 2014=6, 2015=3, 2016=2). There is a fair split between studies performed at single institutions (14 papers) as opposed to those which involved two or more institutions (16 papers). The majority of the papers reported the gender distribution of their participants (24) with six reporting equal distributions (margin of 2%). Four papers reflected a noticeable gender bias (i.e. 70+%): Four of the papers reflected a significant male bias of 70-90% in the sample (Chawinga & Zinn, 2015; Hussein, Aryaci, et al., 2013; Isaacs et al., 2013; Unwin, 2008) and one paper a female bias of 100% (Ottenbreit-Leftwich et al., 2010). The male dominated results are from African studies. The female dominated study is from the USA and based on a study of award-winning school teachers where all eight participants (from a possible 31) were female.

Roughly a third of the papers reported the age distribution of their participants. Percentages of the sample older than 40 years ranged from 63% (Cao et al., 2013) to 92% (Straumsheim et al., 2015) while the range for older than 50 years old was 29% (Manca & Ranieri, 2016) to 66% (Straumsheim et al., 2015). Participants thus appear to be older, potentially more established academics. Less than a third of the papers reported the rank or position held by participants. The percentage of respondents at Associate Professor or Professor level ranged between 34% and 42% with two South African papers reporting less than half these values, at 14% (Chimbo & Tekere, 2014) and 15% (Backhouse, 2013). Manca and Ranieri (2016) study in Italy reported nearly half (48%) of participants holding these senior positions. Individual technologies are used more in specific institutions than in others, but no single institution can be considered to have the highest usage in all technologies (Shelton, 2014). This suggests an institutionally-bounded adoption of technologies.

Trends in software use appear related to disciplines' pedagogies and thus shifts in patterns of use tend to be based on teachers following patterns of familiarity (Georgina & Olson, 2008). Approximately half the studies (16) reported the disciplines from which responses were received. These are reflected as the number of papers in which the disciplines are represented: Arts, Humanities and Social Sciences (14), Physical & Natural Sciences, Engineering, Technology and Health Sciences (16) and Professional Studies and Business (8). Seven studies specifically reported on Computer Science (CS) and technology teachers and four reported on education teachers. One study explicitly excluded CS and education teachers from their sample with the aim of polling 'typical' teachers yet "one participant *(in the same study)* said in an interview, the participants in the study were not typical instructors because every participant was bold enough to try online education" (Seaton & Schwier, 2014).

3.3 'What' social computing is used in HE teaching

Technology use has varied over time. Shelton (2014, p. 753) categorisation of "core", or "commonly used", and "marginal" or "not widespread" technologies provides an entry point into the discussion on SC as they are considered marginal technologies i.e. are those widely used in a specific context, but whose use is not widespread within HE.

3.3.1 Core technologies

"Core" technologies "are widely used across all institutions and subject areas although the frequency of use in each of these varies" (Shelton, 2014, p. 753). In his study core technologies were slideshow presentations (e.g. PowerPoint) and virtual learning environments (VLEs). 77% of HE teachers used PowerPoint frequently with two highly significant relationships, namely, between the discipline being taught, and class size, and PowerPoint use. Use of PowerPoint in education was 86% (Shelton, 2014, p. 754). Six of Tanzania's eight universities also emphasised use of slide-based presentations (Lwoga, 2012). One respondent suggested PowerPoint makes students passive and reduces the potential for discussion and critical thought (Shelton, 2014).

The second technology Shelton identified as "core" is a VLE. He found no significant difference in VLE use based on subject but use varied greatly between different institutions (Shelton, 2014). The VLEs most commonly used are LMSs. A LMS is not generally seen as a social computing tool; however many LMSs include functionalities which support mobile, ubiquitous access and 'social' collaborative interactions. These benefits could classify the LMS, or certain combinations of its features and their use, as social computing.

Current research focus has centred around either considering the use of an LMS as a whole and what factors influence this use, or alternatively considering how and why teachers use LMSs and LMS features, differently (Schoonenboom, 2014). LMS features are used most for the distribution of materials, less for communication between teachers and students and the least for assessment or collaborative learning (Ocak, 2011; Schoonenboom, 2014; Sobaih et al., 2016). These general patterns are identifiable in Turkey (Ocak, 2011), Australia and New Zealand (Bower et al., 2014) and Tanzania (Lwoga, 2012). LMSs may be supplemented with other applications, such as documented for the VU University in Amsterdam that uses Sakai as its LMS (Schoonenboom, 2014). LMSs can also be used to achieve a broader range of pedagogical objectives. A Greek study of 25 Computer Science teachers, from six universities, showed that Laurillard (2002) full range of media use were employed i.e. narrative, interactive, communicative and, to a lesser extent, productive in an LMS-based blended learning context (Lameras et al., 2012).

Variability and nuances in use are noticeable across institutions in the same country. In the NRF-funded SA project on use of emerging ICTs in HE (2011-2013), Ngámbi's (2013, p. 656) participants indicated the LMS was the technology with the highest adoption rate for teaching in "innovative ways" (24%) based on its use in the last five years (n=59). In a study of the LMS used at UNISA, respondents indicated a competence of more than 60% in ICT resources but only 26.3% of academics indicated average competence in LMS use (Chimbo & Tekere, 2014, p. 75). Chimbo and Tekere found this troubling as this is the major platform for both administration and teaching and thus one would expect high levels of competence. These studies illustrate how LMSs can be used differentially depending on teacher intent. On the other hand, it should also be noted that some teachers used an explicitly teacher- and content-centred approach even when provided with a technology-enabled, specially designed, active- and blended-learning classroom (Gebre et al., 2015). Presence of a specific technology cannot thus be seen as necessarily leading to a predictable teaching outcome.

A cautionary word was raised by Lameras et al. (2012) who highlighted that two criticisms sometimes raised with regard to use of educational technologies are that (1) blended teaching becomes all about technology being used to replace the teachers' responsibility in the classroom; and (2) that teachers' view of teaching online becomes dominated by the role of the technology rather than a focus on the pedagogy. While these issues were not present in their study, they should be explored for potential relevance in study contexts.

Teachers may be motivated to try SC or marginal tools specifically if they believe they can enhance their teaching and aid student learning. Scott (2013) presented a vignette which illustrates this: two teachers in an Australian university found their LMS (WebCT) was not achieving the interaction, collaboration and accessibility anticipated. They moved to a social networking site (SNS) with Facebook-like features (Ning) when they realised students were using Facebook instead of the LMS. This highlights how a specific technology can actually be seen as an impediment to a teacher achieving their goal.

3.3.2 Marginal technologies: Social computing

"Marginal" technologies "are widely used in certain situations (may be related to institution or subject) but are not widespread and when they are used, this is often infrequent" (Shelton, 2014,753). They were identified by Shelton as Web2.0 technologies, or the SC technologies which are the focus of the current research. The age of a technology is not a factor in its "core" or "marginal" technology categorisation. E-Assessment tools have been available longer than VLEs and thus would rate as "core" if this were the case.

Research shows that use of social computing in HE in Africa has been problematic with usage "distinctly low" and initiatives being driven by individuals rather than institutional policies and strategies (Lwoga, 2012, p. 91). In contrast to their educational use, personal use by academics is high. A Malawian study reported 10 to 13 teachers of the sample of 19 reported using Wikipedia, YouTube, blogs, Google Apps and Twitter (Chawinga & Zinn, 2015). Similarly, SC social use is very high in Tanzania (Lwoga, 2012) and an Egyptian study reported a large majority of teaching academics accessing social media for general purposes (Sobaih et al., 2016). As an example, the Egyptian faculty are subscribed to several SNS with Facebook, WhatsApp and LinkedIn being the top three in use and YouTube, Twitter and Instagram also popular. Only two respondents (out of 190) use blogs and wikis (Sobaih et al., 2016).Younger teaching assistants (83%) were more likely to use social media for academic-related work than older faculty (professors=74%) (Sobaih et al., 2016, p. 300). The primary reason for use of SC is to remain connected i.e. to enable receipt of updated news and information and to be able to express their views. The difference between the perceived value of SC use and the actual use was statistically significant, with a large effect size, in all four areas measured i.e. teaching and learning, student support, community building and networking, and promotion of the academic program (Sobaih et al., 2016).

Both Shelton (2014) and Chimbo and Tekere (2014) often received a "neutral" response to their SC survey questions. HE teachers are known to over-report their use of technology and thus the low levels of reported use of these marginal technologies may hide even lower levels of actual use (Shelton, 2014). In South Africa elearning projects happen more informally; through staff experimenting and running small, pilot projects and due to student initiatives (Lwoga, 2012). Bozalek, Gachago, et al. (2013) suggested communities of practice may exist based on continually evolving practices many of which are based on SC technologies. The use of a marginal technology appears to be based on a voluntary and conscious decision on the part of the teacher (Shelton, 2014).

Reported use of technology is also related to the subject being taught and “how the subject is organised” (Shelton, 2014, p. 755). It is not clear what is meant by “how it is organised”: Shelton could be referring to issues like the dominant view of the epistemology of the discipline or dominant pedagogy being practised as considered by Lameras et al. (2012), but this could also refer to practical aspects such as class size and the institutional culture, explained in other parts of his paper. Scott (2013) suggested caution should be exercised in making generalised assumptions about SC use based on subject discipline. Bozalek, Gachago, et al. (2013) stressed that the relationships between the pedagogical practices and emerging technologies are not as simple as a cause-and-effect relationship but are rather symbiotic. This symbiotic relationship adds to the complexity involved in understanding the phenomenon. A challenge is that even when SC is used to facilitate collaborative work, there still tends to be a focus on individual assessments which are not congruent with the collaborative approach during learning (Brown, 2012). The comments from these teachers stressed the “contextual considerations, either pedagogical, pragmatic or a mixture of both” as playing a role in the outcomes (Brown, 2012, p. 54).

Ranking of SC tools is dependent on the sample and the research questions of the specific research study. In 2010 a study ranked Facebook, Wikipedia and YouTube as the top three social media tools for learning (Liu, 2010). Bart (2011) study of all “Faculty Focus” subscribers considered Facebook, Twitter and LinkedIn as the “big three” in social media. To illustrate the impact of the study design on results: in 2010 and 2011 Jane Hart’s Top100 Tools list only included two of these apps within the top five entries on her list; YouTube (#2 in 2010) and Twitter (#1 in 2011) (Hart, 2017a). The relative popularity of apps is highly context dependent and thus depends on sampling of respondents.

The six technologies used most often by English HE teachers in Shelton (2014) study were e-assessments, podcasts, blogs, wikis, e-portfolios and social bookmarking. Adoption patterns are similar to the UK in Australia with Facebook, YouTube, wikis, blogs and Twitter used most frequently (James, 2014). In 2014 the most widely used social computing tools globally, for education, were Twitter, Google docs and Google drive, and YouTube, followed by WordPress, Dropbox, Evernote and Facebook (Gachago & Ivala, 2015). For 2016 a list of the top 100 tools across all levels of education, (Hart, 2017b) listed the top 10 applications used globally in education as YouTube, Google docs/ drive, PowerPoint, Google search, Twitter, Dropbox, Prezi, Kahoot, Powtoon, and Word. This list is not dominated by SC tools such as Facebook (#15 in EDU100 but #6 in Top200 general "learning" use), Skype (#17 in EDU100 and #7 in Top200), LinkedIn (does not appear in EDU100 but #8 in Top200) and WordPress (#13 in EDU100 and #9 in Top200). This may be related to the broad range of educational users who were polled (from primary school to adult education). While the discussion of individual SC applications provides information on their relative use, this should be viewed as potentially biased by their contexts including their cohorts of users, because SC use is recognised as being context-sensitive (Ng'ambi, 2013; Selwyn, 2011b).

Crook (2008, p. 7) functional categorisation of Web2.0 services as applied in Selwyn et al. (2008) focused on the typical human dispositions of "the playful, the expressive, the reflective and the exploratory" as a typology. He suggested these are represented by specific technologies e.g. (1) the "playful" by virtual games and virtual worlds; (2) the "expressive" or creative production and sharing by YouTube, Flickr and SlideShare; (3) the "reflective" by blogs, wikis and social networking; and (4) the "exploratory" or syndication, recommenders and folksonomies by portals, subscription podcasts, RSS feeds, tagging and tag clouds. It has been suggested that perhaps the category of social networking sites does not fit within the "reflection" category (Lwoga, 2012). Individual reflection is only one use to which social networks are put and it is suggested that sites such as Facebook and Myspace serve roles more specifically of facilitating "social connection"; a fifth category. Bower et al. (2014) introduced a cautionary note when they suggested that features and benefits of applications are often updated and thus comments on their use and applicability are potentially only relevant for limited time frames from when they are observed.

The “playful” tools most mentioned are virtual worlds. In SA, virtual worlds have reached the “early adoption” stage of use (3-16%) (Bozalek, Ng'ambi, et al., 2013, p. 428) which appears similar to the US institution surveyed by Cao et al. (2013). Low adoption rates could be due to the numerous challenges presented by VWs in relation to “technical, cultural, interactional, economic, scheduling, standards, scaffolding persistence, social and identity-related issues” (Bower et al., 2014, p. 21).

People are expressive via YouTube, Flickr and SlideShare (Crook, 2008). In SA, video production, including creating podcasts (or vodcasts) has reached the “early majority” stage of adoption (16.5-50%), although screen casting has only reached the early adoption stage (3-16%) (Bozalek, Ng'ambi, et al., 2013, p. 428). In their USA-based study, Cao et al. (2013, p. 587) reported that 78.6% of faculty use YouTube and other multimedia sites such as podcasts, iTunes and Flickr.

While Crook (2008) identified blogs, wikis and social networking as reflective tools; Selwyn et al. (2008) and Lwoga (2012) supported social networking being identified as a separate category. Blogs are seen as the most useful tool overall with benefits “in terms of improving student learning, increasing student-faculty interactions, improving student writing and ease of integration” (Ajjan & Hartshorne, 2008, p. 78). By 2014 blogs were one of the top six most commonly used social computing technologies in the UK (Shelton, 2014, p. 755). Blogs are also less likely to be used in big classes and are rather used in small group tutorials or seminars. In SA, use of blogs has reached the “early majority” stage of adoption (16.5-50%) (Bozalek, Ng'ambi, et al., 2013, p. 428) and they rate as the second most innovatively used technology (8%) (Ng'ambi, 2013, p. 656). Wikis also potentially improve “student learning, increase student to student, and student to faculty, interactions, improve student satisfaction, writing and integration” (Ajjan & Hartshorne, 2008, pp. 78-79). In Tanzania only one of the six universities studied used wikis and usage was very low (Lwoga, 2012). Use was also considered to be “marginal” in the study of 27 English institutions (Shelton, 2014) with use being related to academic discipline. Wikis are used more in Arts than Science and computing at UNISA, South Africa (Chimbo & Tekere, 2014). In South Africa, wikis have reached the “early majority” stage of adoption (16.5-50%) (Bozalek, Ng'ambi, et al., 2013, p.

428). Depending on how they are employed, wikis may serve as evidence of knowledge construction by students (Ng'ambi, 2013).

“Exploratory” tools tend to involve syndication, recommenders and folksonomies by using portals, subscription podcasts, RSS feeds, tagging and tag clouds (Crook, 2008). At UNISA, the School of Computing uses data mashups more than lecturers in other disciplines (Chimbo & Tekere, 2014). Cao et al. (2013, p. 587) reported that 78.6% of teachers use multimedia such as podcasts. Podcasts were one of the top six most commonly used social computing technologies in Shelton (2014) English study. Podcasts and vodcasts (which are often still referred to as ‘podcasts’) rate as the second most innovatively used technology (8%) in South Africa HE (Ng'ambi, 2013, p. 656). Podcasts serve as a source of distributed expertise as they can be used to engage with experts in a field (Ng'ambi, 2013). Social bookmarking has low uptake (Ajjan & Hartshorne, 2008).

Social computing as ‘social connection’

The forming of “social connections” is not one of Crook’s (2008) categories but it is conceptually supported as a necessary category (Lwoga, 2012; Selwyn et al., 2008). This category of use is of particular interest in this study, where the social construction of knowledge is a key focus. Cao et al. (2013, p. 587) focused on use in teaching, and reported only 11% use at the US institution they studied. Sobaih et al. (2016) found the majority of faculty believed video, podcasts, wikis and social networking sites (SNS) are valuable tools for collaborative learning. In SA, social networks have reached the “early majority” stage of adoption for academic use (16.5-50%) (Bozalek, Ng'ambi, et al., 2013, p. 428). SNS are used more in Arts than Science and Computing (Chimbo & Tekere, 2014).

In 2011 Facebook was the most popular of three SNS (Facebook, Twitter, LinkedIn) with 84.6% teacher uptake, of which 44.6% used it daily and 46.1% used it for both personal and professional use (Bart, 2011, pp. 7, 9). In Scott (2013) study, the teachers changed to Ning (a SNS) because students were not using the LMS provided and were using Facebook for the functionality they required. Ning was seen as better able to support the co-construction of knowledge and student learning with easy to access materials and better usability as the ‘Facebook-like’ interface was intuitive. Ning can serve as a source of distributed expertise as students can use the platform to create and share blogs (Ng'ambi, 2013). While Twitter is a microblog, it also functions as a SNS. Roughly half of HE teachers (50.2%) use Twitter (Bart, 2011, p. 7): This is similar to Cao et al. (2013, p. 587) results, where 41% of respondents use microblogs. In SA, microblogging has reached the “early majority” stage of adoption (16.5-50%) (Bozalek, Ng'ambi, et al., 2013, p. 428). Although this is mentioned independently of SNS in their study, it falls in the same category of use. Microblogs rate as the third most innovatively used technology (3% of innovative teachers sampled) (Ng'ambi, 2013, p. 656). Twitter can also be used to support distributed intelligence (Ng'ambi, 2013). Microblogs are used by the Arts and Computing schools rather than Science schools at UNISA (Chimbo & Tekere, 2014). Manca (2020) reports Facebook, YouTube and WhatsApp as the most popular SNSs. She sees a maturing of research into instructional use of these platforms and their use as complementary tools, not limiting focus to student reactions. By 2021 the most popular SNS in education generally have become LinkedIn, Twitter, Facebook, Instagram, Xing and TikTok (Hart, 2021).

Bower et al. (2014) noted the use of video conferencing and the web to create necessary connections for teaching and collaboration. In SA, web-conferencing has reached the “early majority” stage of adoption (16.5-50%) (Bozalek, Ng'ambi, et al., 2013, p. 428). This was supported by Ng'ambi (2013) sample of 18 participants who were purposively selected as known emerging technology users, yet who reported less than half (44%) use web-conferencing. Instant messengers such as phone texting, online instant chat and MSN messenger are used by 46.4% in their teaching (Cao et al., 2013, p. 587). The BlendSync Project also considered the use of desktop-based video conferencing tools such as Skype (59.1%) and to a lesser extent Windows Live Messenger, Google Voice and Video Chat, and Yahoo! Messenger (Bower et al., 2014, p. 28). In SA, Internet telephony has reached the “early majority” stage of adoption (16.5-50%) (Bozalek, Ng'ambi, et al., 2013, p. 428) and in 2014 Skype and Google chat were mentioned by some UNISA respondents as technology “they used frequently” (Chimbo & Tekere, 2014, p. 78).

A number of applications are discussed within the literature which do not fit well within this extended, six category typology. Tools which focus on an individual’s need for security, organisation or structure have become common and include applications such as Google documents; cloud storage options such as Google Drive and Dropbox; and organiser apps such as Evernote. For HE teachers organisational tools may include tools which support the academic enterprise, either for students or teachers. and there may be a blending of tools which individually could be seen as either core or marginal. As an example, tools could include core VLEs but with marginal plugins which allow for extension of available features. How teachers view these features i.e. as a single tool or multiple tools, impacts their reporting of use. In SA, web-based documents (such as Google docs) have reached the "early majority" stage of adoption (16.5-50%) for academic purposes (Bozalek, Ng'ambi, et al., 2013, p. 428). This statistic does not differentiate between teaching and other academic uses, for example, research. Google drive and Dropbox are amongst the most commonly reported social computing tools used globally in education (Gachago & Ivala, 2015; Hart, 2017b). These are used to share documents, potentially as part of collaborations, and store backup copies of digital materials.

3.3.3 Social computing use in South African HE

Czerniewicz and Brown's (2010) four surveys, over five years, conclude that technologies are being used to strengthen or reproduce traditional teaching activities rather than transform them. They found that ICTs play a supportive rather than a supplemental role, with students not seeing the ICT system as replacing face-to-face interactions. They found 71% of students hardly ever publish, and only 41% upload content (Czerniewicz & Brown, 2010, p. 147). They did not find a blurring between academic LMS and social software as reported by Rambe and Nel (2014). Access is being determined by connectivity not by location specifically, and where lecturers do not use the LMS extensively, students turn to Facebook and SMSes (Czerniewicz & Brown, 2010).

A major South African study (2011-2013), funded by the National Research Foundation (NRF)(http://www.nrf.ac.za/), involving eight SA HE institutions and one international NGO and 18 researchers, investigated "whether and how qualitative outcomes in education could be realised through the use of emerging technologies to transform teaching and learning interactions and paradigms in the South African Higher Education sector" (Emerging ICTs in Higher Education, 2011). The outcomes of this research have been reported extensively (Backhouse, 2013; Bozalek, Gachago, et al., 2013; Bozalek, Ng'ambi, et al., 2013; Gachago & Ivala, 2015; Gachago et al., 2013; Ng'ambi, 2013) and refer to different elements within the overall dataset or extend the core survey data.

Ng'ambi (2013, p. 656) participants indicated the LMS was the technology with the highest adoption rate for teaching in “innovative ways” (24%) based on its use in the last five years (n=59). In contrast, the “marginal” social computing technologies such as blogging, podcasting and social media/ networks were only used by 7-8% of participants (n=16 to 20 for various items) (2013). He highlighted that the majority of respondents use these technologies to support prescriptive learning with a limited few using the technologies in transformative ways. The study focused on learning and specific activities the HE teachers were encouraging. Ng'ambi (2013, p. 660) recommendation is a five-phase pedagogical model and he suggested that a “learning activity is shaped by an awareness of capabilities of available technologies”. What is unclear from the discussion is where the authority is located within this pedagogical model. The knowledge of the technology and its affordances could determine the nature of the learning activity implemented, or the educational goal could determine the activity. In addition, it may be that these are exclusive or inclusive options.

Bozalek, Ng'ambi, et al. (2013, pp. 425-427) surveyed 242 HE teachers in SA with the majority (57%) drawn from four Western Cape universities and 20% from one of these, namely the University of Stellenbosch. Of direct relevance to this doctoral study is the fact that the study focused on general academic use of technology rather than specific use in teaching and UKZN was not represented in the sample. Their definition of emerging technologies is functionally, rather than technologically, deterministic: “tools, technologies, innovations and advancement utilised in diverse educational settings to serve varied education-related purposes” (Bozalek, Ng'ambi, et al., 2013, p. 422). They specifically noted these “may, or may not be new technologies”(Bozalek, Ng'ambi, et al., 2013, p. 422). They found respondents’ primarily explore these technologies because of personal interest and passion (28%) and because their institutions provide access to the applications (23%) (Bozalek, Ng'ambi, et al., 2013, p. 429). There is little direct impact on teaching and learning but respondents report better interaction and communication with students (30%) and positive feedback from students (27%) (Bozalek, Ng'ambi, et al., 2013, p. 430). The two greatest institutional constraints (54% of overall constraints identified) were "inadequate access to the Internet" (21%) and lack of equipment/ computers (15%) (Bozalek, Ng'ambi, et al., 2013, p. 431). Lecturers' constraints (25% in total) were primarily "lack of time/ time management" (8%) and "lack of colleagues' support due to fear of change, resistance"(10%). Students' constraints (22% in total) related to lack of skills (7%) and "lack of motivation (especially if no marks allocated)" (7%) (Bozalek, Ng'ambi, et al., 2013, p. 431).

Bozalek, Ng'ambi, et al. (2013) used Rogers (2003) 'Diffusion of Innovations' model, which posited that users can be profiled in terms of their likelihood to adopt technology. This suggested that use of a particular technology, once adopted by some users, gradually becomes more accepted and thus enjoys greater uptake until the "last" adopters (besides those who never adopt the technology) are engaged. Classification is ordinal, from innovators (first adopters), through early adopters and early majority to late majority ("last" adopters). In their South African context, Bozalek, Ng'ambi, et al. (2013, p. 428) noted the innovators (<3%) were using modelling and simulation tools; early adopters (3-16%) were starting to use a range of emerging technologies (i.e. e-portfolios, learning analytics, remote instrumentation, tablet computers, reusable learning objects, screen casting, context aware environments, adaptive systems, game-based learning, social bookmarking, personal response systems, virtual worlds, augmented reality, argumentation visualisation); the early majority (16.5% up to 50%) were using a broader range of both social computing and conventional tools (i.e. social networking, instant messaging, e-books, web based documents, blogging, bibliographic management, Internet telephony (VOIP), open educational resources (OER), wikis, podcasting, RSS feeds, mind mapping tools, video production, web conferencing, micro blogging and lecture capturing); and the late majority were using research databases. Research databases were thus the only tool used regularly by more than half the respondents. This portrayal of a linear progression, suggesting a specific sequence and chronology in technology adoption, has been critiqued by Matthews (2008, p. 42) as inappropriate because teachers reach a comfort level through continuous "exposure, encouragement, and support".

3.4 'How' social computing is used in HE teaching

The majority of HE teachers use technology to prepare for teaching (96%) and in "most" of their teaching (87%) (Shelton, 2014, p. 752). Primary use of web technologies is focused on fundamental, functional teaching and learning tasks (Chawinga & Zinn, 2015). Brown (2012), however, stressed that understanding of student needs should always underpin teaching innovation. These needs include increased student access to information, enabling lecturer-to-student, student-to-student and student-to-lecturer communication; use of teaching aids such as YouTube; the storage and provision of access to teaching materials; and collaboration over distance (Chawinga & Zinn, 2015; Chimbo & Tekere, 2014; Georgina & Olson, 2008).The collaboration over distance can also extend to allowing access to external experts (Backhouse, 2013) that is useful for African universities with limited access to international professional and continental networking (Czerniewicz & Carr, 2011).

Based on Pea's (1994) conception of communication, students and teachers approach online communication very differently. Student conversations online tend to be transmissive or ritualised, dependent on their audience, as students choose tools based on friendship groups and lifestyles (Timmis et al., 2010). Student interactions can be generative when offering support online (Timmis et al., 2010). While aspects of teacher behaviour must be transmissive and ritualised to maintain the social order for a class, their focus when using social computing is more often transformative (Timmis et al., 2010). This cannot however be assumed merely because social computing is employed. Transformative communication is a dynamic two-way system where both the teacher and the students' beliefs, conceptions and understanding are transformed (Pea, 1994).

Lameras et al. (2012) study presented a classification of use of technology that is generally consistent with other phenomonographic studies of e-learning although some variations in categorisation are noted. Lameras et al. (2012) four categories are discussed below, namely: (1) information transfer only (referred to in the discussion as *Lameras1*), (2) application and clarification of concepts (*Lameras2*), (3) exchange and development of ideas (*Lameras3*) and (4) exploration, knowledge-sharing collaborations and process awareness skills (*Lameras4*). Gebre et al. (2015) Canadian study combined teachers' descriptions of effective teaching and their anticipated learning outcomes, to develop a categorisation of three conceptions of ‘effective teaching’: Transmitting knowledge (category 1) aligns with Lameras1; Engaging students (category 2) aligns with Lameras2 and Lameras3; and developing “students’ learning independence/ self-reliance” (category 3) aligns with Lameras4. There is a blurring of boundaries between categories, as Gebre et al.’s category 2 introduces the concept of “process” orientation which is part of Lameras4. Gebre et al. placed more emphasis on the locus of power or control i.e. on the student- vs teacher-centred dimension of instructional strategies and did not take specific note of the nature of the content.

Schoonenboom (2014) added to this categorisation by considering the task-technology fit of the LMS features against basic HE teaching tasks. The implication was that the appropriateness (usefulness and ease of use) of the technology to the required task would have a direct impact on use. Gebre et al.’s categories are hierarchical and thus there is a sense of “inheritance” i.e. that reported use of a technology at a higher instructional category may include (or perhaps assumes) that lower categories of instructional use are already employed; albeit perhaps using a different technology. Methodologically, Lameras et al. (2012) and Gebre et al. (2015) generated their categories from the respondent data whereas Schoonenboom (2014) questioned respondent’s use relating to a predetermined list of teaching tasks. Despite these variances in categorisation, Lameras et al.’s categories provide a fair overview of the range of potential uses of the technology. The four categories are explained in greater detail below.

3.4.1 Information transfer

An application is used for information transfer (Lameras et al., 2012). The focus is on providing “any time, any place” access to information. This is a static feature providing an administrative function which supports a teacher-centred and content-oriented approach (Gebre et al., 2015; Lameras et al., 2012). This usage links to some of Schoonenboom (2014) group 1 tasks that are performed often, are important and teachers have a high intention to use the software features are they are seen as relevant, useful and easy to use e.g. PowerPoint slides (Schoonenboom (2014), emails, slide-based presentations, the web (Lwoga, 2012). This category of technology use would not qualify as ‘social computing’ as it does not include social, collaborative aspects of teaching and learning; but is nevertheless useful and potentially empowering for students who have not historically had access to resources and information.

3.4.2 Application and clarification of concepts

This core focus on feedback as part of a blended learning system is not stressed as strongly in other studies and could relate to the nature of the discipline of the teachers in the study i.e. Computer Science (Lameras et al., 2012). This type of use supports “question-answer” functionality and communication between the teacher and students. This feature has a “high intention to use” and is used often (Schoonenboom, 2014). The use of an application to probe student understanding is considered “useful”, yet difficult to achieve (Schoonenboom, 2014). Student communication between each other is seen as important, difficult to achieve, but less common, although it does occur (Lameras et al., 2012). Teachers respond to student questions or application-based submissions via discussion boards or forums (extrinsic motivation). Students can self-test by doing automated quizzes and scenario-based simulations (intrinsic motivation) (Lameras et al., 2012). Self-testing, although useful, is also considered difficult to achieve (Schoonenboom, 2014).

3.4.3 Exchange of ideas/ sharing of resources

Students are encouraged to enter a conversation about the topic with both their peers and their teacher that allows them to negotiate, challenge and potentially change, their understanding (Gebre et al., 2015; Lameras et al., 2012).The potential for a large variety of resources to be provided or linked to the site allows students to follow their interest. This remains content focused and, although teacher-centric, allows students freedom and scope to explore. While seen as important, student discussions are seen as difficult to implement (Gebre et al., 2015; Schoonenboom, 2014). Transformative conversations are important because of their potential to modify participants’ existing viewpoints (Timmis et al., 2010). This discursive approach is student-centred although the primary focus is still on the content rather than on process issues (Lameras et al., 2012). The communication is asynchronous and allows participation outside normal classroom time, encourages self-reflection, provides writing practice and leads to a transcript of the discussion.

3.4.4 Collaboration, develop process awareness

This category allows for collaboration, supports knowledge creation and allows students to become aware of process skills (Lameras et al., 2012). This encourages important small group collaboration and the development of learning communities, but the technology tools available for this purpose are not seen as useful (Schoonenboom, 2014). Gebre et al. (2015) study also highlighted the general difficulty of using technology to create meaningful engagement and interaction. This category is strongly student-focused aimed at supporting students in collaborations but also in developing the necessary process skills required to develop social capital and social networks. Social capital develops from the forming of social relationships with someone (social ties), through developing shared responsibility (through trust) and providing reciprocal support (norms of reciprocity) (Lameras et al., 2012; Meulemann, 2007). The emphasis on process skills is not profiled in other studies of this period and does not appear on Schoonenboom (2014) list of teaching tasks in her task-technology fit study; although Gebre et al. (2015) later study picks up on this aspect.

3.4.5 Category of non-use

Some of Schoonenboom (2014) task-technology fit categories have not been covered in the four Lameras et al. (2012) categories of use. Her Group 2 tasks have low intention to use as they cannot be performed using technology and they either are not considered important by teachers, or are not performed by them e.g. holding office hours through an IM chat or Skype and examining and commenting on a digital portfolio, for example, using SharePoint or Sakai. These categorisations will require extensive research focus post-COVID-19.

3.5 Reasons why social computing is used in HE teaching

Selwyn (2011b, p. 5) stressed that "all in all, it is unhelpfully idealistic to imagine social media as providing a level playing field for all". There is a growing body of evidence to suggest that the use of social computing is not the overwhelmingly democratic activity as it is often portrayed (Bair & Bair, 2011; Selwyn, 2011b). Even accepting that there is unlikely to be a totally level playing field in any social arena where social computing is to be deployed, it remains important to recognise that emerging technologies in HE in South Africa can provide meaningful opportunities for change (Bozalek & Ng'ambi, 2015; Department of Higher Education and Training, 2013; Veletsianos, 2011).

There is still a need for research on the question of why some teachers in HE use LMSs much more extensively than other teachers (Shen & Ho, 2020; Torrisi-Steele & Drew, 2013). The reasons why HE teachers use social computing in the way they do is “non-trivial and not one to be taken for granted” (Ng'ambi & Bozalek, 2013, p. 532). Rather, it is a complex interweaving of decisions to resolve the tensions between the benefits they offer and challenges they raise. Contrary to populist opinions, online learning is not widely seen as an appealing option for teachers (Johnson et al., 2014). Where social computing has been implemented, the adoption appears to have outpaced our knowledge of its use (Bair & Bair, 2011). There is also limited research on models dealing with the transformation of teaching practice in the presence of these technologies (Ng'ambi, 2013,652). Realistically, teachers’ responses to emerging technologies tend to be ambivalent because of the nuanced and complex interplay of factors which play a role in moulding their responses (Rambe & Nel, 2014). In addition, Schoonenboom (2014) questioned if participants in research studies respond to questions on a platform based on their use of only a few features of the platform, rather than the platform as a whole. In addition, it is unique combinations of context-task-interface (technology) which produce specific results and the outcomes in different contexts require empirical investigation (Brown, 2012; Schoonenboom, 2014).

The discussion here focuses on the HE teacher: professional aspects such as the influence of the academic discipline; pedagogical factors including the role of the student; operational and institutional factors as well as the broader HE and physical context. The factors do, however, potentially overlap (as shown above) and thus these boundaries between categories are highly permeable.

3.5.1 Demographic factors

Only by understanding why SC is used in specific ways is it possible to improve our theorising in this regard. Current literature suggests numerous factors to explain differential use, along numerous other dimensions such as “socio-economic status, social class, race, gender, geography, age and educational background" (Selwyn, 2011b) and may apply equally to HE students and their teachers (Scott, 2013).

3.5.1.1 Gender

Technology experiences tend to be culturally gendered. Males' decisions to use a technology tend to be more influenced by the benefits they will accrue by using the technology (performance expectancy) (Venkatesh et al., 2012) than females' (Nistor et al., 2014). Females tend to have to expend more effort (effort expectancy) (Venkatesh et al., 2012) in order to use a technology than males (Nistor et al., 2014). Gender norms may thus play a role in the uptake of social computing in teaching due to the stereotypical views held by both men and women (Scott, 2013). Gendered technology confidence can influence the technology views associated with specific academic disciplines e.g. 64% of teachers in STEM are male and 68% in the health sciences (medicine, dentistry, health) are female (Scott, 2013, p. 576). Gender bias can be subtle and may be reinforced by certain technological and managerial processes (Scott, 2013). This is reinforced by the fact that the majority of computing experts are male (Klawe et al., 2009) and femininity is often equated with a lower level of computer skill (Fleischmann et al., 2016). Teacher agency, however, provides an opportunity for the teacher to develop the SC space without restrictions.

Govender and Govender (2014) suggested the difference between male and female effort expectancy may be less evident in South Africa, due to a strong emphasis on empowering women. The Nigerian and Egyptian studies found no significant gender differences as opposed to Onwuagboke and Singh (2016) who highlighted that traditional African societies create barriers that impact the opportunities available to women. Hussein, Aryaci, et al. (2013) found that in the Gulf States, where female students are segregated from male students, women found it culturally acceptable to use collaboration platforms hosting a variety of participants.

3.5.1.2 Age

Research shows that older teachers in HE in developing countries participate less in social media than their younger counterparts (Cao et al., 2013; Manca & Ranieri, 2016; Sobaih et al., 2016). This could be due to the perception that social media is the preserve of young people (Scott, 2013) as they use social media for both personal and professional purposes

(Manca & Ranieri, 2016). However, teachers with more years of teaching experience, who are generally older, appear to use SC more in their teaching than people with less experience (Manca & Ranieri, 2016). This appears to contradict the narrative which suggests the use of social computing is more common among younger, rather than older, technology users. Earlier research by Mueller et al. (2008) found that the number of years teaching did not seem to have an impact on use of technology in teaching. This is thus a more complex issue than it first appears.

3.5.1.3 National culture

The conception of teaching, both of what constitutes effective teaching and how it can be articulated, is framed by both the physical places and cultural spaces in which it occurs (Gebre et al., 2015).

3.5.1.4 Geographic, economic and language differences

Because context is important in technology use; geographic, language, economic and even climate differences may play a role in the deployment of social computing in Africa (Lwoga, 2012). Ocak (2011) suggested that similarities and differences between experiences from different countries is not unusual.

3.5.2 Personal attributes

Personal attributes of the teacher may play a role in their technology use. This can include their personality and interpersonal skills, their attitude toward technology, prior experience of technology use or seniority, and finally, their level of competence in working with technology.

3.5.2.1 Personality/ interpersonal skills

There is a strong connection between caring and perceived credibility, both as a teacher and as a participant on social computing platforms (Johnson, 2011; Kress, 2010). This recognition seems to signal an emphasis on “caring”, more than on “competence” (Johnson, 2011, p. 32). Kress (2010) suggested that if you wish to move beyond the affordances created by others, it is necessary to participate in the shaping of one’s own world according to one’s own interests. It is suggested that the interpersonal skills of the teacher may be important as students are more motivated and actively participate when they perceive a teacher as being authentic, genuine and open (congruent); respectful (accepting) and understanding of the feelings of students and what is important to students (empathetic understanding) (Derntl & Motschnig-Pitrik, 2005, pp. 116-117). Developing the appropriate conversational tone and social presence is more difficult for teachers in an online space than in a face-to-face environment (Bair & Bair, 2011). The value of having good interpersonal skills and reliable easy-to-use technology is clear (Ocak, 2011). Teachers working in an interactive and social educational space will feel more confident if they are confident about their own interpersonal skills and the technology they are employing (Shelton, 2014).

3.5.2.2 Attitude towards technology

Use of SC is a matter of personal choice which may be driven by an interest in experimenting with pedagogy, a passion for technology or a positive attitude toward taking risks and tolerance of failure (Bozalek, Ng'ambi, et al., 2013; Chawinga & Zinn, 2015; Ocak, 2011; Scott, 2013; Shelton, 2014; Siemens & Tittenberger, 2009). In South Africa the main motivator for using emerging technology (28% of respondents) is the lecturer’s own interest in the technology (Bozalek, Ng'ambi, et al., 2013, p. 429). However, choices can equally be negatively influenced by prejudices (Lwoga, 2012). Prensky (2009), Thomas (2011) and White (2009) argued for a more nuanced understanding of the potential divides that separate ‘users’ and ‘non-users’. White (2009) referred to digital residents and digital visitors where digital residents ‘live in’ the technology and embrace it as part of their daily lives while visitors ‘drop in’ to use the technology only when necessary. Prensky (2009, p. 1) argued that (ultimately) “digital wisdom” should become the goal: “both the wisdom arising *from* the use of digital technology … and the wisdom *in* the prudent use of technology to enhance our capabilities”.

Seaton and Schwier (2014) suggested that teachers are not apathetic but rather respond according to the level of engagement they feel is required for their courses. Technology use may not appeal to risk averse personalities as a technological environment can be unpredictable (Bower et al., 2014). Teachers also tend to use technology to support their current practices rather than using it as a vehicle to consider other ways of teaching (Ottenbreit-Leftwich et al., 2010). Social technologies appear to support the engagement-oriented learning theories although teachers using emerging technologies employ a wide range of approaches (Backhouse, 2013). As with the personal use of social computing, other academic uses of SC do not necessarily lead to use in the classroom (Brown, 2012). The structural rewards in HE favour research outputs and thus encourage academics to focus on the technologies which can *reduce* the time and effort needed to achieve their basic teaching workload while they use technology to *enhance* their research (Manca & Ranieri, 2016).

3.5.2.3 Prior experience or seniority

Prior experience of technologies may affect teachers take-up of e-learning, especially emerging technologies such as an SNS (Scott, 2013). The importance of having prior experience with a technology and the resulting sense of familiarity reinforces the need for providing technology training for HE teachers (Georgina & Olson, 2008; Mueller et al., 2008).

3.5.2.4 Technological competency

Of the top six challenges facing HE, the most important is the generally low levels of "digital fluency" amongst HE teachers (Johnson et al., 2014, p. 20). It is important that a teacher feels competent in dealing with technology if they are to use it in the classroom (Georgina & Olson, 2008; Torrisi-Steele & Drew, 2013). In a study focusing on the UKZN Education discipline, teachers felt that the prevailing conditions did not facilitate LMS use (94%) and the majority felt their proficiency level was low (87%) (Govender & Govender, 2014, p. 215). Teachers see using a new technology as potentially challenging, requiring time, confidence and commitment in order to master its implementation (Ocak, 2011; Shelton, 2014). It may be the usability of specific software that limits its use in teaching: Seaton and Schwier (2014, p. 11) stressed that in their study "instructors rarely had issues with not being competent enough to use the technology". Problems experienced by teachers may relate to permission settings and technical problems, such as network settings or numerous upgrades, which are not under their control and are issues which could not be solved even by competent users (Seaton & Schwier, 2014).

Training can stimulate the use of technology but most support services are not set up for one-on-one training (Backhouse, 2013; Georgina & Olson, 2008). Teaching requires more work when it is taken online as it requires the additional levels of knowledge and skill demanded by the technology and there is thus an additional cost to the teacher. A participant in a study by Seaton and Schwier (2014, p. 11) suggested “You have to know more to even be there”. It is important that training targets the challenge or reason for non-use of technology (Schoonenboom, 2014). The influence of colleagues should also be considered when developing training, as the most effective approach to take would appear to be based on peer-to-peer level training (Georgina & Olson, 2008).

3.5.3 Academic identity

There is strong evidence to suggest that academics’ major concern when engaging with social media is the maintenance of their professional identity (Onwuagboke & Singh, 2016). It is also evident that the academic rank or reputation may impact their use. Full professors use “professional” sites, such as LinkedIn, more than their colleagues (Manca & Ranieri, 2016; Veletsianos, 2013). The use of a variety of applications for personal and professional use can pose a threat to a professional identity if the boundaries between the various platforms and content are seen as porous or even seamless. The flexibility provided by online environments gives a teacher a feeling of empowerment (Backhouse, 2013; Bair & Bair, 2011). The flexibility in terms of ‘place’ (83%) and ‘time’ (81%) during which teaching occurs is perceived as a benefit by the majority of teachers (Chimbo & Tekere, 2014, p. 78). There is, however, a tension between flexibility and structure in an online environment. The challenge is that students often assume that once some perceived pattern of delivery is established, the lecturer should not (and from their perspective, cannot) change it (Bair & Bair, 2011). In addition, if an institution decides to mandate the specific use of a technology, teachers are likely to feel their academic freedom is being encroached upon (Lawrence & Lentle-Keenan, 2013; Matthews, 2008).

3.5.3.1 Conceptual view of teaching

The way teachers use a technology-enabled classroom will depend on the way in which they conceptualise their role as teachers; their aims, objectives and contexts, their academic identities and their understanding of their students’ needs (Brown, 2012; Gebre et al., 2015; Onwuagboke & Singh, 2016). Teacher beliefs have more influence on their practice than their subject knowledge (Lameras et al., 2012; Ottenbreit-Leftwich et al., 2010). Beliefs are determined based on what teachers say, plan to do, or what can be observed from their practice. Unfortunately, these indicators are difficult to measure and there may be apparent contradictions between beliefs and practices.

Gebre et al. (2015, p. 204) cited numerous studies in support of their claim that "computers reinforce traditional methods of teaching instead of promoting more learning-oriented teaching approaches". However, while teachers may aim to develop student-centred teaching, research suggests that in reality their practices are less student-centred than they claim (Schoonenboom, 2014). It is difficult for teachers to change their beliefs and yet when important aspects of their teaching are not supported by current modes of delivery, this can stimulate discussions and collaborations which can shift perceptions and actions (Scott, 2013). The act of using technology may also stimulate teachers to reconsider their role and beliefs about teaching and learning (Mueller et al., 2008). Lameras et al. (2012, p. 154) suggested that "the epistemological beliefs of individual teachers may not be stable across different contexts of practice, or may be over-ridden by other considerations". Fundamentally, though, pedagogical beliefs cannot be "added" as an "after-thought to an online course; they are the foundation upon which a course is designed" (Kinchin, 2012, p. E45). What is clear though is that technology use is not dependent on how good a teacher one is (Mueller et al., 2008). This suggests that good teachers do not have to necessarily use technology and technology use does not necessarily result in good teaching. Technology cannot be considered neutral (Lameras et al., 2012) as it contains specific beliefs and gendered assumptions about its purpose, use, and role in the world within its design (Kinchin, 2012). A HE teacher's identity and their online persona (or teaching presence) may be constrained by the features of the platform, design and construction of the space and even the presence of other actors (such as co-teachers) or student expectations (Lawrence & Lentle-Keenan, 2013; Morgan, 2011). Teaching online carries a high cognitive load which is even worse in a blended learning environment as there are then two cohorts to manage (Bower et al., 2014). Technologists may however believe that because of their technical knowledge they are best suited to decide on the use of technology in teaching. During course design these tensions may be evident between teachers and technologists, with both attempting to dominate the course design (Kinchin, 2012).

3.5.3.2 Resistance to change

Generally, teachers show some resistance to change and this appears to play a larger role in technology use than, for example, infrastructural challenges (Lwoga, 2012). Those teachers who do use emerging technologies appear to be those HE teachers who are part of larger communities of practice (Bozalek, Gachago, et al., 2013). The resistance is not ‘anti-change’ per se but is rather a call for careful consideration of all options in the specific context in which HE teachers work (Brown, 2012). Research shows both students and teachers express a preference for face-to-face teaching and thus there is a pre-existing resistance to moving away from this form of delivery (Cao et al., 2013; Seaton & Schwier, 2014). However , there is considerable research that “suggests online courses are as effective as face-to-face teaching (Bair & Bair, 2011, p. 1) but this may have only limited impact on teachers’ perceptions.

3.5.3.3 Technology limits on teaching

Teachers may feel the nature of the subject has an impact on the potential use of social computing, or that the affordances of the technology prevent them teaching in the way they would prefer. Technology platforms may thus constrain or promote certain activity by their design (Lameras et al., 2012). This can specifically occur if management decisions result in a more constrained and conservative deployment of technology, forcing a ‘domestication’ of more radical social computing approaches which teachers may prefer (Brown, 2012). Selwyn (2011a, p. 717). suggested that change is more likely to come from educational technologists working to effect change “around the edges” rather than attempting to effect change at the centre. He also suggested that working with, rather than against, existing formal structures will deliver better results. Concerns are also expressed by teachers that the technology is an ‘informal’ platform (social) and hence not appropriate for ‘serious’ work (Chawinga & Zinn, 2015). Defensively, use of such platforms appears to teachers as if their work is being deprofessionalised (Ocak, 2011). Teachers are also concerned that online courses may oversimplify the educational process, robbing it of its richness and complexity (Matthews, 2008). Uncritical and ‘fashionable’ views and expectations of use from management, students and the wider society can often leave teachers feeling pressured to employ SC in their teaching to preserve their reputation (Backhouse, 2013; Bozalek & Ng'ambi, 2015; Lawrence & Lentle-Keenan, 2013; Onwuagboke & Singh, 2016; Shelton, 2014). This sense of being coerced into use of social computing is likely to cause a negative response and create resistance to its use.

3.5.3.4 Technology aids teaching

However, it is also argued that teacher use of SC allows them to appear as "public intellectuals" addressing numerous audiences and providing them with a larger platform for their ideas (Greenhow & Gleason, 2014; Manca & Ranieri, 2016). Teachers are equally as strategic as students in their use of technology in their professional lives. The choice of technology tools is specifically linked to the level of commitment to the specific task and the audience interested in the results (Manca & Ranieri, 2016; Timmis et al., 2010).

3.5.3.5 Course related aspects

A HE teacher's decision to use social computing, as with all technology, may be influenced by a number of course-related aspects such as the nuances of the discipline in which they teach, the academic level of study of their students, their class sizes, and the opinions and influence of their colleagues.

Discipline-based course nuances

Discipline-based differences are common in many aspects of academic life and serve to preserve the identity and focus of the discipline: "The tribes of academe, one might argue, define their own identities, and defend their own patches of intellectual ground by employing a variety of devices geared to the exclusion of illegal immigrants" (Becher & Trowler, 2001, p. 47). A discipline, like a tribe, will also have its own culture comprised of traditions, customs, practices, beliefs, morals, rules of conduct, language and symbols, and shared meanings (Becher & Trowler, 2001).

Schoonenboom (2014) focused on the knowledge domain of a discipline and suggested variations in SC use are related to differences in HE teachers' epistemological views, which may be related to their disciplines. Using a Bernsteinian lens, Lameras et al. (2012) Computer Science teachers viewed their content knowledge as a vertical hierarchical structure, with content being highly defined and more advanced knowledge being built upon existing prior knowledge (Bernstein, 1999). In these disciplines, knowledge is seen as external to the student and thus, while content can be mediated online, it is likely to be in the form of explicit resources rather than collaborative (social) endeavours. This 'hard' view of a discipline suggests that SC would be used less by those in the natural sciences, mathematics and Computer Science (Cao et al., 2013). The student-focused approaches, and the use of SC, appears to be more common in 'soft' humanities disciplines which focus on knowledge as being constructed either by the individual, or within a collaborative context (Cao et al., 2013; Lameras et al., 2012) . Computer Science, media studies and education are specifically South African examples where social computing is used (Backhouse, 2013). Interestingly, the use in Computer Science reported in Backhouse's study is different to the findings of other researchers in this field already discussed (such as (Cao et al., 2013; Lameras et al., 2012)). Teachers' willingness to adopt technologies appears linked to not only the discipline or specialisation, but also their perception of how it may make their jobs easier (Chimbo & Tekere, 2014).

Academic level of study

Studies show a greater inclination to SC use in more advanced level courses than at undergraduate levels, irrespective of the discipline (Lameras et al., 2012). It is suggested the role of the teacher changes, from an instructor to a facilitator at more advanced levels (Lameras et al., 2012, p. 149 Table 2). This suggests that in postgraduate programmes for many disciplines (both 'hard' and 'soft' areas), SC is a viable medium to support interrogation of assumptions, knowledge and practices. The greater the role of discussion and collaboration in a specific academic space; the more it is likely to lend itself to the use of SC tools. This could also explain why teachers do not necessarily have a single approach to their teaching but adjust it to suit the different groups of students with which they engage.

Class size

Use of technology, or specific tools, may depend on class size. Blogs appear to be used more in small classes, group tutorials or seminars (Bozalek, Ng'ambi, et al., 2013; Shelton, 2014). This may be linked to the fact that engaging with the content of blogs (and other social computing artifacts) in class interactions and formative or summative assessments, can be very time consuming (Bower et al., 2014).

Colleagues' influence

While teachers are influenced by their colleagues it appears that social norms prevail and thus the intention to use SC is influenced by the groups with which teachers most commonly interact socially, namely their colleagues, students and line managers (Brown, 2012; Cao et al., 2013). Seventy percent of UK HE teachers felt their colleagues expected them to use technology (Shelton, 2014, p. 756) while roughly a quarter of the comments in a South African study related to colleagues' attitudes and the time required to employ social computing (Bozalek, Ng'ambi, et al., 2013). Relationships with colleagues may take a variety of forms including a tribe (Becher & Trowler, 2001), community of practice (Wenger, 2010) or a clan (Ouchi, 1980). These are not identical in their aims: Academic tribes are not meritocratic but have their own identities and defend intellectual 'territories'; a community of practice is aimed at achieving 'a joint enterprise'; and clan members agree on a goal which represents a form of organic solidarity that arises out of the interdependence of the clan members. Evaluation of achievement of these clan goals is based on subtle cues of approval or disapproval among clan members. Based on the relationships established, teachers may experience a particular societal context as supportive (Brown, 2012); or it can enforce a negative pressure that impacts their academic freedom, if their position does not align with that of their colleagues (Shelton, 2014).

3.5.4 Professional risks

Numerous professional risks may exist that influence HE teachers. Teachers may be concerned that details about their private lives are available to students online and this may discourage them from using these media in their teaching (Hussein, Arayici, et al., 2013; Scott, 2013; Sobaih et al., 2016). Some teachers may feel equally uncomfortable communicating with fellow teachers via pubic media such as Facebook (Scott, 2013). For those teachers who see social computing as providing only marginal educational benefits, the privacy risks are not worth the limited gains (Cao et al., 2013). In addition, teachers using emerging technologies may feel isolated from peers who do not appreciate the use of technology in teaching (Bair & Bair, 2011; Georgina & Olson, 2008; Seaton & Schwier, 2014).

When teachers enter an online discussion, this may limit different opinions being expressed (Bair & Bair, 2011). This is the reason HE teachers may choose not to insert themselves into online discussions. However, if a teacher is not visibly present in an online space and takes an observer role, they run the risk that participants may report them as 'absent' to other students, colleagues or managers (Bair & Bair, 2011). Teachers' careers are strongly impacted by student evaluations of their teaching and evidence suggests online evaluations of teachers tend to be lower than surveys completed face-to-face (Wasilik & Bolliger, 2009). Teachers also have legitimate concerns that their individual intellectual property will be policed and owned by the institution once captured within a formal LMS (Matthews, 2008; Wasilik & Bolliger, 2009). To counteract this, teachers should either be allowed to retain their own IP or should be compensated appropriately (Wasilik & Bolliger, 2009). Finally, teachers may be concerned that once an online course has been developed their involvement may be considered redundant and thus the teacher could be seen as expendable (Matthews, 2008).

3.5.5 Pedagogical factors

Teachers stress that they have to be convinced that there is a pedagogical purpose to using technology as part of their teaching or they will hesitate to engage with its use (Cao et al., 2013; Matthews, 2008). Teachers' use of technology will be impacted by negative experiences: Low levels of satisfaction with the outcomes of attempts at using technology will reduce the likelihood of further attempts (Morgan, 2011; Ocak, 2011).

3.5.5.1 A creative, disruptive force

The teachers using emerging technologies appear to demonstrate a passion for teaching, technology and improving their students' learning These teachers face many pedagogical challenges when approaching blended or online teaching (Georgina & Olson, 2008). Technology is not merely an 'add-on' to the teaching but may require revisiting of the curriculum as well as reorganising and revisiting the conceptualisation of the course and may require additional teacher training (Georgina & Olson, 2008; Glenn, 2008; Lwoga, 2012; Ocak, 2011). Technology thus creates a sense of disruption and change in HE teaching which, other than providing positive potentials for change (Johnson et al., 2015), is time-consuming for HE teachers as they need to focus on developing the necessary skills and materials, and require technical support to become competent (Bozalek, Ng'ambi, et al., 2013; Gebre et al., 2015; Govender & Govender, 2014; Ocak, 2011).

The threshold teachers set for use will, however, vary on an individual basis (Shelton, 2014). It requires hard work to achieve the integration of technology into teaching and is only worth the effort if the outcomes are positive (Lawrence & Lentle-Keenan, 2013; Ottenbreit-Leftwich et al., 2010). Likewise, when technology use is highly relevant to performing a specific task i.e. if perceived usefulness is high, then results are more likely to be positive (Bozalek & Ng'ambi, 2015,3; Cao et al., 2013; Gebre et al., 2015; Manca & Ranieri, 2016; Manzuoli et al., 2016; Mueller et al., 2008; Porter et al., 2016; Timmis et al., 2010). Many teachers use technology to increase social or collaborative learning, to overcome perceived challenges and to improve their curriculum (Backhouse, 2013; Lwoga, 2012). In aiming to achieve this collaborative experience, teachers are called on to play multiple roles: planner, communication designer, provider of information, facilitator of interactions and discussions; a model and coach in the educational space; as well as an assessor (Lameras et al., 2012; Seaton & Schwier, 2014).The overarching intention is to stimulate students to take responsibility for their learning, by promoting active learning through use of technology. Nearly half of teachers (48%) see this as an important reason to use technology in their teaching (Straumsheim et al., 2015, p. 6). However, it is important to note that the majority of all users of social computing and emerging technologies are consumers of content rather than producers, and in most online communities it is “1% of users who contribute 90% of the content” (James, 2014, p. 564).

3.5.5.2 Beneficial to teaching

If teachers choose to use technology because it can have a positive effect on teaching and learning then it is useful to understand the broad categories of use which are perceived to, or promoted as, affecting teaching either directly or indirectly. These may represent reasons for use or non-use (see section 2.5.2.)

3.5.5.3 Roles of teachers and students

Establishing a connection with students is another of the main drivers of the use of social computing (Chawinga & Zinn, 2015; Lawrence & Lentle-Keenan, 2013; Sobaih et al., 2016). It may thus be difficult for individual teachers to perceive, or engage in, teaching activities that are not seen to be part of the norm. The ability to reduce the distance between the student and the teacher is however seen as a benefit by many teachers (80.8%) in a study by Chimbo and Tekere (2014, p. 78), and reported by Lawrence and Lentle-Keenan (2013). Frequent interaction between student and teacher is considered a core principle of good teaching and learning (Bozalek, Ng'ambi, et al., 2013). Social engagement via these platforms can also reduce the students' sense of isolation (Backhouse, 2013; Bower et al., 2014). A teaching approach focused on increased communication and providing a voice to all participants is more conducive to the development of teaching and learning initiatives that consider transformation of the process from a teacher-centred pedagogy to a practice which includes, not only pedagogy, but also andragogy (student-centred) and heutagogy (student-directed or student negotiated) (Bozalek & Ng'ambi, 2015; Cochrane et al., 2012). Social computing applications are seen as a vehicle for students to renegotiate their position in the learning process allowing them to publish their ideas and create artefacts of their learning (Ajjan & Hartshorne, 2008; Brown, 2012).

Teacher-to-teacher communication is also aided by social computing as it allows for social engagement, sharing of resources, increased speed of feedback and relationship building (Chawinga & Zinn, 2015; Sobaih et al., 2016). This can provide a useful mechanism for bringing international experts into the classroom. This has the benefit that it allows South African students access to both global and continental HE teachers (Backhouse, 2013; Chawinga & Zinn, 2015; Chimbo & Tekere, 2014; Czerniewicz & Carr, 2011).

3.5.5.4 Indirect influences on pedagogy

Indirectly, personal and social teacher use of technology may play an important, albeit indirect role in the teaching and learning process by enhancing their reputation (Hussein, Arayici, et al., 2013) and credibility, and to help develop trust (Johnson, 2011). However, if there is too much disclosure or the discussions, preferences or habits are considered to be inappropriate or unprofessional then online sharing can be damaging to a teacher's credibility. Johnson (2011, p. 22) suggested that a teacher's credibility is based on "competence, trustworthiness, and caring". In addition, Kress (2010) suggested teachers should focus on the 'design' of their teaching. Design looks forward towards the reality that a teacher is attempting to conceptualise, create and instantiate. This approach, however, places pressure on the teacher: Firstly, it requires that a teacher has a specific intention or view of the world; and secondly, it requires that one has sufficient confidence and competence to be able to articulate or develop that view in a specific technological context (Ocak, 2011). If teachers are not able to achieve this, then they are of necessity, trapped within a view governed by existing technology affordances which others have determined.

3.5.5.5 Technology may not be beneficial to teaching

Less researched and theorised are those aspects of the use of technology which a HE teacher may feel either detracts from their teaching, or offers no specific benefit. Shelton (2014) found a number of HE teachers who used specific technologies frequently but did not think it improved their teaching. He suggested they, thus, must have a different reason for using the technology although he did not report data on their reasons. This raises questions around potential pressure being applied to teachers to use technology, either directly or subtly by students, colleagues or institutions. Shelton (2014, p. 757) suggested teachers may be required “to use technology in ways with which they are not comfortable” implying perhaps that they would prefer to use technology in a different way, or not at all, or perhaps even that they feel it is to the detriment of their teaching.

In addition, teachers may feel a greater sense of disconnect from their students due to a lack of a physical social presence which would normally be experienced in a face-to-face classroom (Bair & Bair, 2011; Seaton & Schwier, 2014). Another concern mentioned by teachers is the lack of control over the quality of online courses. The literature on this is inconclusive (Scott, 2013). It is also suggested that using SC for educational purposes results in a poor signal-to-noise ratio as the clarity of the educational message (or signal) is hampered by the ‘noise’ or distraction from personal and social interactions on the social computing platform (Hussein, Aryaci, et al., 2013). Bair and Bair (2011) concluded that while students had more access to information, they only read the most readily available information and their writing showed evidence they had only read material which aligned with their pre-existing opinions. Students may also be less engaged if they feel their teacher is ‘absent’ (if the teachers choose to remove themselves from the online discussions, in the hope of allowing a more student-centred process to emerge) (Bair & Bair, 2011).

Less than half the lecturers in a study at UNISA felt that social computing improves students' problem solving skills (Chimbo & Tekere, 2014, p. 79) even though this is reported as a key benefit which students can gain from this use of technology (Ottenbreit-Leftwich et al., 2010). Students may also become overly dependent on tutors for direction and answers, and demand an unrealistic level of responsiveness of those educators servicing an online module (Lawrence & Lentle-Keenan, 2013). A teacher may thus feel they are creating dependent students who are reliant on the input from others and unable to resolve their own challenges. The conclusion has been drawn that an under-theorised, learner-centred pedagogy based on SC, runs the risk of extending ignorance rather than a broader, more inclusive view of the world (Bozalek & Ng'ambi, 2015). Increased plagiarism, cheating and distractibility has also been noted (Glenn, 2008).

3.5.5.6 Learning and students

There appears to be a gap between students' perception of the use of social computing in their personal lives (largely positive) and its use as part of their academic lives (which tends to be limited) (Sobaih et al., 2016). Students choose social computing tools based on their social circles rather than its particular use or affordances (Timmis et al., 2010). This can result in a resistance to the tools a teacher may be attempting to employ. Interestingly, Timmis et al. (2010) found that teachers will also choose tools based on their commitment to the task and the audience for whom the work is being prepared. Motivation is important when students are provided the opportunity to use optional features in social computing: Novelty, assessment and employment appear to be strong motivators (Scott, 2013). In Malawi there is consensus that students should be exposed to emerging technologies to benefit their career paths (Chawinga & Zinn, 2015). The overall assessment of US millennials entering the marketplace is that they are comfortable with collaboration, multi-tasking and emerging technologies but that they are less experienced at independent decision-making (Glenn, 2008). The tools that are used are influenced by the relative presence of the social capital constructs of reciprocity, mutual trust and shared goals between participants in the educational space (Tzanakis, 2013).

It is key to note that despite other potential considerations, HE teachers who use emerging technologies are driven by the educational welfare of their students (Backhouse, 2013; Porter et al., 2016). Social computing allows students to engage in the formal class activities but also provides access to current events and connections with a variety of people on the topic. This helps them to build confidence and contribute to the knowledge available to their class (Chawinga & Zinn, 2015).

The use of technology reduces students' sense of isolation, allows for more personalised learning and helps to stimulate student interest and participation (Backhouse, 2013; Bower et al., 2014; Porter et al., 2016). This can lead to positive learning outcomes and student satisfaction (Cao et al., 2013). For students to gain the benefits of technology use they need to become more discerning about content they access as well as take responsibility for active participation (Crook, 2008). 'Non-participating' students may be passively engaged, in that they are reading content and discussions without actively voicing an opinion. Such deepening of knowledge may only become evident in later submitted work (Bair & Bair, 2011). Teachers experiencing a lack of participation from students may despair and change their approach because they have not realised these dynamics could be at play. Research results on participation, however, appear to differ. Some studies report a lack of student social presence (Seaton & Schwier, 2014) whereas others report highly engaged student participation (Backhouse, 2013; Wasilik & Bolliger, 2009). A teacher's sense of difficulty in interpreting student participation is increased when teachers lack the knowledge of which social computing media would be appropriate for their context (Rambe & Nel, 2014). In the "SA Emerging ICTs" study, 22% of HE teacher responses focused on student-related challenges (Bozalek, Ng'ambi, et al., 2013, p. 431) with the largest student constraints, a lack of student motivation and uptake of the educational technology (2013).

Perception of students' participation can be impacted by their verbal or general language ability specifically if not working in their home language (Chawinga & Zinn, 2015). Cultural differences may also play a role in how online behaviour is perceived (Chawinga & Zinn, 2015). At the same time, because social computing platforms are fundamentally writing platforms they can assist students in improving their skills in a foreign language, and provide students with sufficient time to craft a response (Hussein, Aryaci, et al., 2013). In addition, social computing platforms can allow students who are more introverted to participate more actively in online groups than they may be able to do in a conventional classroom (Backhouse, 2013). More introverted teachers may also see this as a benefit of online engagement (Wasilik & Bolliger, 2009). In contrast to this, Bair and Bair (2011) highlighted the negative impact of providing students with time to think about, and rework, online responses which may then be less authentic.

There is mixed reporting on the influence students may have on teacher use of technology: Students may drive social computing use (Backhouse, 2013; Shelton, 2014) , or may serve to dissuade teachers from using the technology if they, as students, perceive they would require additional training in order to be confident in the technology use (Lawrence & Lentle-Keenan, 2013). Student expectations in Shelton (2014, p. 756) UK study were high with 76% of teachers reporting that their undergraduate students would expect the use of technology in teaching in comparison to a SA study where only 5% felt prompted by students (Bozalek, Ng'ambi, et al., 2013, p. 429). Students do not often suggest applications for use in teaching to their teachers (Brown, 2012). In the same way that teachers' contexts are central in deciding technology use; the context of learning, student's previous experience with technology and their practical skills should also be considered in teachers' decision-making around the use of specific technologies (Backhouse, 2013; Bozalek & Ng'ambi, 2015).

3.5.6 Operational factors affecting teacher choice

There are a variety of operational considerations teachers face when deciding to use technology. A number of these choices relate to resources, such as the availability of applications and equipment, teachers' time management and responsibilities as well as the nature of support available via mentors and rewards, and the implications of managerial pressure.

3.5.6.1 Choice of application

Because both teachers and students prefer face-to-face teaching (Cao et al., 2013), any arguments for the introduction of technology into teaching and learning will need to overcome this intrinsic bias. The number of social computing technologies available to HE teachers is an additional challenge as it is difficult to choose an app when so many choices exist and where there are overlapping functionalities in different offerings (Chawinga & Zinn, 2015). Teachers select tools that match the way they normally prefer to teach as this helps reduce cognitive switching costs (Ocak, 2011). In addition, cost may play a role and free apps may be used because of their price rather than because they are necessarily the best tools for the task (James, 2014). Ultimately teachers make pragmatic choices which are often equally about efficiency as pedagogy. This may be because of the pressures of massification, especially in the African context (Backhouse, 2013).

3.5.6.2 Lack of equipment/ resources

Lack of institutional equipment or resources plays a major role in the use of technology in teaching (Porter et al., 2016). In South Africa, the availability of these resources is cited as the second highest motive (after personal interest) for using emerging technologies in teaching (23% of respondents) (Bozalek, Ng'ambi, et al., 2013, p. 429).

3.5.6.3 Demands on teachers' time

The lack of available time to develop and implement SC in teaching is one of the two greatest challenges for teachers: The other is the lack of equipment (Porter et al., 2016). Consistently, the highest cost of SC use is identified by teachers as being the time commitment required (Bozalek, Gachago, et al., 2013; Lawrence & Lentle-Keenan, 2013; Lwoga, 2012; Schoonenboom, 2014; Shelton, 2014).

In blended learning, teachers' roles shift and become more multifaceted, which increases the time required to both prepare for, and engage in, teaching (Ocak, 2011). It takes time to learn about technology and its use and this extra time commitment needs to be included in formal workload allocation models (Bower et al., 2014). Even if a person has used a specific form of technology in their personal life it requires an additional investment of time to consider and learn how it can best be used as a pedagogical tool (Georgina & Olson, 2008). In addition, it then takes time to create the necessary content or activities; and time to test and practice how the interactions work in a specific format or medium (Lawrence & Lentle-Keenan, 2013; Ocak, 2011). Mueller et al. (2008, p. 1524) suggested "it takes 5 or 6 years for a teacher to gain mastery in integrating technology, and that is when teachers are given support and time to learn and plan for integration". Contrary to common ideas on using technology in teaching; teachers find that developing an online course is an iterative process which makes ongoing demands on a teacher's time and is not a once-off time investment(Georgina & Olson, 2008; Scott, 2013). The time required is further compounded by the fact that technology keeps changing. This forces teachers to continually revisit their pedagogy and make adjustments when a form of technology removes a feature, adjusts how it operates, integrates with other applications, or presents new opportunities (Ocak, 2011). This can leave teachers feeling like "perpetual novices" (Mueller et al., 2008). A participant in Ocak (2011, p. 695) study felt that "at the beginning, blended courses seemed appealing, but I have to redesign the same course every year, based upon new technologies". This is the opposite of what is suggested by Guess (2008) i.e. once online courses are developed and mainstreamed, they do not require additional resources. Bower et al. (2014) suggested that in addition to the time element, there is also a cognitive load associated with running synchronous online chats during which teachers need to monitor student comments and respond; prompt the discussion with inputs and attend to any participation or technological issues which may arise. Bair and Bair (2011, p. 5) expressed this succinctly when they suggested their study showed "technology made work easier and faculty worked harder".

When delivering a course using social computing, teachers experience an increase in interaction with students via online discussions and email communications, which makes high demands on teachers' time (Matthews, 2008). Monitoring and responding to communications adds to the amount of time a teacher is required to devote to activities; both during preparation and while in session (Bower et al., 2014; Porter et al., 2016). Students also expect their teachers to provide technical support online and this can add to the overall workload (Bair & Bair, 2011). More than half (53%) of teachers feel the institution does not recognise the time commitment required (Straumsheim et al., 2015, p. 31). Matthews (2008) cited a case where teachers demanded a union representative's presence in negotiations focused on establishing a training programme related to technology use in teaching to ensure these impacts are considered. As a positive benefit, technology can help reduce the time some tasks require, such as delivering the same topic to different groups of students, marking multiple choice assessments, being able to receive and return assignment submissions and assessing the participation of students (Bair & Bair, 2011).

Teachers appreciate the flexibility social computing allows them (94%) and their students (97%) (Wasilik & Bolliger, 2009, p. 175). This is important to teachers who are under pressure to perform and publish research (Seaton & Schwier, 2014). Some teachers specifically employ technology in their teaching to assist in the administration of a course

(Lawrence & Lentle-Keenan, 2013). While there is an increase in use of online courses to overcome challenges of working older or mid-career students, at least 40% of traditional American students use online courses to address timetabling problems or for convenience (Guess, 2008).

3.5.6.4 Technology champion or mentor

The involvement of a technology champion, senior staff, educational developers, an established community of practice and support at faculty or department level has a key role to play in the use of technology (Bozalek, Ng'ambi, et al., 2013; Brown, 2012; Cochrane et al., 2012; Lwoga, 2012; Mueller et al., 2008; Porter et al., 2016; Schoonenboom, 2014). It appears that for blended learning to be successful, there needs to be senior leadership support, eager for the project to succeed (Ocak, 2011). There is concern that technology may be implemented to support managerial goals rather than those of teachers, as institutions are more likely to select technology solutions that focus on a closed platform, are Web1.0-oriented, teacher-driven, top-down and suggests a one-size-fits-all approach (Brown, 2012). While institutional support and policies are important, large scale initiatives appear to be less successful than those instigated closer to the coal face where mentors are familiar with the specific challenges being experienced and where their input is trusted (Cochrane et al., 2012). Teachers prefer to receive input from people from within their own discipline as their pedagogic use of technology is likely to be similar to their own use (Matthews, 2008; Porter et al., 2016). Cochrane et al. (2012) suggest these initiatives may require a champion to play a boundary agent role i.e. to draw colleagues into legitimate peripheral participation at a discipline level. It may also be necessary to provide a shell or demonstration artefact to serve as boundary objects to encourage engagement.

3.5.6.5 Managerial pressure and rewards

There appears to be managerial pressure on HE teachers to teach with technology for a variety of reasons. These reasons include enhancing the reputation of the university, because it is perceived as a necessary part of teaching best practice, and because it is seen as a mechanism to indicate an institution is on par with those in developed countries rather than being left on the wrong side of the digital divide (Backhouse, 2013; Cao et al., 2013; Kinchin, 2012; Lawrence & Lentle-Keenan, 2013; Onwuagboke & Singh, 2016). While managerial pressure may result in a greater uptake in technology use in teaching. this may not include a pedagogical review of the teaching. Such pressure may encourage a duplication of an instructivist approach (Kinchin, 2012).

In addition, the second highest of the top six challenges facing HE is the “relative lack of rewards for teaching” although it is seen as a problem which is well understood and which we know how to solve (Johnson et al., 2014, p. 24). Teachers feel the increased workload associated with the use of technology in teaching is not generally adequately compensated (Guess, 2008; Wasilik & Bolliger, 2009). While financial incentives are most commonly offered to teachers engaging in online courses; a reduction in the assigned teaching load is the incentive preferred by teachers (Govender & Govender, 2014; Porter et al., 2016). Only 2% of teachers surveyed in South Africa felt that being paid to engage with technology serves as an incentive (Bozalek, Ng'ambi, et al., 2013, p. 429). More than half of teachers (52%) do not feel they are compensated fairly for the time spent on online courses; with 49% (Straumsheim et al., 2015, p. 31) suggesting the institution does not reward online teaching in their tenure or promotions decisions (Georgina & Olson, 2008; Straumsheim et al., 2015).

3.5.7 Institutional factors

3.5.7.1 Institutional culture

Lameras et al. (2012) and Shelton (2014) found no significant difference between VLE use in different academic disciplines, but noticed large, and significant differences in use between a range of different UK institutions. The role of the institutional culture or the norms it perpetuates, are thus important factors in teachers’ decisions around technology use. Institutional support for an initiative makes it easier to achieve project goals and teachers may explicitly acknowledge such support in recognition of the role it plays in technology enabled teaching project success; see e.g. Czerniewicz and Carr (2011, p. 3). The South African study reported by Bozalek, Ng'ambi, et al. (2013, p. 430) indicated 73% of respondents’ comments (n=64) reported positive institutional support. In descending order of importance, respondents mentioned support from dedicated Teaching and Learning units (19), supportive colleagues (12), line managers such as Heads of Department or Deans (8), financial support via grants etc. (5) and a few who mentioned IT units, friends and broader connections. Only 11 responses were negative, although six comments suggested ambivalent feelings on institutional support and four mentioned a form of passive resistance when approached for support.

It is important to remember that institutional culture is seldom experienced as a single homogenous state in all parts of an institution (Matthews, 2008). Institutional culture may be fractured along “great culture” lines including those external forces and allegiances such as political parties, unions and wider cultural dimensions. Institutional culture may thus be perceived, and experienced, very differently by individuals in different sections of the same institution.

Individuals may be influenced by opinions of others at a variety of levels: “Social influence is the extent to which consumers perceive that important others (e.g. family and friends) believe they should use a particular technology “ (Venkatesh et al., 2012, p. 159). Shelton (2014) and Lawrence and Lentle-Keenan (2013) suggested a strong social influence is exerted by students, colleagues, university managers and even the wider society. This effect is more evident when use of a technology becomes mandatory rather than when use is voluntary (Venkatesh et al., 2003). General comments made to teachers about technology represent a subjective norm and may be phrased in a way that teachers feel pressurised into using technology to an extent where they feel unable to exercise their academic freedom and personal agency to teach without technology (Ajjan & Hartshorne, 2008; Shelton, 2014). Lack of institutional support for technology, technical support or design assistance makes teachers suspicious of administrator motivations (Ocak, 2011). A South African study shows that individuals embedded within a community of practice focused on the use of emerging technology in HE teaching, score higher on use of these technologies in their teaching (Bozalek, Gachago, et al., 2013).

The literature on change in public sector institutions such as universities highlights the difficulties experienced when trying to implement a simple form of policy directive from authority figures (Matthews, 2008). The anxiety and fears created by a perceived authoritarian style of management can be sufficient to alienate academics and to create a climate of distrust, where any direction from formal leaders is treated with suspicion. Considering teachers’ behaviour when becoming engaged in SC, or becoming members of an intentional community of practice that is focused on introducing emerging technologies, it will be beneficial for institutions to provide a number of routes by which teachers can become active in SC use (Cochrane et al., 2012). The focus in Cochrane et al. (2012) approach is to move teachers into legitimate peripheral participation and from a more teacher-centred to student-centred approach as they recognise the majority of teachers are using the platform merely as a repository for resources and found a workshop training model ineffectual.

Individual department or discipline cultures should thus be taken into account and incorporated before training begins (Georgina & Olson, 2008). It should be remembered that teachers may have deeply ingrained patterns of professional behaviour which are unlikely to be altered by interventions which take the form of brief workshops or presentations i.e. without sustained interactions or support (Chimbo & Tekere, 2014; Glenn, 2008). Teachers may also require reductions in teaching time or access to teacher relief to provide an opportunity for them to spend the necessary time developing their learning pedagogy and technical competence (Govender & Govender, 2014).

Seaton and Schwier (2014) focused on the relationship between a HE teachers' requirement to carry out research and their engagement in online teaching. Their study showed that teachers required to teach and do research were significantly less engaged in online teaching than teachers required to only teach. Research requirements of academic staff dominated their professional work with teaching seen as a less important responsibility (Lawrence & Lentle-Keenan, 2013; Seaton & Schwier, 2014). Academics use those technologies which directly impact research more than those which relate to other professional responsibilities (such as teaching) (Ng'ambi, 2013). The valuing of research and devaluing of teaching on a global scale in HE, as evidenced in international ranking systems, is recognized as a "wicked" challenge (Johnson et al., 2015). Determining appropriate strategies to improve this situation is difficult as current reward strategies have limited success. In addition, the focus on research results in poor attention being paid to the processes of teaching and it is relegated to being an after-thought for tenured academics or serviced by an ever-changing rotation of temporary, short-contract teaching staff with little motivation to develop innovative approaches or develop a continuity within the teaching (Johnson et al., 2015).

3.5.7.2 Institutional branding

The presence of e-learning and m-learning in a university are seen as indicators of a vibrant and progressive institution which is innovative and attractive to funders, parents and students. Use of technology in teaching is thus seen as a differentiator when considering a HE institution (Glenn, 2008). Economically, the investment in technology is perceived as providing a good return on investment allowing for an increase in student numbers with a relatively small impact on institutional resources (Lawrence & Lentle-Keenan, 2013). The technicist, uncritical acceptance of technology as the solution to HE problems at a national level is also highlighted at an institutional level (Onwuagboke & Singh, 2016; Shelton, 2014). In contrast to this predominantly positive perspective, there are concerns that the lack of institutional control in the presence of open, online, social interactions presents a risk to the institution and the institutional brand which manifests as low levels of support for SC and similar forms of emerging technology (Ng'ambi, 2013). This is exacerbated by the lack of pedagogical institutional guidelines for the use of emerging technologies.

3.5.7.3 Institutional resources

The resources available within an institution have a direct impact on the feasibility of; and level of synergy experienced with, technology use. The impact of policies, infrastructure and, financial and technical support are noticeable.

Policy

Success in the use of emerging technologies and blended learning requires institutional leadership support for creative solutions and the recognition of the increase in popularity of the vision of students as hands-on creators in shared spaces (2017 to 2019) (Johnson et al., 2014; Matthews, 2008; Ocak, 2011). Lack of effective policies and support is a key limiter of institutional progress in the use of technology platforms in teaching (Lawrence & Lentle-Keenan, 2013). Institutions also appear to lack specific social media policies or have not adequately communicated these to their staff and students (Bart, 2011).

Academic staff view policy documents as the primary indicator of an institution’s fundamental or “ hard line” agenda; despite managerial assurances which may indicate a softening in approach or indications of a management transition to a modified position

(Matthews, 2008). More difficult to resolve are those policies and environments which make it difficult for teachers using technology-enhanced pedagogies to upscale the approaches they have successfully piloted (Johnson et al., 2014). Johnson et al. (2014, p. 28) categorised this as the fourth highest challenge for HE institutions and rated it as a challenge that is well understood " but for which solutions are elusive". They viewed institutional systems as being generally unsupportive of experimentation and apparently unable to assist in effectively moving innovative approaches into the mainstream. It is difficult to develop strategies to effect change on an institutional scale because different communities may require different approaches (Matthews, 2008) that create challenges for policy-makers (Porter et al., 2016).

Infrastructure for teachers and students

A major infrastructural constraint in South Africa is the lack of quality bandwidth access to the Internet and lack of resources (54%) (Bozalek, Ng'ambi, et al., 2013, p. 431). This is a widely cited challenge for teachers and improving access is costly (Chawinga & Zinn, 2015; Czerniewicz & Carr, 2011; Lwoga, 2012; Onwuagboke & Singh, 2016; Porter et al., 2016; Schoonenboom, 2014; Seaton & Schwier, 2014). While the degree to which the lack of resources is a barrier to technology use may vary institutionally (a range of 10% - 65% (Shelton, 2014, p. 752)); it is also important that available resources are reliable. Teachers reported using technology based outside the institution as they find it more reliable (Shelton, 2014). Backhouse (2013) agreed with this finding as she sees many respondents resorting to emerging technologies (based outside the institution) as a way of compensating for these challenges. Bozalek and Ng'ambi (2015) supported these findings and this later study reported a shift in HE ICT infrastructure in South Africa towards cloud-based and more flexible technologies. Lack of reliable electricity can also be a major constraint (Chawinga & Zinn, 2015), or the lack of appropriate software to watch videos (Rambe & Nel, 2014). These challenges seem to be more pronounced in the developing world (Lwoga, 2012). Irrespective of context, it is clear that if a teacher does not have access to the technology they are meant to use in their classroom it becomes impossible for them to develop a competency with the technology and to use it as part of teaching practice (Onwuagboke & Singh, 2016; Porter et al., 2016).

Teachers cannot assume students have access to technology. Even if the percentage of students without access is low, it is problematic, as it results in even greater marginalization of those students from their peer's experience (Ocak, 2011). Ways in which this can be counteracted include to make use of cloud-based infrastructure and to build activities which are based on existing student digital literacies such as competent mobile phone use (Bozalek & Ng'ambi, 2015). This can reduce the choice of application or platform available to the teacher if additional teaching support is not available (Bower et al., 2014).

Financial

The pressure internationally on HE to meet growing demands in terms of the number of students accommodated and the cost of the services provided, is forcing HE institutions to turn to some form of e-learning solutions to assist in resolving the financial pressures. Not only will this assist in serving larger numbers of students but it is also hoped that it will be more efficient and cost effective (Bair & Bair, 2011; Bower et al., 2014; Czerniewicz & Carr, 2011; Glenn, 2008; Lawrence & Lentle-Keenan, 2013; Schoonenboom, 2014; Sobaih et al., 2016). This is an attractive solution when there is research to show technology mediated learning can be equally as effective as face to face courses (Bair & Bair, 2011).

HE institutions are generally funded via a government model which not only looks at student registration but also throughput rates. Systems which may thus assist with enhancing student engagement, retention and completion, such as e-learning and m-learning, are seen as useful (Lawrence & Lentle-Keenan, 2013). This may well be the case in well-resourced contexts such as New Zealand, but in other contexts, for example, Egypt (Sobaih et al., 2016) and Korea (Porter et al., 2016) the costs of the new approaches, tools and resources may be too high.

Technical support

The importance of technical support as an enabler of social computing use is well documented (Bower et al., 2014; Lwoga, 2012; Ocak, 2011; Porter et al., 2016; Schoonenboom, 2014; Seaton & Schwier, 2014; Shelton, 2014). Professional and technical support for developing materials has a positive impact on teacher satisfaction (Wasilik & Bolliger, 2009). Institutions may, however, experience a challenge in obtaining and retaining the appropriate ICT experts to support teachers (Lwoga, 2012) and ongoing financial support for technical support is viewed by teachers as an indicator of the long-term commitment to technology enhanced teaching (Matthews, 2008). Without adequate, friendly and enabling support, teachers may struggle with technical details and decide to abandon their attempts (Ocak, 2011). However the nature of the technical support and how it fits into the institutional culture is also an important factor. In cases where instructional designers are provided it has been noted that they can become more of a hindrance than a help if clear guidelines in terms of their role and responsibility are not established up front (Lawrence & Lentle-Keenan, 2013). Lawrence and Lentle-Keenan (2013) discuss that even when teachers are working together on a course they may conceptualise and use a virtual space very differently. The creation of a space may thus be challenging even before technical issues arise (Morgan, 2011). It is important to note that teacher perceptions change over time and thus their needs shift. This requires institutions to be proactive in their support of technology use in general, and SC use in particular.

3.5.8 National/ regional context

In 2014 the fifth greatest challenge, referred to as a 'wicked challenge', facing the HE sector was the need to increase access to HE institutions (Johnson et al., 2014). There is an imperative for universities to become more comfortable with managing change as technology begins to play a bigger role in all areas, including teaching and administration e.g. the use of big data and analytics, which will require them to use agile approaches to become more responsive over the next five years (Johnson et al., 2014). 'Universities South Africa' (https://www.usaf.ac.za/) consisting of the Vice-Chancellors of SA public universities, includes a Teaching and Learning Strategy Group (TLSG) within its structure, whose focus in 2014 was 'Learning with technology'. The intention was to provide input to Vice-Chancellors so that they could use the findings from the group to engage executive leadership in discussions pertaining to the support of educational technologies within their specific institutional context (Kilfoil, 2015).

The 2017 call for comments on "The open learning policy framework for post-school education and training" focuses on the development of a South African policy framework to guide implementation of the 2014 White Paper for Post School-Education and Training (PSET) (Nzimande, 2017, p. 2). A clear definition of "open learning" is provided i.e. "… an approach which combines the principles of learner-centeredness, lifelong learning, flexibility of learning provision, the removal of barriers to access learning, the recognition for credit of prior learning experience, the provision of learner support, the construction of learning programmes in the expectation that learners can succeed, and the maintenance of rigorous quality assurance over the design of learning materials and support systems" (Nzimande, 2017, p. 5). This aims to distinguish it from distance learning and e-learning, and reinforces that open learning can be implemented in numerous modalities including in situ teaching and learning, and the use of traditional media e.g. printed documents. It is envisaged that implementation will take the form of a National Open Learning System (NOLS) jointly driven and monitored by HE institutions and the Department of HE and Training (DHET). Fundamental to increasing digital access is alignment with the National Integrated ICT Policy White Paper (2016) that aims to "ensure (that) everyone, regardless of who they are, where they live or their social or economic standing, can benefit from the opportunities offered by ICT, either on an individual or shared basis" (Nzimande, 2017, p. 26).

Government funding may mediate the use of social computing, either directly or indirectly (Lawrence & Lentle-Keenan, 2013). In South Africa the DHET supports research by funding institutions based on a research-productivity model which clearly signals the importance of research at HE institutions. No funding on a similar scale supports quality or innovative teaching as the SA government funding model is primarily linked to research outputs and throughput rates (North et al., 2011). While research outputs are linked to individual academic authors and thus credit accrues to them individually there is no similar, direct link, between student throughput rates and the effort, or quality of teaching, employed by an individual teacher. In addition, demands are being made to ensure students are receiving relevant education to meet the workforce needs (Johnson et al., 2014) – particularly in African universities, this is recognised as requiring students to be prepared for a knowledge economy (Czerniewicz & Carr, 2011).

Broadening the focus from HE, to society at large; another positive impact of the use of technology in HE is that it reduces the need for printed materials and the need to travel to teaching centres. It thus helps reduce the carbon footprint of the HE sector (Backhouse, 2013; Chimbo & Tekere, 2014).

3.5.9 Suggested areas for further research

Teachers who experiment with innovations, most often conduct research on their own practice. Researchers are encouraged to reveal and critique their underlying assumptions and any limitations associated with their method or resultant evidence. This should provide sufficient context for other researchers to fully understand their position as a teacher-researcher (Kirkwood & Price, 2013). This research position opens the door to studies that are practical rather than idealistic and which consider “how technology is actually being used in practice” (Selwyn, 2011a, p. 715). Selwyn and Grant (2009, p. 82) “called for researchers to move away from speculative accounts of possible forms of social software use in the near future, and instead concentrate on developing ‘thick’ descriptive accounts of the present day use of social software in situ”; Herring (2004, p. 34) suggested researchers “take a step back from the parade of passing technologies and consider more deeply the question of what determines people’s use of mediated communication”. It is critical to research actual teaching practice irrespective of whether or not the technology implementations are ‘successful’ as these studies are able to teach us more about the phenomenon than pure ‘proof of concept’ studies which focus on successful implementations (Selwyn, 2011a).

There is also a need to focus research on the teachers or faculty involved in the use of technology (and social computing in particular), as opposed to the focus on students and learning (Ajjan & Hartshorne, 2008; Bair & Bair, 2011; Selwyn & Grant, 2009). To understand how technology practices are a reflection of teachers’ value beliefs we need to research individual practices (Bozalek, Gachago, et al., 2013): This will allow us to determine if these can broaden our definitions of technology integration in ways which can assist in teacher professional development (Ottenbreit-Leftwich et al., 2010). There is limited research on innovative use of emerging technologies; specifically social media. This includes a limited understanding of what motivates teachers to adopt such technologies in their teaching (Gebre et al., 2015; Van der Merwe et al., 2015) as well as why some teachers are resistant to such technologies (Manca & Ranieri, 2016). It is suggested that specific categories of users be considered as the focus for research (Moore, 1991; Porter et al., 2016).

It is important to research if, and how, social computing aligns with existing institutional cultures and structures (Bozalek, Gachago, et al., 2013; Lawrence & Lentle-Keenan, 2013; Selwyn & Grant, 2009). This includes how teachers are supported in their integration of technology (Ajjan & Hartshorne, 2008) and an appropriate role for the teacher in an online class (Bair & Bair, 2011). The issue of technology use needs to be approached as a larger systemic topic related to institutions' choice of LMS technology and issues relating to the overall impact of research-intensive universities' cultures and the role of time management (Seaton & Schwier, 2014). Studies which focus on the specific contexts of use are important as it cannot be assumed that the tools will be used in the same way by all users; or groups of users, within a HE context (Bower et al., 2014; Rambe & Nel, 2014; Timmis et al., 2010).

3.6 Conclusion

There are numerous SC technologies, which are used in HE teaching. In addition, there are features and affordances of other technologies, such as LMSs, which allow for discussion and collaboration and thus the potential for socially constructed perspectives and understandings of academic content. The focus of this research is on *specific uses* of technology, rather than on *specific technologies*. This chapter used the construction of the research questions, namely What, How and Why - social computing is used by HE teachers, as broad categories under which to explore the selected literature.

What social computing is used is influenced by global trends, national interests and institutional norms. Since 2011, consortium- or national-based reports have highlighted implementations of technology supporting web-based, flexible, social interaction within HE teaching and learning. In some instances, specific aspects of these social computing-related technologies are highlighted in reporting e.g. social networking, cloud computing, mobiles, MOOCs, the evolution of online learning, and the increase in the use of blended learning. While specific geographic regions may be differentially represented in the literature, this review has included specific literature from South Africa and the African-Middle East region.

There are challenges associated with the use of social computing. “Harmonised solutions” such as a “one size-fits-all” or a “perfect technology implementation” are seen as unrealistic and ill-advised. The suggestion is that no single-solution can perfectly take into account the many specific nuances of the range of different disciplines’ content, pedagogical approaches and technological expertise which are needed to produce individual courses which meet specific teachers’ needs.

Technology use can be categorised as either core (commonly used) or marginal (less common in general use, although the use may be high in specific contexts). Slideshow presentations and VLEs, specifically LMSs, are the most common core technologies in UK HE institutions while use of email, discussion forums, the Web, CDs, laptops, and smartphones are more broadly listed as being ‘core’ to HE teaching globally. In South Africa LMSs are the technology with the highest adoption rate for use in innovative teaching. LMSs are used to perform numerous functions including information transfer (e.g. slideshows), application and clarification of concepts (e.g. discussion forums, SMS, self-testing software), the sharing of ideas and resources (e.g. discussion forums, file-sharing), collaboration and the development of process awareness in students (e.g. Wikispaces, Google docs). The fit between the task to be performed and the affordances provided by the technology selected are important for successful implementation.

Marginal technologies, many of which are social computing tools such as blogs, podcasts and SNSs, have low uptake globally and in South Africa. The specific technologies most listed include Facebook, Wikipedia, YouTube, Twitter and a variety of other SNS. Other categories of technologies include file sharing applications, social bookmarking, and writing and response/ feedback tools. Overall, the use of social computing is acknowledged as being context sensitive and reported results may vary because of the specifics of the methodology, such as the selected cohort of participants or the institution targeted. The success of social computing use in teaching may be influenced by the motivation for learning it creates. By stimulating key human reactions, SC applications allow students to be playful, expressive, reflective, and exploratory in their learning. In addition, they allow them to make a social connection, and create security and organisation in their lives.

The reasons why HE teachers use social computing in the ways they do are wide ranging and complex. Technology is disruptive because "in general, cultural evolution follows technological evolution" (Levy, 2010,72). Thus, the use of social computing will require change, and the evolution of teaching practice and the environment in which it occurs. Many of the reasons stated for use (or non-use) are reported in the literature. These include personal, academic identity, pedagogic, technological, operational, institutional and global factors. What is clear from the discussion is that these are each complex and have both 'push' and 'pull' elements, which respectively encourage, and dissuade, teachers from using SC. The greatest challenge appears to be the time investment required, either directly or indirectly. The nature of the support from colleagues or managers and competing institutional demands, or specific targeted supportive resources also play a large role. The benefit, however, is that there are stimulating and useful ways in which SC can improve teaching and assist student learning.

While a significant amount of research has focused on the student experience in computer-mediated classrooms, the position and experience of teachers "has not received significant attention" even though teachers are instrumental in the success of an online course (Seaton & Schwier, 2014, p. 2). Only by studying the use of social computing *in situ*, can we determine what the real potentials are which are being explored: "The way forward is paradoxically to look not ahead, but to look around" (Brown & Duguid, 2002, p. 8). The exploration of teaching and SC, as intertwined phenomena, has been neglected in the pursuit of each as independent areas of research (Gebre et al., 2015).

The focus of this research study has been strongly influenced by the suggested areas for future research explored in the existing literature. The three research questions target the issues raised in section 3.5.9, p.103: In particular, this research aims to report on thick descriptions of actual use of SC in teaching, from individual teachers' perspectives. The research will focus on how teachers use the technology and are influenced by, and manage, the broad range of factors within their specific context, when choosing to use SC. The context of their teaching practice will also include the communities in which they operate and the institutional cultures and structures which shape, and are shaped by, their actions. In conclusion, the study suggests underlying structures and mechanisms which may influence the use of social computing in HE teaching.

Chapter 4 discusses how the phenomenon (SC), and associated constructs highlighted for research (individual HE teachers, actual use in teaching, the context of the teaching including structures and mechanisms) have informed the theoretical framing of this study. This includes a discussion of the paradigm, and how this has influenced the conceptualisation of the research.

4 Theoretical framing of the study

> *... when it comes to explaining complex phenomena, any number of theories might in principle make valuable contributions, singularly or more often together, with the extent of their contribution unknowable in the absence of empirical research. (Gross, 2010, p. 346)*

4.1 Introduction

The theoretical framing of this study is informed by the nature of the phenomenon as foregrounded in the literature. The study deals with individual HE teachers as located within an institutionally-bounded case study. These teaching academics experience numerous influences or sources of power but simultaneously are renowned for acting to protect their academic freedom and retaining decision-making power within their classrooms. The potential role of influences as embedded in structures or individuals suggests that a critical theoretical approach, focused on revealing power differentials or inequality, could be appropriate. The overarching paradigm for the study is thus Critical Realism (CR).

Within the literature review it became clear that individual characteristics, such as teacher identity, and group dynamics, such as membership within specific academic disciplines or communities of practice, could play an important role in SC use in teaching. Likewise, the factors influencing the complex intersections between the technology, pedagogy and content of teaching require theoretical investigation. In order to explore these aspects, both the Social Theory of Learning (Wenger, 1998a), incorporating Communities of Practice and TPACK (Technological, Pedagogical and Content Knowledge) (Mishra & Koehler, 2006) have been used during the research design and data production phases of the study.

This chapter discusses each of these sets of theoretical scaffolds which have been used to frame the empirical research, namely: Critical realism as the 'under labourer' of the study, and Social Learning Theory and TPACK as representative of the aspects related to what, and how, teachers teach with social computing. The theoretical framing of the analysis is also introduced.

4.2 Paradigmatic position: Critical Realism

Paradigmatically, this research relies on elements of critical realism (CR) as conceptualised by Roy Bhaskar (2008) for its framing. A primary benefit of using the critical realist approach is that it allows for conceptions of reality that include a reality which can exist outside of human experience, while also acknowledging that reality can only be engaged through human experience. CR thus proposes that both realism and relativism have a role to play in our understanding and experience of the world. CR is thus concerned with knowledge "production" (Moore, 2007). In contrast to this, Cobern and Loving (2008, p. 441) suggested "an individual constructs knowledge of reality from sense perceptions and from conjectural theories, which are subject to many influences". While the 'production'/ 'construction' within these statements are philosophically different, pragmatically they both allow us to accept a view of reality in which 'things' exist prior to our presence, but which develop meanings through our interactions with them. Bhaskar (2008) discussion, however, seems more concerned with validating CR as being consistent with, and for, the 'pure' sciences. While social elements of the paradigm are given more attention by Archer (1995) social realism, CR is still criticised for not being true to the critical thought from which it draws its name (De Vaujany, 2008). In this study of teaching in a HE institution, it was anticipated that some evidence of power would be present and thus the ability to represent this appropriately in the framing is important.

CR operates on a three-layered ontology. These three layers all represent reality with the 'Real' being the fundamental, intransitive layer, which is considered generative as it contains the underlying mechanism(s) for the other layers. The layer of the 'Actual' is the event layer, while the 'Experimental' layer is the perceptual or epistemic layer. Thus CR sees physical entities, ideas, feelings, languages, structures etc. as real (Mingers, 2004). The actual and experimental layers are considered transitive although causal relations can also form between elements in these layers. Although Bhaskar (2008) suggested that the ontological layers are discrete, it appears this may be difficult to achieve analytically. The value of ontological layering is that when combined with CR's acceptance of both relativist and realist positions, it allows for the representation of all participants' conceptions of reality, for the purposes of discussion and analysis. It also provides a lens (incorporating observation and experience/ perceptions) through which events can be viewed. Through retroduction the potential role of mechanisms, structures and agency can then be suggested (Table 5). This allows for all positions to be incorporated into theorising.

Table 5: Critical Realism as a way of thinking about this study

<table>
<tr><td>EMPIRICAL</td><td>EXPERIENCES & OBSERVATIONS
of social computing use in HE teaching</td><td rowspan="2">Social computing communities</td></tr>
<tr><td>ACTUAL</td><td>EVENTS
related to social computing use in HE teaching</td></tr>
<tr><td>REAL</td><td colspan="2">STRUCTURES & MECHANISMS transform, and are transformed by, AGENCY giving rise to social computing use in HE teaching

This ontological layer represents complex (nonlinear) interactions between “different kinds of entities” : “physical entities, ideas and concepts, feelings and reasons, languages, meanings, norms, practices and social structures” (Mingers, 2004, p. 6)</td></tr>
</table>

CR thus accommodates both structure and agency and “conceptualizes the social world as an interaction between self-aware agents and social and cultural structures which both enable/constrain action and are themselves reproduced and transformed in the process” (Mingers, 2004, p. 13).

CR theorising at the systems level has been criticised for not fully exploring how open and complex systems operate (De Vaujany, 2008; Mearman, 2006). Likewise the way in which researchers should aim to uncover the generative mechanisms is not clearly addressed. The context-mechanism-output triad is suggested as the device to achieve these explanations but it appears inadequate in this context because it seems overly mechanistic and simplistic to deal with the complexity of the HE teaching system. CR does view causality as multifaceted (not linear) and accepts that a mechanism can lead to different outputs, with the researcher also being accepted as a causal power, but the challenge is in operationalising this worldview methodologically and analytically.

Within education CR has begun receiving more prominence since approximately 2000, in reaction to the social constructivist approach that had dominated the literature prior to this (Young & Muller, 2010). Bhaskar called for more empirical work situated in CR and suggested the laboratory and the classroom as obvious sites for scientific study (science as rigorous endeavour is assumed here). This study thus contributes to expanding understanding in this context. This lack of experimental work is also evident within the Information Systems (IS) literature that acts as a reference discipline for this research due to its interest in the application of technology (Carlsson, 2011; De Vaujany, 2008; Howcroft & Trauth, 2004).

One of the challenges faced in this study was that CR does not accommodate digital media effectively as it classifies them as intransitive objects (De Vaujany, 2008) i.e. they are unchanged by our knowledge of them and are considered to be independent of us. This categorisation is limiting when dealing with SC as, unlike other computing applications, these applications are by their very nature a reflection of their users who upload content, comment and engage via the specified technology. This definition is also challenging when technology can seldom be viewed as 'unchanging' because the rate of change in this sector tends to be exponential, in comparison to social and economic systems which, in general (they suggest) appear to change incrementally (Brown & Duguid, 2002). Technology may also be seen as part of the despecialisation process that, along with purely learner-centred approaches, are considered by some to have eroded the concept of knowledge as valuable (Young, 2007). There is also the tension which exists between: formal and informal structures; the interplay between processes and practices; and the role of the individual versus the role of the collective (Brown & Duguid, 2002). These complexities create a strong argument for an educational study, based in the classroom, which explores the use of SC in teaching so that a deeper understanding of HE teachers' reality can be explicated.

4.3 Working theories

> *Hypothesis 11: In response to the diverse influences now acting on the curriculum, especially its being situated in a global world of unceasing change, the curriculum as a project will come ever more to embrace three domains of human being, those of episteme (knowledge), praxis (action) and ontology (self-identity).*

Hypothesis 12: The pattern that these three domains will exhibit in structuring the curriculum will be a function of the differential power of the knowledge field and the positioning of the host institution within the higher education system. (Barnett, 2000, p. 264)

The substitution of 'teaching' for 'curriculum' in the above quotation provides useful constructs for theorising teaching: 'diverse influences', 'knowledge', 'action', 'self-identity', 'pattern'/'structuring', 'power', 'host institution' and 'higher education system'. Many of these elements are highlighted through the use of CR, as detailed in Table 5, and the research questions for the study. The central focus is on the HE teachers' use of SC and it is thus necessary to theorise their position in the learning system in terms of interactions between entities i.e. "physical entities, ideas and concepts, feelings and reasons, languages, meanings, norms, practices and social structures" (Mingers, 2004, p. 6).

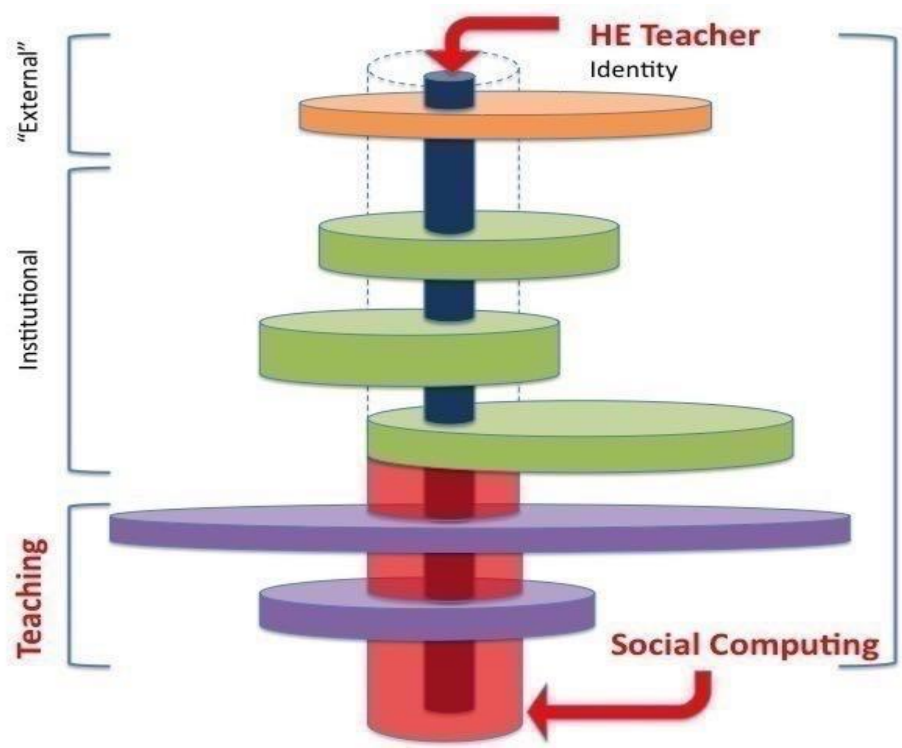


Figure 6: The HE teacher's position in relation to social computing and teaching

The representation of HE teachers (the unit of analysis) and their context in terms of individual and group-related aspects, is presented in Figure 6. While the use of constructs such as 'identity' and 'communities of practice' from the Social Theory of Learning (Wenger, 1998a) allows for the interactions between self, agents and structures, this framing provides little detail for understanding and producing data about the HE teacher's practice in terms of the use of SC.

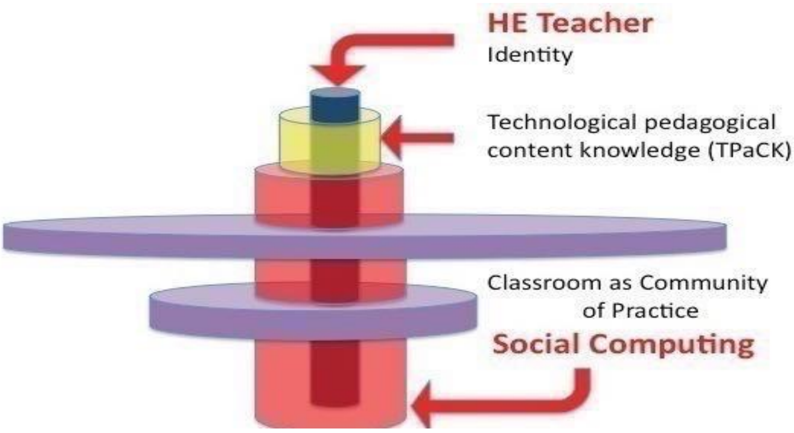


Figure 7: Theoretical framing for this study

The TPACK framework (Mishra & Koehler, 2006) deals with the teacher's position in terms of the intersection of technological (T), pedagogical (P) and content (C) knowledge (K) which is available to inform practice. These additional theoretical elements are included in Figure 7. However, this deals with 'knowledge of' rather than the 'use of' a particular technology and is thus a limited framing.

Elements from both the Social Theory of Learning, often referred to as the Community of Practice framework named after one of its main constructs (Wenger, 1998a, 2006) and TPACK (Mishra & Koehler, 2006) are used in this study. The following sections provide an introduction to these constructs in order to establish how elements have been appropriated and deployed for their explanatory potential.

4.3.1 Social theory of learning (Wenger)

Lave and Wenger's (1991) theory of situated learning developed into Wenger's Social Theory of Learning (Wenger, 1998a). The use of community of practice (CoP) in education is already well established. Koliba and Gajda (2009), in their review of approximately 230 articles spanning numerous journal databases for the period 1999-2007, presented 42 educational CoP studies. The majority of these focus on elementary and secondary school levels, with nine of the studies situated in HE.

Wenger's theory (Figure 8) described learning as: 'becoming' through a process of identity construction, 'experience' through negotiated meaning, 'doing' by engaging in practice, and 'belonging' by being part of a community. In addition, he highlighted three sets of constructs central to theorising: firstly, the mutual engagement of participants who participate and dialogue on a regular basis; secondly, involvement in a joint enterprise where members collectively negotiate the community and hold each other accountable, and thirdly, a shared repertoire of resources (Brown & Duguid, 1991; Murillo, 2011; Roberts, 2006; Wenger, 1998a).

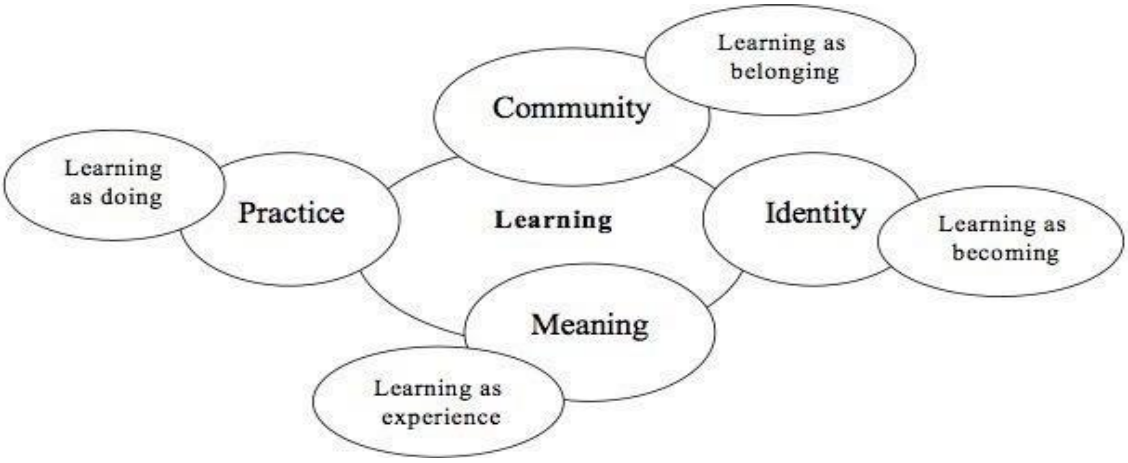


Figure 8: Components of Wenger's Social Theory of Learning (Wenger, 1998a, p. 5)

Wenger (2006, p. 4) suggested that "learning involves the recognition and cultivation of constellations of communities … For individuals, learning becomes a process of recognising and 'managing' these multiple forms of participation over time in the ongoing construction of an identity." He thus brought agency and structure into interaction and suggested the "learning trajectory through these complex systems, involving participation in a multiplicity of contexts" is the way in which individual identity is constructed. Trajectories can be inbound (on track to become full members), peripheral (will not necessarily lead to full membership) and boundary (involves maintaining memberships across the boundaries between different CoPs) (Wenger, 1998b). This positions individuals in terms of single communities but conceptualising a single individual in terms of a multiplicity of community trajectories is more complex. This nexus does not translate into distinct identities in each community, nor does it blend them together; rather the trajectories become positioned in relation to each other; whether they are in contradiction or in harmony (Jawitz, 2007).

There is a dovetailing in intent of SC and communities: SC “puts power in communities” (Charron et al., 2006) and communities need to “invite the interaction that makes them alive” (Wenger et al., 2002). In this study, prior experience of “communities”, of “social computing”, or both, may create a tendency towards SC use in teaching. A community of practice framing appears promising. By exploring the elements identified as necessary to foster a community of practice: i.e. designing for evolution; dialogue between outside and inside perspectives; different levels of participation; public and private spaces; focus on value; combining familiarity and excitement and creating a rhythm for the CoP (Wenger et al., 2002), it may be possible to see how SC comes to be positioned in the way that it does.

Numerous critiques of the social theory of learning have been advanced. Maistry (2008) suggested that a serious limitation is that the teacher and instruction do not have a place in the framework as it foregrounds ‘participation’ rather than ‘teaching’. The focus on community learning also restricts the way in which the individual is theorised (Handley et al., 2006; Murillo, 2011). In addition, the theory does not profile issues relating to power within CoPs or the context. While Lave and Wenger (1991) incorporated emancipation into their framework, later discussions have become more aligned with organisational perspectives and thus have become less critical in nature (Davenport & Hall, 2002; Maistry, 2008; Murillo, 2011). Murillo (2011, p. 27), despite his critique of CoP still argued “that Wenger’s framework does give coherent replies to most critiques and that the way forward lies in rigorously testing and refining the framework through fresh empirical studies”. This study does not aim to determine if the communities in which the HE teacher engages necessarily meet the three requirements to be defined as a CoP. Wenger (2011) in a presentation at Lancaster University suggested that it is not a question of whether a group constitutes a CoP, or not, that is useful but rather “the question is: Is it useful to view it as a community of practice?” (speaker emphasis). The use of “communities of practice” in this study is loosely defined, and all communities that the HE teacher identifies as relevant are considered. While the criteria for a CoP are not being applied as identification criteria, they provide useful descriptors for the variety of CoPs, which may be identified by participants. For each individual teacher these details will differ. We could hypothetically postulate e.g. referring back to Figure 7, that the purple “classroom as CoP” that the HE teacher shares with the class(es) is likely to meet regularly (face-to-face or virtually) and require joint participation. However the agreement on what holds the community together and accountability to the community may not be negotiated but may be prescribed by the teacher. A shared repertoire of resources is likely, although the resources may not be voluntary engagements as students may feel there is a performance requirement for assessment purposes. The knowledge communities the academic may belong to as a teacher, professional or specialist both within the organisation (green in Figure 6) and externally (orange in Figure 6) may not only influence (and be influenced by) them but these influences may interact in ways that create unique trajectories for the individual. Dube et al. (2006) provided a detailed typology for virtual CoPs based on 21 structuring characteristics which they group into four categories, namely: demographics (lifespan and maturity related), organisational context, membership characteristics and technological environment. This is a useful analytical tool for dealing with multiple communities of practices and where the CoP is the phenomenon being researched. This is not the case in this study and thus it has not been employed.

4.3.2 TPACK (Mishra & Koehler)

The TPACK framework draws together the concepts of technology-, pedagogy- and content-knowledge as well as the interfaces between each of these knowledge areas (Koehler & Mishra, 2009) . This framework is an extension of the work done on Pedagogical Content Knowledge (PCK) by Shulman (1986). Shulman (1987, p. 15) suggested “the key to distinguishing the knowledge base of teaching lies at the intersection of content and pedagogy, in the capacity of a teacher to transform the content knowledge he or she possesses into forms that are pedagogically powerful and yet adaptive to the variations in ability and background presented by the students”. PCK is not simply about the content but also includes knowledge about how to teach particular content and knowing what confusions could arise for learners, in order to address this during the teaching. Preparation for teaching requires “transformation” and “presentation”: Ideas as they are understood need to be transformed in order to be taught, “to think one’s way from the subject matter as understood by the teacher into the minds and motivations of the learners” but equally “identifying the alternative ways of representing them to students" (Shulman, 1987, p. 16). The transition from 'thinking about-' teaching, to 'doing-' teaching is the practice of 'embodiment'; a practice in which SC may play a useful role (Shulman, 1987).

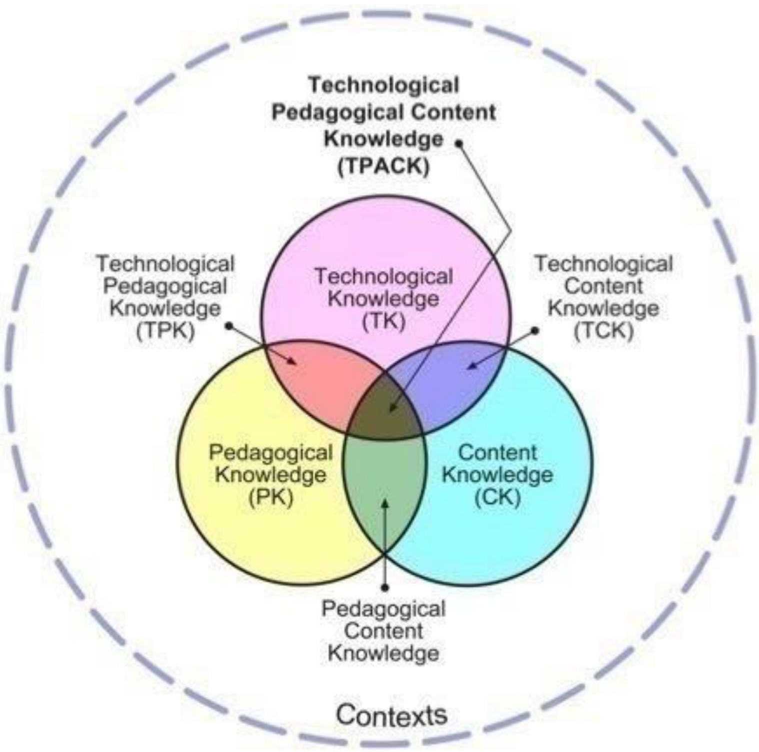


Figure 9: TPACK Framework (Koehler & Mishra, 2009, p. 3)

As with Shulman's discussion of PCK, Mishra and Koehler (2006) suggested that it is in the intersection spaces where integration and alignment become challenging for the teacher (Figure 9). Mishra and Koehler (2006, p. 1029) suggested this is a complex relationship where components are in a "state of dynamic equilibrium"; in a state of tension where any shift in the balance needs to be "compensated" by changes in the other two components. Thus, for the individual HE teacher, these aspects may be shifting and changing between individual teaching events and even during the unfolding of a single event. "Teaching with technology is a difficult thing to do well" and the TPACK framework allows the integration of technology into teaching to happen more ecologically rather than technology being seen as an 'add-on' to practice (Koehler & Mishra, 2009, p. 67). Koehler and Mishra (2009) suggested that the technological knowledge is in a greater state of flux than that of the pedagogical and content knowledge domains which means the tension between these elements is complex, dynamic and practically ever-present.

The inclusion of Pedagogical Content Knowledge (PCK), Technological Pedagogical Knowledge (TPK) and Technological Content Knowledge (TCK) provide specific, concrete, concepts by means of which ‘teaching’ can be explored in the empirical context, in terms of the relevant knowledge domains. This study, however, focuses on the teacher’s intent when putting this multifaceted knowledge into practice. This framework also has no mechanism to theorise the ‘student’ as part of the learning activity. TPACK will be difficult to use if a teacher has only limited knowledge of available pedagogies as may be the case for content specialists (such as academic researchers) who are also required to teach (Amory, 2015).

4.4 Analytical theories

The discussion of the theoretical framing of the study up to this stage has provided useful descriptive tools to address questions related to how and why HE teachers teach in the way they do. As a result they have provided useful constructs to use in developing research instruments and leading to the production of data. Unfortunately, however, they have limited use in terms of supporting the process of retroduction i.e. to theorise the fundamental mechanisms and processes which operate within the system. The importance of appropriate analytical tools has focused attention on the need to understand how mechanisms and processes work, as well as ways of understanding the relationships and reactions occurring within the system.

4.4.1 Critical realism: A three-layered approach

The analytical process in this study is informed by Critical Realism (Bhaskar, 2008) and the concept of morphogenesis/ morphostasis (Archer, 1996). From a practical perspective, the work of Charles Tilly, as viewed holistically by Krinsky and Mische (2013), provides an analytic device useful for analysis. Tilly’s Relational Realism, in so far as it agrees that causal mechanisms in the social sciences are based on relations, has a similar perspective to CR. CR differs from Tilly’s perspective in that it sees all social structures and actions as “conceptual” i.e. their meaning, at least in part, is based on the meanings actors ascribe to them. CR also stresses time and space dependencies. It thus suggests that causal structures may be linked to specific times in history (time dependency) and specific cultures and contexts (space dependency) (Steinmetz, 2010).

CR suggests a three-level analysis of reality to access the Empirical event layer, the Actual layer and the generative structures and mechanisms forming the Real layer. All entities which exist within the system have potential causal effect and thus form part of the analysis (Mingers, 2004). These entities could include physical objects (such as HE teachers, teaching resources, technology), intangible objects (such as ideas, emotions and reasons) and social structures (such as language, norms and practices) although they may not all be directly observable. CR does not focus specifically on the role of technology (De Vaujany, 2008) and this study positions all entities as having a similar status in terms of their potential role in the system (Latour, 1997).

Critical Realism (CR) and Relational realism (RR) both focus on what is real but epistemologically and methodologically they approach this reality from different perspectives (Demetriou, 2012). CR posits that the deep-seated mechanisms and structures are the foundation of reality but can only be known through empirical study of events which give insights to the actual reality which has manifested. The actual and experimental layers are considered transitive although causal relations can also form between elements in these layers (Bhaskar, 2008). It is thus the layer of the Real, which is key in theorising. Bhaskar (2008) suggests that the ontological layers are discrete which would suggest clearly discernible boundaries between them; yet it is not clear how these layers can be accessed, and separated methodologically. Tilly suggested that it is the relationships between objects which ultimately give rise to, and are influenced by mechanisms, processes and structures in the society (Krinsky & Mische, 2013). His theorising thus builds specifically from the micro-level. Tilly's conception of a mechanism has been critiqued for its lack of rigour; it, however, offers one of the few alternative qualitative analysis approaches which does not focus on "variables" as the primary unit of analysis (Demetriou, 2012). In addition, RR explicitly concerns itself with power relations. It originated in class-based research of social movements, and Tilly later broadened the focus to incorporate wider issues of inequality (McAdam et al., 2004). The criticism of the lack of the 'critical' in CR (De Vaujany, 2008) can thus usefully be countered by incorporating Tilly's perspectives on how to approach data analysis.

4.4.2 Communities and learning trajectories

While CoP and Social Learning Theory have been used as a point of theoretical departure for this study, it is important to note that the ambiguous definition of CoPs in the seminal studies in this area has allowed the concept to be used productively "in increasingly divergent ways" (Murillo, 2011, p. 5). Wenger's theory of Social Learning provides a number of useful concepts and relationships that can thus be employed for analytical purposes. His construction of social learning as being constituted of numerous forms of learning allows a clear link between action (relation) and concepts. A CoP is focused on common interest in a joint enterprise which involves developing shared artefacts. The focus is on shared learning through dialogue and participation through which appropriate knowledge, skills and the disposition of members is acquired (Cochrane et al., 2012): Thus engagement and participation help one to learn how to belong in a community; learning the values and habits can assist in becoming a member of a community as one develops an identity within the community; through experience one can learn about the nature of the group and the meaning it has and purpose it serves, and while doing the practical work the community is engaged in, one can learn the practice associated with the community (Wenger & Snyder, 2000).

For Wenger, a key aspect for an individual is their ability to recognise, cultivate and manage their learning trajectories through participation in multiple communities (Wenger, 2006). An individual may not want to be part of the core participants in a community as it is possible their trajectory may be inbound, outbound or even peripheral. Cochrane et al. (2012) suggested that analytically critical moments (or actions), boundary objects which facilitate boundary-crossing between members of different CoPs and the relations associated with legitimate peripheral participation need to be considered. Tilly speaks of two forms of network configuration that underpin organisational structures namely "hierarchy" and the "categorical pair". The categorical pair "consists of a socially significant boundary and at least one tie between sites on either side of it" (Tilly, 1998,47). There are other structural forms but these two are seen as the basis of maintaining beliefs about the differences between members on either side of the boundary and hence support boundary maintenance (Gross, 2010).

4.4.3 Relationships

Krinsky and Mische (2013) provided a procedural approach to relational reality-based analysis: initially all actors and events should be identified. These occur within the layers of the experimental and actual levels of CR. Heuristics, scripts and local knowledge can provide insight into identities, boundaries and populations (Krinsky & Mische, 2013). Interpersonal practices and historically connected, or patterned behaviour are identified as causal, patterning mechanisms. These then form the building blocks of theory (Krinsky & Mische, 2013).

The work of Tilly focused attention on the representation of relations in data. These 'formalisms' represent actors and the relations between them (Krinsky & Mische, 2013). Practically, the lines or edges connecting entities should be theorised, rather than the objects themselves. This focus is important as it is relations and actions which create the stasis, movements or potentials for change, within a system. Ambiguity in relations is important as it can allow for the possibility of alternate paths of action and can allow for face-saving behaviour for actors (Krinsky & Mische, 2013). A tension exists between the level of generalisability of such formalisms and where they represent the specific and particular. When the impact of collective action is considered from the perspective of potential transaction costs a rational formalism may allow for the comparison between potential costs and benefits. Tilly's presentation of relations as a subject-verb-object triad links to a network view of interacting individuals and communities which incorporates both the individual HE teacher and the collectives in which they operate (Krinsky & Mische, 2013).

Once the nature of the relationship is known it is necessary to consider what theoretical abstractions might be possible from the observations. The transactions costs incurred in the relations are an indicator. The transactions costs are the energy it takes one actor to effect a change in another actor. Relational mechanisms are the way in which the status quo is maintained , or changed. Zelizer and Tilly (2006) placed emphasis on trust networks where parties are prepared to accept a measure of risk to the collective based on the ties to individual members. Tilly suggested analytical focus should rather be placed on how groups, and actors within groups, interact and their shared understandings; rather than focusing on what is happening within a specific individual's head (Krinsky & Mische, 2013). However, Tilly ultimately acknowledged that prior patterns of relations should be seen as potential predictors of action; but stresses that people's explanations of their interests and reasons for behaviour should be relied on as much as possible (Tilly, 1978).

Conceptually, mechanism are difficult to specify as they may blur structure and agency (Krinsky & Mische, 2013). Patterns of behaviour may be recognisable as disruptive or normative. Tilly developed his concepts of "repertoires of contention" and "repertoires of governance" to represent these patterns (Krinsky & Mische, 2013). This terminology has also been used by Benwell and Stokoe (2006) who identified "interpretive repertoires" which represent dimensions along which participants may be positioned. Krinsky and Mische (2013) suggest the role of stories are important. "Standard stories" are narratives with actors, actions, causes and effects that are told from a specific perspective where causes are seen as located within the actors consciousness. These are contrasted with the preferred source of information referred to as "superior stories". Superior stories are those that provide a perspective which is a fair compromise between standard stories and technical, or less biased, accounts i.e. "they simplify radically, but everything they say is true" (Krinsky & Mische, 2013, p. 18). Stories may use representations that provide a basis for shared understanding that helps clarify meaning, helps in decision-making and provides a basis for change (Krinsky & Mische, 2013).

4.4.4 Changes of state (motion): Mechanisms and processes

Important to the analysis is the focus on the process of 'becoming' (Wenger, 2010). Labelling of activity should focus on identifying 'process' rather than a 'state' e.g. Tilly's change of focus in his use of terms e.g. from 'state formation' to 'state transformation' is seen as representing a major shift in his understanding of processes (Krinsky & Mische, 2013). Tilly's work in political spaces suggested that change occurs slowly in specific dimensions of space and time. This would appear to resonate with views of institutional change. A focus on smaller processes unfolding together, yet differentially in space and time, explains why adoption of specific repertoires may be delayed in specific contexts (Krinsky & Mische, 2013,15). It may be necessary to maintain a matrix of interactions (force relations), which exist between entities, in order to understand how microlevel activity gives rise to available opportunities (Steinberg, 2015).

The series of events that lead to mechanisms and processes was not fully explained by Tilly (Demetriou, 2012). Demetriou (2012) suggested a possible solution is to identify and label the outcomes of a mechanism (m-outcomes) as these are more clearly identifiable. These outcomes will be related to the environment or context and a combination of m-outcomes plus the related rationale forms a process (Demetriou, 2012).

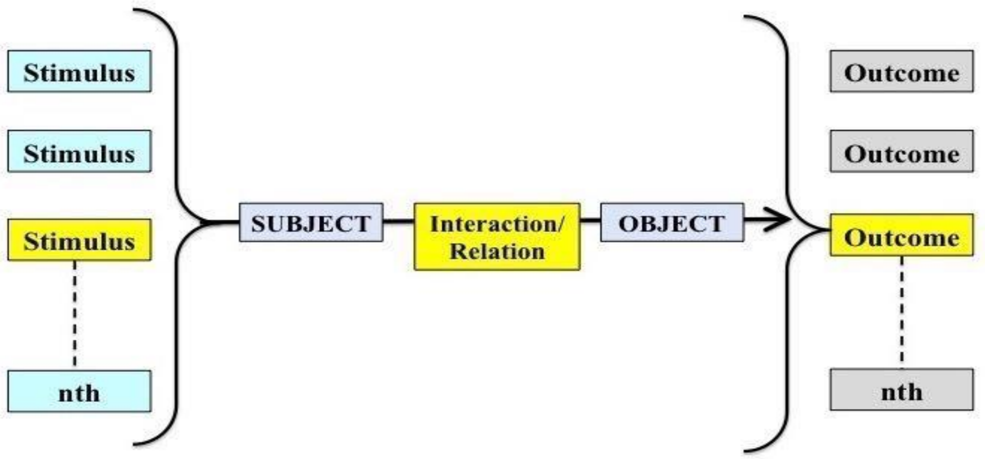


*Figure 10: Derivation of the "**S**timulus- [actor **S**ubject- **I**nteraction/ relation- actor **O**bject]- **O**utcome" (S-S-I-O-O) quintuple*

This focus on "outcome" resonates with fundamental mechanistic views of computing which explain the key focus of technology as moving data through an IPO (input-processing-output) cycle, in order to produce value-added 'information' from a processing transaction. It is also widely acknowledged that the information output from a process can itself then form the 'data' (input) for further processes (Davis & Yen, 1998). The triad of subject-action-object (Krinsky & Mische, 2013) when overlaid on top of the IPO cycle can be represented as "input → (subject-action-object) → output/ outcome". Rephrasing this formulation for application in a social space transmutes into a "stimulus- [actor subject- interaction/ relation- actor object]- outcome" (S-S-I-O-O) quintuple (see Figure 10). It should also be noted that multiple stimuli could play a role in any specific interaction or relation. Likewise, there may be many outcomes from an action, some of which may be unintended.

Operationalising Tilly's mechanisms can be achieved in different ways. An alternate approach, A-P-H-R chains, suggests that mechanisms can be understood via descriptive Actor-Problem Situation-Habit-Response chains (Gross, 2010). This does not, however, clearly identify subject-object connections which are important for identifying power relations. The analytical difficulty is that all elements of such quintuples or chains may not be identifiable within the data. Reliance on observation of a situation or even interrogation of the subject may not yield this level of detail as a subject may not be able to identify the stimulus which has led to specific actions. However where a stimulus explicitly appears in stories, it can serve as a device to link relations to each other. Tilly uses the concept of "repertoires" and speaks of "events" in association with mechanisms but stops short of making a connection to "practices" (Gross, 2010). Similar to the IPO cycle in computing, it is suggested that the outcome from a mechanism can itself serve as the stimulus for another mechanism, or along with numerous m-outcomes, could give rise to a process. Overall, however, it is well recognised that the dynamics of change arise out of "the constant tension in social life between individual innovation and socially-imposed convention" (Goldstone, 2010, p. 366).

Understanding the relation within, and outcome of, a mechanism requires a clear understanding of the components. "Human activity is social" (Musser et al., 2003, p. 2): As the thrust of this study is to understand *social* computing use within a specific *social setting (*HE teaching), it is appropriate for this research to avoid the deterministic, affordance view of technology as a cause of change. Unlike in a positivist approach, technology is not placed at the centre of the discussion in terms of how it controls or enables our behaviour and what we can achieve via its use. In contrast, the people (HE teachers) will be placed at the centre of the analysis as they take the decisions related to the technology use and determine what artefact may remain after the practice, or even how these artefacts may be used subsequently

(Oliver, 2013). As the focus of the study is the use of SC in teaching, it is also important to determine the relations which exist in terms of technological, pedagogical and content knowledge of individual HE teachers, as related to their community memberships (Shulman, 1987).

Both human and non-human entities within the system may initiate or influence actions and relations. Likewise entities may be seen to represent the singular or the collective. As a result, actors in the system may be represented by entities which are 'non-human' and 'non-individual' and may act, or be empowered to act, in the Actor Network Theory (ANT) tradition (Latour, 1997). However, unlike in ANT, where being labelled an "actor" "implies no special motivation of human individual actors, nor of humans in general" (Latour, 1997, p. 5), this study does allow for motivations for human action to be considered. At the same time however, it accepts that non-human entities, such as SC may have an equally nuanced role to play. SC may itself provide a stimulus which is more than merely the sum of contributions. SC presents in many forms and conceptually is non-static. ANT places emphasis on the work or activity being done and appears to locate an actor within a single specific network, or in different parts of a single network (Chatti et al., 2010). This study assumes actors may operate in numerous communities simultaneously. While ANT stresses the work occurring in a network this study focuses on the relationships underpinning action and the mechanisms and processes which result.

Processes are constituted via mechanisms, or combinations of mechanisms, representing human practices and which can be categorised in four main forms. These mechanism forms are represented as opportunity hoarding (benefits denied to 'outsiders'), exploitation (benefits of the relation flow systematically from one to the other), diffusion/ emulation (action modelled on the action of another), and adaptation (everyday practices people use to cope with, and reproduce, distinctions) (Krinsky & Mische, 2013; Voss, 2010). Global influences cross national boundaries and translate into local influences via new lifestyles and through the identity construction processes of actors (Hetherington, 1998). In addition, macro-processes "from above" which serve to script relations may be dialectically transformed by the "local knowledge which animates these scripts" (Steinberg, 2015,46).

4.4.5 The role of power

Research based on Critical Theory focuses on the role of power relations within society. Power within the HE system is not seen as static or 'own', but is seen as relational and associative. Power is relational in that it cannot be owned, but can be shared via social relations and discourses (Silva, 2007). Thus associative power is an outcome of associations, occurring within a context (Heeks & Stanforth, 2014). Power can be seen to exist in three circuits within an organisation and its use is strategic: The first, episodic power, is the most evident and is where one person can influence another person to do something they otherwise would not. The second, social integration, represents the power imbued within a position in an organisation which allows access to resources and legitimacy and provides rules of meaning and membership. The third is the systemic integration, which focuses on techniques of production which favour specific interests and techniques of discipline (Silva, 2007). Circuits have been used as an explanatory device in a variety of contexts. Zelizer (2011) discussion of economic circuits provides insights useful for the analysis of power relations. She includes specific transactional characteristics which may be useful in considering the negotiations in the presence of specific power contexts. Characteristics of these Zelizer circuits include distinct social relations among individuals, shared activities and a boundary separating members and non-members which includes some control of transactions across the boundary. In addition, there is a common accounting system and shared understanding of the meanings within the circuit, including their moral value (Zelizer, 2011). If activities within a network exhibit elements of "account keeping" between participants, then it is possible that this framing could be of use. Specific to the academic context, Maton (2005) focused on two types of academic autonomy namely positional autonomy (PA) and relational autonomy (RA). Positional autonomy relates to specific positions or roles being fulfilled and links to who is in charge and can be considered to refer to positions within the discipline, school or college. Relational autonomy is linked to the principles according to which decisions are made, or external controls and thus can be seen to refer to the institutional or perhaps national level.

In most instances, power is not a simple binary exchange of forces. More realistically, it should be viewed as a complex set of interactions which occur amongst all actors in a space. These can be considered to be "arenas of negotiation" where actors are required to align themselves with specific interests or positions, amongst which negotiations occur and decisions are taken, and actions decided (Few, 2002). Inequality develops between groups when valuable resources are differentially allocated to them, in response to a problem by creating some categorical distinctions between them (Tilly, 1998). For Tilly, inequality is focused on the access to resources and he thus identified two main mechanisms of inequality i.e. opportunity hoarding and exploitation. These are reinforced by mechanisms of emulation and adaptation which are seen to operate to keep transaction costs low.

However, where processes and systems intersect, there may be the blurring of boundaries and the actual power differentials may be difficult to discern. In SC spaces, students may have the benefit of what Bernstein referred to as invisible pedagogies, where students have control of the selection, sequence and pace of their studies, and hence have access to more power and control, than in the traditional classroom (Jump, 2011). There is power imbued within socially recognised roles and discourses. Bernstein presented a reminder that pedagogy contains within it two discourses with which the teacher must be concerned and each of which have embedded power relations: the first is the instructional discourse which conveys the specialist knowledge, skills and disposition expected in the discipline; the second is the regulative discourse which deals with the social expectations of the relations and identities expected in a learning space (Jump, 2011). Realisation rules are the normalisation rules learnt through experience of the social context and represent the expected norms of behaviour for each of the role players in a given context (Jump, 2011). Rules are regulated by powerful agents and thus the disciplining of rules becomes a political issue (Silva, 2007).

4.4.6 The influence of the institutional context

The one aspect of the problem domain which has not been theorised adequately from an analytical perspective is the institutional influence on the HE teacher. As the focus of case study research is specifically to highlight issues specific to the context (Runeson & Host, 2009), it is important that elements of the context are considered during analytical coding. While SC is pervasive in the social and personal domains, it has low adoption as a tool enabling socially constructed forms of teaching and learning. HE teachers using these tools as part of their teaching practice can thus be seen as innovative, early adopters of the technology. The dynamics of innovation implementation as theorised by Nelson Repenning (2002) provides useful perspectives for analysis. He included the role of other actors and structures by way of his reinforcement, diffusion and normative processes.

Repenning (2002) model of innovation implementation includes constructs already identified in the literature.

Figure 11 illustrates the constructs, relationships and processes involved in the implementation and diffusion of innovation. In particular, Repenning focused on the reinforcing relationships between commitment to the innovation, effort expended on the innovation and innovation results (R1).

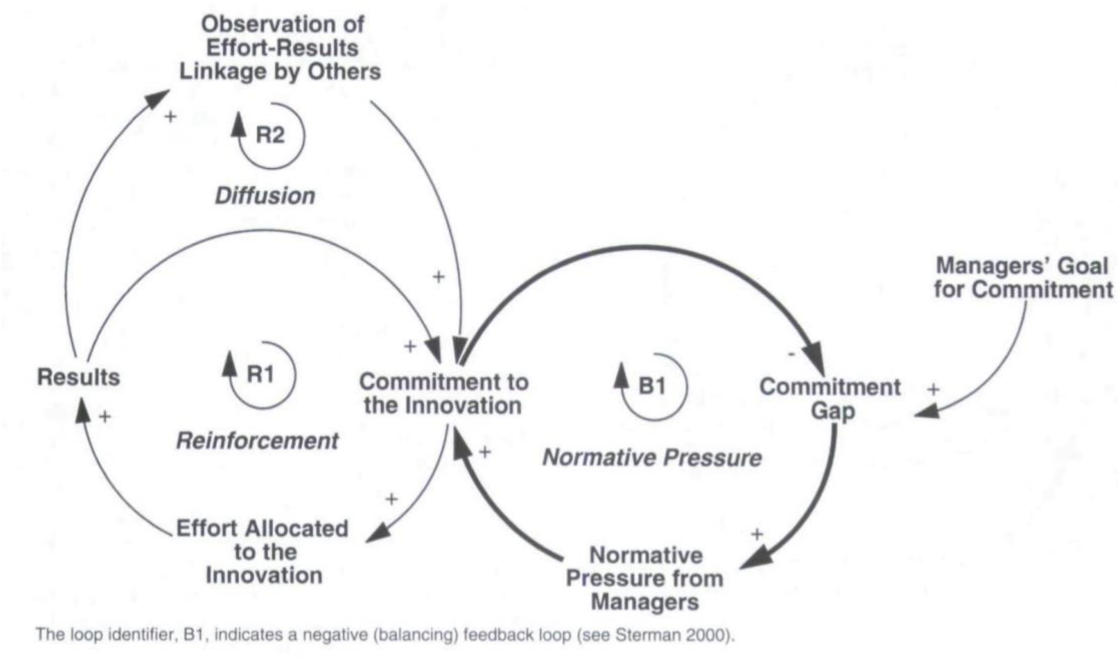


Figure 11: Innovation implementation reinforcement (R1), diffusion (R2) and balancing/ normative loops (Repenning, 2002, p. 114 Figure 3)

An additional reinforcement process (R2) focuses on the diffusion of the innovation within the organisation, based on the observation of the impact achieved in terms of results and based on the effort allocated. If results are not satisfactory and the users are not happy with the outcome, word of mouth will be negative. Word of mouth (WoM) discussions influence whether the feedback is positive i.e. the loops are operating in a positive direction, or negative, in a downward spiral. Both these reinforcement processes (R1 & R2) can either form positive (virtuous) or negative (vicious) feedback loops.

A balancing process (B1), focuses on the normative role of managers who represent the interests of the organisation. This model is based on the assumption that the decision to adopt the innovation has already been made and a specific innovation implementation goal has been set by management. Normative pressure is thus applied by management based on the commitment gap between the innovation goal and the current results. If normative pressure is applied until word of mouth becomes positive, the relationships affecting commitment i.e. positive results and positive input from others causes the direction of the feedback loops to change and become an upward spiral. The point at which the feedback creates an upward spiral is referred to as the motivation threshold. The relationship between normative pressure, commitment and the motivation threshold is a complex one. Small increases in normative pressure have little impact at the extremes i.e. when commitment is high and above the motivation threshold, or when commitment is low and well below the motivation threshold. However, when commitment is just below the motivation threshold, even a small increase in normative pressure can produce a dramatic impact on the outcome.

In addition, the model shows that early successes, if based on specific additional inputs by management, can be detrimental to success because people feel the innovation has been oversold and they become more sceptical about being able to achieve the results without the additional inputs. This makes it even more difficult to achieve the motivation threshold.

4.5 Conclusion

The pragmatic use of devices from aligned theoretical framings provide a more complete set of constructs for use in data production as well as providing the terms and procedures necessary for analysing the data. Aligned theories have the potential to provide complementary insights into the problem domain. The inclusion of the work on power differentials helps to address the lack of these within CR. The following chapter focuses on operationalising the research constructs and details the research design and methodology.

5 Research Methodology

> *Theory and data are created together [primarily through case studies and are a] major mode of self-expression, discovery and exegesis (Cecez-Kecmanovic et al., 2014, p. 566)*

5.1 Introduction

The research questions and reference literature for the study provide the theoretical backdrop against which the research study is designed. The importance of the paradigmatic position adopted in the study is that it specifies the nature of the lens through which the problem will be viewed. As Chapter 4 has explained, this study takes a critical realist stance in relation to HE teaching using SC. It is thus necessary to use the constructs provided by CR, TPACK and the social theory of learning and its community of practice (CoP), as starting points for designing the research and the production of appropriate data to address the research questions.

5.2 Research design and methodological approach

The constructs applicable to this research include the 'identity' and 'communities of practice' of the HE teacher, as well as the 'knowledge associated with' use of a 'technology', in a 'pedagogically appropriate way', in relation to the 'academic discipline content'. These are multifaceted issues which cannot be easily determined through direct questions and quantitative measures. By their nature, these aspects of teaching are likely to be nuanced and interconnected and may well require probing by the researcher and deep reflection by participants, to uncover which factors are relevant, how they relate to each other and perhaps interact. A qualitative approach to data production is thus determined as most appropriate because "what really intrigues qualitative researchers is the way people make sense of their world and their experiences in this world" (Yazan, 2015, p. 137). Miles and Huberman (1994, p. 147) stressed qualitative research as "a very powerful method for assessing causality" and "it is well equipped to cycle back and forth between *variables* and *processes* – showing that 'stories' are *not* capricious, but include underlying variables, and that variables are not disembodied, but have connections over time"(author emphasis retained).

There appears to be a balance between quantitative and qualitative work in the broader field of instructional design and technology (West & Borup, 2014). Qualitative research is however, commonly used in a study of this nature where details and nuances matter (Bair & Bair, 2011; Czerniewicz & Brown, 2010; Gebre et al., 2015). Qualitative data production was used as part of the 'Emerging ICTs in Higher Education' study (http://emergingicts.blogspot.co.za/p/about-project.html), undertaken collaboratively by numerous HE institutions in South Africa (Backhouse, 2013; Ng'ambi, 2013).

The research method selected for this study is the case study approach. The reason for this decision, as well as the repercussions of this decision, are discussed in more detail in the following section.

5.2.1 Case study research

A case study is "an empirical method aimed at investigating contemporary phenomena in their context" (Runeson & Host, 2009, p. 134). Case study is a key methodology in understanding phenomena because it accepts that context is important and that local instantiations of a phenomenon may differ from those at a regional, national or even global scale. The selection of the scope, or scale of a case study will determine whether the outcome speaks to the phenomenon at a micro-, meso-, or macro-scale. In addition, a case study approach is appropriate when the researcher has no control over behavioural events and when the focus is on 'how' and 'why' research questions (Yin, 2014). Case study research thus focuses on thick descriptions for each case, which are sufficiently detailed and thorough, that they clarify the nature of the case. Merriam (1998) suggests that case studies in education should be focused on process, context and discovery rather than targeting outcomes, specific variables and confirmation. The inclusion of the former characteristics is supported, but in this exploratory study it is considered equally important to consider the outcomes and variables impacting such outcomes, as well as bearing in mind existing theoretical framings of the phenomenon and determining which findings of the case study are confirmatory.

Seminal authors in the area of case study research are Yin, Stake and Merriam (Harrison et al., 2017; Yazan, 2015). Yazan (2015) has provided an analysis of their differing positions.

This study aligns with the constructivist view of knowledge of Merriam (1998) and Stake (1995), rather than the positivist position of Yin (2014) as this also aligns with the underpinning critical realism paradigm. Determining the boundary of a case study is an important decision for all three theorists (Yazan, 2015). Yazan (2015) and Harrison et al. (2017) have provided a nuanced explanation of how the three theorists positions differ. This study has a more pragmatic approach to defining a case study: “if researchers are able to specify the phenomenon of interest and draw its boundaries or ‘fence in’ what they are going to inquire, they can name it a case” (Yazan, 2015, p. 139). In addition, case study is a popular methodology in educational research. Numerous studies on teacher use of educational technology have used a case study approach (e.g. Bower et al., 2014; Bozalek, Ng'ambi, et al., 2013; Gebre et al., 2015; Govender & Govender, 2014; Hussein, Aryaci, et al., 2013; Jump, 2011; Lawrence & Lentle-Keenan, 2013; Matthews, 2008; Morgan, 2011; Ocak, 2011; Oliver, 2013; Ottenbreit-Leftwich et al., 2010; Scott, 2013; Seaton & Schwier, 2014). Jump (2011) systematic review of 16 case-study based articles for the period 2007 to 2010 is indicative of the value gained by using a case-study approach for exploring technology use in teaching.

Criticisms of case study research include a challenge to the rigour of the approach. Yin (2014) suggested that, compared to other methodologies, case study research does not have a well-defined and highly structured, standardised approach. This criticism may also be based on the fact that case study theorists have different approaches to the methodology. Some researchers, following Yin (2014), suggest that all steps in the process should be decided and defined before data production commences, while others motivate for greater flexibility in terms of when data collection (or production) is considered to commence (Yazan, 2015). Another criticism levelled is that case study research cannot be generalised. Yin (2014) suggested that, as with experimental research, the findings of a case study may only be generalised to the extent that similarities between the study context and case, can be seen to be similar to the ‘generalised’ application space. Flyvbjerg (2006, p. 227) suggested that because “knowledge cannot be formally generalized does not mean that it cannot enter into the collective process of knowledge accumulation in a given field or in a society”. He also suggested that the strategic selection of cases can assist with the generalisability of results as “it is often more important to clarify the deeper causes behind a given problem and its consequences than to describe the symptoms of the problem and how frequently they occur" (Flyvbjerg, 2006, p. 229). Likewise, case study research does not need to result in an "unmanageable level of effort", which is suggested as another drawback (Yin, 2014, p. 21). While case studies may generate large amounts of data, Rule and John (2011) suggested the singular focus of a case study may be an advantage over more extensive survey-based methods in terms of the amount of data generated and the management of the process.

Numerous typologies are available to categorise case studies because of their flexibility and adaptability to be 'fit for purpose' (Cohen et al., 2007; Rule & John, 2011; Yin, 2014). This study is explanatory and exploratory (Yin, 2014) as well as both intrinsic and instrumental (Rule & John, 2011). The UKZN case study is intrinsically of interest as an institutional case of a merged HE institution consisting of a historically predominantly white university (University of Natal) and a black and Indian historically disadvantaged university (UDW) from the Apartheid era. The various experiences of academic disruptions at UKZN, including a merger, a shift to a college structure and annual student unrest around issues of access due to the massification of HE in SA, also qualify this as a case of intrinsic interest. In addition, this is an instrumental case study that focuses on a particular phenomenon and produces and analyses data on relevant cases to explore that issue (Rule & John, 2011).

5.3 The context of the study

5.3.1 Selection of the case study site

A case study located in a HE institution in South Africa, "peripheral to the international centre(s) of the academic world, namely North-America-Western- Europe (with a second node in Eastern-Asia that is rapidly rising)" (Wolhuter, 2014, p. 275), could assist in providing research insights into the phenomenon in the global South, where there is a dearth of such research. In addition, UKZN HE teachers were not represented in the 2013 study of use of emerging ICTs in HE in SA, and the study will thus assist in extending the understanding of the phenomenon in SA HE (Bozalek, Ng'ambi, et al., 2013).

This study is a multiple-case case study, located within a single case-study site (Eisenhardt, 1989). Baxter and Jack (2008) referred to this form of a case study as a "single case with embedded units". This study uses Eisenhardt (1989) terminology and refers to the embedded units as 'cases'. UKZN provides the bounded context for the study. The teachers in a single HE institution can be considered to experience the same institutional forces impacting their teaching at a general, strategic and policy level. It is also recognised that the institutional context in which a HE teacher operates has an impact on their educational technology use (Bozalek, Ng'ambi, et al., 2013). Selecting the participant teachers from a single institution allows the macro-scale influences to be held somewhat constant for all participants, although it is acknowledged that teachers may experience these circumstances differently. This allows the researcher to reduce variability of influences on the individual teacher so that the focus is on differences and similarities in participant experiences against a similar backdrop, as opposed to if the teachers came from a variety of institutions. The context in this case study provides the socio-historic background for the research and is part of the foreground as it also "plays an active role in shaping the present and the future" (Rule & John, 2011, p. 48).

The University of KwaZulu-Natal (UKZN), South Africa, was selected as the site for the study (http://www.ukzn.ac.za) because it represents a site where academics have experienced numerous forms of structural disruptions. The purposive selection of this case study site is intended to foreground the experience of the teachers using SC in their teaching more starkly. It is assumed teachers are less likely to innovate pedagogically in times of institutional change and stress. Those who choose to innovate at such times are thus assumed to be able to provide insights into the motivations, challenges, mechanisms and processes they face in a different, potentially more explicit manner. In addition, management expectations of use under such circumstances should be lower and thus responses from participants are anticipated to be more direct with less pressure to provide an 'acceptable', potentially more performative, response. This case site selection is thus an example of intensity sampling, that is, "information rich cases that manifest the phenomenon intensely, but not extremely" (Miles & Huberman, 1994, p. 28).

5.3.2 University of KwaZulu-Natal, South Africa

UKZN commenced on 1 January 2004, from a merger between the University of Natal, and the University of Durban-Westville (UDW). During the proposal development stage of this study UKZN operated under an eight-faculty structure. However, since late 2011, the institution has been comprised of four colleges (UKZN, 2010) and has five campuses over two cities (eThekwini and Pietermaritzburg). In August 2011 UKZN had 1 319 permanent and contract 'Instruction/Research Professionals' that could serve as the source for selection of potential study participants. These details were obtained from the Division of Management Information (DMI), UKZN, on 29 August 2011.

Of relevance to the research are the institutional structures and institutional and academic discipline cultures impacting teacher participants. At the outset a decision was taken to trust the participants' ability to provide the best representation of their reality (Tilly, 1978). As a result, a literature-based exploration of these aspects of the context is not undertaken at this point. Instead, a discussion of the context is suspended until Chapter 6, sections 6.3.3, where the participants' own explanations of the context are used to create the reference framing for subsequent analysis. To prevent a case study becoming too broad and thus unmanageable, it is necessary to 'bind' the case (Baxter & Jack, 2008). This is achieved by using the comments of the HE teachers as the only lens through which all stakeholders' involvement is understood i.e. the participants' colleagues, students etc. are not interviewed for their input.

5.3.3 Unit of analysis: Individual HE teacher

The unit of analysis also represents the individual cases, or the objective focus of the case study research, which in this study is the "individual UKZN HE teacher" (Miles & Huberman, 1994; Rule & John, 2011). The phenomenon of the case study is "the use of social computing (SC) in HE teaching" and the researcher who performs the research provides the subjective focus of the process (Rule & John, 2011). This structuring of the case allows the individual teacher cases to be studied independently (within the larger case) that allows between case analysis as a comparison of different teacher cases, and cross-case analysis that looks at the data across all of the case studies (Baxter & Jack, 2008).

5.4 Position of the researcher

> *The researcher brings a construction of reality to the research situation, which interacts with other people's constructions or interpretations of the phenomenon being studied. The final product of this type of study is yet another interpretation by the researcher of others' views filtered through his or her own. (Merriam, 1998, p. 22)*

It is important to provide the background of the researcher in relation to the constructs of the study, in order to identify any assumptions which may colour the analysis. In addition, it is important to understand the role the researcher has played in the study to determine potential points where they have influenced the process. This is important because, as Merriam (1998, p. 22) suggested, in a qualitative study the researcher can also be considered an instrument of data production.

The researcher executing this project is female, has taught undergraduate and postgraduate modules, and supervised research in South African HE institutions for over 20 years: six years in HDIs (including four years at UDW), two years at the University of Natal: Durban (eThekwini), and has been employed by UKZN since 2004 to the present. The majority of her HE academic and teaching career has thus been within the institution(s) which forms the case study site. She thus has personal knowledge and understanding of the context of the study. Her academic discipline is Information Systems and Technology and she thus has expertise in emerging technologies such as SC and extensive practical experience teaching, and teaching with technology.

Although she works in a technology field she does not consider herself a technophile but rather typifies herself as having a pragmatic approach to technology. She believes that technology provides major transformative potentials for improving human life rather than being a solution to problems in its own right. The researcher believes that technology is not neutral but shaped by decisions that motivate its particular design and that technology use is moulded by the implementation decisions as well as the intention of the user and its practical use. It is also possible for a technology to be appropriated for use in ways not originally intended. This 'mis'-appropriation can result in positive benefits in an application space but can equally negate the intended positive affordances of the technology.

The researcher controlled all phases of the study, namely, the refinement of the research focus and research questions, methodological choices, planning of the processes used to produce data, the analysis (including all NVivo coding) and synthesis of the findings. She was also responsible for selection of theoretical framings and representations of data in the form of figures, tables and models and chose the format used to represent the case study report (PhD thesis document). A transcriber was employed to transcribe audio recordings of the participant interviews into MSWord documents. Verification of these transcriptions is discussed below (section 5.6.3).

She is a participant researcher in this study. While her own history at the institution could potentially colour her perspective of the data, the benefit is that she is more inclined to be able to understand, and gain, participant insights into elements of the informal reality in which they operate (Gillham, 2003). During data production she is thus perceived as more of an insider who shares the participants' reality, rather than an outsider performing research 'on' their reality (Matthews, 2008). Considering the researcher has used numerous SC applications in her teaching since 2002 and at UKZN, it would have been disingenuous to remove her name from the lists developed during the sampling process.

5.5 Entering the field: Developing a reference list of participants

A register of teachers that use SC for teaching at UKZN does not exist. Prior to entering the field it was thus necessary to develop a strategy to access potential study participants. The strategy involved meeting with UKZN role players who, based on their area of responsibility, could provide information on SC use at UKZN. This involved interviews with:

- Academic computing section of UKZN Information and Communication Services (ICS) who handle technical queries from academic staff;
- UKZN University Teaching & Learning Office (UTLO) and Teaching and Learning (T&L) Committee members, committee chair (Prof Renuka Vithal) and faculty-based T&L committee representatives; and
- Quality Promotion & Assurance (QPA) unit, faculty representatives who deal with teaching portfolio development.

Dr Dale Peters, Manager of Academic Computing (ICS) called a meeting on the 22 February 2012, that she attended with the researcher and four ICS staff members (two senior educational IT consultants, an academic computing consultant and an audio-visual technician). This involved brainstorming as an ICS team to generate a list of possible study participants. This was followed up by email with the relevant staff during mid-March 2012. The University's Teaching and Learning (T&L) processes were in a state of flux as the restructuring from faculties to academic colleges had led to changes in the nature and operation of its committees. To best facilitate the list generation process, both the members of the outgoing 2011 committee and the 2012 committee were approached, with responses received in early May 2012. Within QPA only two of the staff responded at the end of February and early March 2012. One respondent provided names of two teachers known to be very active users of SC, while the other provided a list of ten names of 'good, quality teachers' but with no idea of their use of technology. Both the T&L and QPA members provided input by email.

Table 6: List generation of potential UKZN HE teachers who use social computing

Source	1st Referral	2nd Referral
ICS	18	4
UTLO/ T&L	4	1
QPA	12	8
Subtotal	34 (4 duplicates)	13
TOTAL		**43**

Table 6 details the number of teachers added to the potential participant list by the ICS, UTLO and T&L, and QPA staff and committee members in the first round of referrals, that is, within 10 weeks (22 February - 3 May 2012). Thirty-four names were suggested which included four duplicates. These 30 teachers were approached by email to confirm their use of SC in teaching and to secure their participation. Where individuals who were contacted judged it appropriate, they referred the researcher to other staff who they thought might be able to assist. This snowball sampling occurred in response to the email invitation as well as during the interview process (Cohen et al., 2007). The 13 additional teachers suggested by their colleagues form the '2nd referral' list mentioned in Table 6. These teachers were added between 16 August and 25 October 2012. The potential participant list suggested by members of appropriate institutional structures, or their academic colleagues, totalled 43 teachers.

5.5.1 Sampling: Selection of participants

The original research design intended case selection from a list of potential participants, to follow Eisenhardt (1989, p. 537) and use theoretical sampling to achieve polar types (opposites), and extreme cases where theoretical concepts are “transparently observable”. Sampling in this instance would be purposive, once the list of potential participants was available, with the intention to fill theoretical categories (Cohen et al., 2007). A decision on the number of cases could not be made until the potential participants had advised their compliance with the acceptance criteria for inclusion and their availability. The inclusion criteria were, firstly, the use of SC in HE teaching; and secondly, its use “for ‘social’-/ group-learning and so that learners can contribute to knowledge, not only be consumers of knowledge” as extracted from the participant invitation email (Appendix C).

The list of potential participants expanded and shrank as teachers made decisions on participation. Some teachers ignored the request (did not respond); others queried the nature of the study and their qualification as participants based on the selection criteria and agreed to either participate or removed themselves from the list, or suggested possible other participants. The way in which the list of potential, and actual participants expanded and shrank organically during the process provided some insight into staff perceptions around social computing use in teaching. This is discussed further at the start of the analysis in Chapter 6.

The theoretical framing of the study involves: firstly, individual lecturers’ membership in communities and, secondly, their pedagogy- and content-knowledge related to their academic faculty, discipline or field. The teachers’ academic specialisation could thus be a consideration during case study selection.

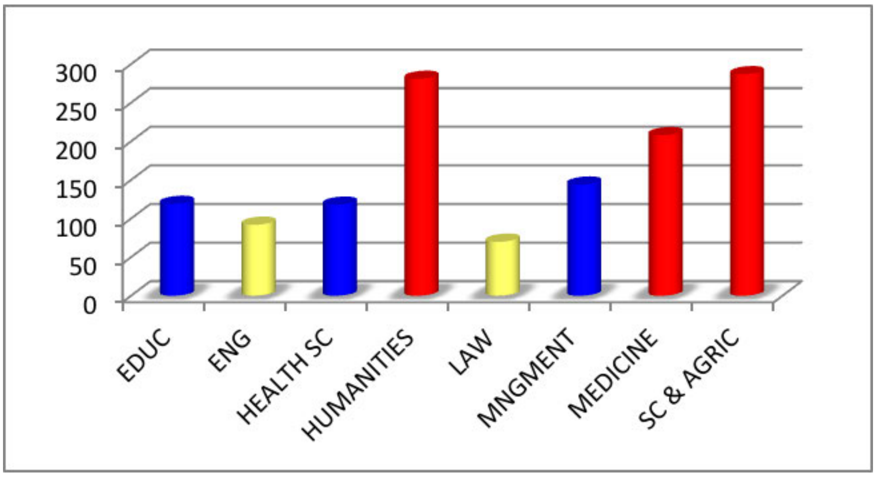


Figure 12: Distribution of teaching academics in UKZN faculties (2011)

In order to determine the academic discipline of the teaching academic staff complement in August 2011, UKZN teaching staff were divided into their faculties as provided in Figure 12. This includes high lecturing staff numbers (200+ lecturers) in Humanities, Development and Social Sciences, the NRM School of Medicine and Science and Agriculture. Lowest lecturing staff numbers were in Engineering and Law with Education, Health Sciences and Management Studies falling between these two ends of the spectrum. The selection of participants on a theoretical basis would need to consider the different knowledge domains and pedagogies represented in these faculties, as these are known to influence use of technology (Ajjan & Hartshorne, 2008; Arbaugh et al., 2010; Becher & Trowler, 2001; Jump, 2011). Once the researcher received teacher responses, it became clear that the list of possible participants was limited: of the initial list of 30 teachers, five agreed to participate, an additional six people were prepared to participate but were unsure if they qualified for inclusion, six people felt they did not meet the criteria (do not use social computing) and 13 people did not respond. A strategy of purposive sampling based on academic specialisation could thus not be supported due to a limited population from which sampling could occur.

A second sampling criterion considered during the development of the study, was to focus on a single, specified 2012 module being taught by the teacher. Again, it became clear that this was not appropriate, as teacher queries highlighted that teachers use SC in different ways in relation to different teaching responsibilities. This sampling criterion thus represented an artificial and potentially misleading construction and was thus removed. Teachers were assured all teaching contexts that had occurred in the recent past related to SC use, could form data for the study.

College of Agriculture, Engineering and Science
School of Engineering
17
School of Agricultural, Earth and Enviro. Sciences
16 | 28
School of Chemistry and Physics
18 | 25
School of Life Sciences
School Mathematics, Statistics and Computer Science
23
College of Health Sciences
School of Clinical Medicine
School of Laboratory Medicine & Medical Sciences
15 | 19 | 24
School of Health Sciences
3-P7 | 9-P8 | 30-P13 | 37-P9
School of Nursing & Public Health
6 | 7 | 11 | 12-P12 | 13-P11 | 27 | 42-P10
College of Humanities
School of Religion, Philosophy and Classics
School of Arts
14 | 22-P16
School of Social Sciences
4-P17
School of Applied Human Sciences
40 | 41-P1
School of Built Enviro. and Development Studies
School of Education
10-P1 | 21 | 29 | 32 | 33 | 34-P15 | 35 | 36 | 38-P14 | 39
College of Law and Management Studies
8-P18
Graduate School of Business and Leadership
School of Accounting, Economics and Finance
School of Law
School of Management, IT and Governance
20-P5 | 26-P4 | 31-P3 | 43-P6

Legend:
(blank) No reply
\# Not SC use #~Position on list
\#-P# #~Position on list-Participant#

Figure 13: Comprehensive list of potential participants and study sample

The final decision on sampling for the study was that all qualifying teachers, who use SC in their HE teaching in ways that encourage student engagement, would be included because the available population was limited. Figure 13 provides a mapping of the potential participant list against their academic disciplines as represented by the School (within each college), in which they are located. The first (or only) number in a cell represents the number assigned to the teacher in the original list that corresponds with when the person was added (with 1 being the first, and 43 being the last person added). Clear cells represent those who did not respond to the invitation and the light grey cells represent those teachers who, while innovative in their teaching, do not use SC in their teaching. The dark cells represent the 18 teachers of the sample and include the participant number (P#) which is used to refer to the teacher case during analysis. Earlier considerations of stratifying the sample according to teacher demographics such as age (Manca & Ranieri, 2016; Scott, 2013; Selwyn, 2011b), gender (Govender & Govender, 2014; Hussein, Aryaci, et al., 2013; Onwuagboke & Singh, 2016; Selwyn, 2011b; Woods et al., 2004) and academic position (Manca & Ranieri, 2016) were deemed impractical due to the small sample size. Where these characteristics may be relevant to the analysis, they will be discussed as pertaining to individual cases, rather than forming a preconceived basis for analysis.

5.5.2 Ethical procedures

Ethical procedures include gaining access to the case study university (UKZN) and the participant HE teachers. This includes ethical approval from the university research committee where the researcher is based, and informed consent from participants (Santiago-Delefosse et al., 2016; Twining et al., 2017). Gatekeeper permission to access the case study university was obtained from the UKZN registrar (1 December 2011). The Humanities and Social Sciences Research Ethic Committee (UKZN) reviewed and approved this study on 6 December 2011 and recertified the study as required, with final recertification on 11 November 2019 (Ethical clearance number HSS/1248/011D, refer to Appendix D and Appendix E). Each participant was provided a letter of informed consent which explained the nature of the study, any legal limits on use and storage of data, participant rights and the contact details where any queries or concerns could be lodged. Participants were required to sign and return a letter acknowledging and accepting the conditions of involvement in the study, prior to the commencement of the interview.

Prior to the start of the participant interviews, each participant's attention was drawn to the fact that, while all reasonable steps would be taken to maintain participant anonymity, because of the small sample size and the nature of the details which would be used to contextualise each case, it was highly likely they may be identifiable by other members within their community. All participants verbally acknowledged this situation and agreed to continue with the interview.

5.6 Data production

Data production involves a decision on the data sources or instruments that will be used, the process of data production and data transcription and verification.

Case study research encourages the use of multiple sources of data to allow for "converging lines of inquiry" (Yin, 2014, p. 120). The first conceptualisation of the study included the concept of researching both the 'actual use' of SC in teaching as represented by the information stream on the application site as well as what teachers 'articulated' about their use. However, after the first interview with P1 it became evident that this represented an artificial distinction as the physical technology is a poor representation of teacher intent, especially if students do not participate in the activity. The initial decision to include document analysis and to collect student input for one participant (P7), who already had informed consent from her students, was also reversed when the number of cases was increased from the original proposed six cases (based on Eisenhardt (1989)) to all 18 potential participants. Document analysis would have been based on scholarship of teaching and learning (SoTL) teacher publications, a teaching portfolio or other documents or online resources. While these were available for some participants, they were limited, spoke to historical situations, and only in one case appeared to contain current insights (P17). Of specific note is that these document sources were suggested in support of comments participants had already made in the interview. The final decision was thus to only use interviews for data production. This approach is supported by Ottenbreit-Leftwich et al. (2010, p. 1325) who suggested that "given that values and beliefs are internal to teachers, the best way to explicate them was through the interviews".

Krinsky and Mische (2013, pp. 18-19) explained Tilly's position on actor statements as follows: "Do we trust actors' accounts of their own interests and motives, or do analysts have a sharper understanding? … And increasingly, what is the association between actors' own difficulties in representing their identities, actions, and understandings and the challenges of historical analysts in explaining processes of social change?" Based on the researcher's position as a UKZN colleague of the participants and with a commitment to allowing the actors in the space to speak their own truth, a decision was taken to trust their statements to be representative. This position is supported by Charles Tilly (1978, p. 61):" treat the relations of production as predictors of the interests people will pursue on the average and in the long run…" *but also* "… rely, as much as possible, on people's own articulation of their interests as an explanation of their behaviour in the short run". Margalit (2002, p. 56) presented a different perspective of what a participant tells an interviewer, when he suggested that "we cannot remember on demand" and thus "remembering and forgetting may, after all not be proper subjects for moral or ethical decrees and evaluations". We should thus be careful of judging the 'honesty' or 'factual correctness' of participant statements but perhaps should rather focus on why they remember things in the way they do. Participants personally 'know' things because of how they remember them (Margalit, 2002), but Margalit (2002, p. 59) suggested that "collective use of remember is closer to believe than to know". These subtle differences encourage a nuanced, generous, and yet critical research approach, to participant transcripts.

Where participant statements appear to contain bias or reflect a specific context or position, these have been highlighted in the analysis. The researcher accepted that this may introduce bias into the study but the assumption was that an 'absolute truth' may not exist, and the lens provided by the participant is personally authentic. Attempts to harmonise a single position as representing an individual, across statements from numerous data sources, may be an artificial construct as people are known to hold contradictory beliefs, opinions or ideas in some form of tension or harmony in their everyday lives. A person's position on issues may also change over time and thus data sources from different periods may not be reconcilable. The primary source of data for this research is thus participant interviews.

5.6.1 Research instrument: Interviews

Interviews allow a participant to explain their situation in their own words telling us "what individuals think, feel and do and what they have to say about it … giving us their subjective reality in a 'formatted' discussion" (Henning et al., 2008, p. 52). Interviews can be structured in numerous ways, from highly structured to an informal conversation. The benefits of using an interview include that the participant explains the situation in their own words, without being prompted by choices predetermined by the researcher. In addition, interviews provide the opportunity for the researcher to question and probe responses in order to gain clarity and depth on a topic. The challenges with interviews are that they are time intensive and require transcription as well as qualitative analysis, which is more demanding of the qualitative researcher.

The research design approved by the UKZN research ethics committee included a three-interview interaction with participants (Appendix F). The interviews were designed to focus on, firstly, locating the teacher in terms of their teaching, communities and their introduction to computing; secondly, historical and current use of SC in teaching; and finally, the impacts and influences on use of SC in teaching and self-reflection on the process. The questions for the interview were derived from the theoretical framing of the study as described in section 4.3 dealing with the constructs from 4.3.1 *Social theory of learning (Wenger)* and 4.3.2 *TPACK (Mishra & Koehler)*. The list generation process and conversations to schedule interviews highlighted that all participants felt highly time-pressured and were only able to make a single interview appointment. As suggested by Yin (2014) it thus became necessary to adjust the design and scheduling to suit participants. It also became clear that a 'non-standardised' way of interviewing (Henning et al., 2008) would be most appropriate, using a largely unstructured and flexible interview structure. This provided the participants the freedom to introduce ideas, in a conversational mode, while the researcher retained the responsibility to guide discussion and introduce topics, so as to ensure the necessary interview questions were covered by the end of the interview (Henning et al., 2008). This created a more conversational and informal discourse which encouraged the participants to relax and share events and stories to illustrate their comments. It is recognised that this "talk as social action" means that the transcript from the interview is co-constructed by the two participants and when analysed should be viewed as such (Henning et al., 2008). These are valuable sources of data as they represent events which can typify and illustrate situations which can then be linked to mechanisms and processes operating in the teaching space. This conversational mode, and the sense of trust and shared common ground between the researcher and the interviewee, encouraged anecdotal storytelling that is valuable when using a CR analytical lens. These ‘observable’ stories provided insights into the Empirical, experiential layer that allows the researcher to understand the Actual events impacting, or being initiated by, the participant. During analysis the researcher can gain insights into the agency, structures and mechanisms operating in the Real.

Only one participant appeared sceptical about the position of the researcher and the motivation behind the research: P2 took a more reticent position at the start of the interview. He admitted that he had thought the research had a hidden agenda i.e. to reinforce the idea that technology could solve all teaching problems, in support of what he perceived as the ‘UKZN management’ position. His fears were allayed once the researcher used an opportunity early in the interview to explain that she did not see technology as a solution to every problem. The tone of the conversation then became genuinely collegial and conversational. All participants made comments that suggested they felt comfortable discussing their positions honestly. Examples of such statements are presented during the analysis, specifically in Chapters 7 to 10.

Prior to entering the field, a pilot interview was performed with a UKZN HE teacher who does not use SC but who has extensive experience as an HE teacher and specialises in technology (25 July 2012). This choice was necessary in order to ensure context related questions and responses were authentic for the participant, and to preserve the participant list for data production. The pilot interview confirmed the questions and structure as appropriate from the interviewee’s perspective but also allowed for operational testing of the recording equipment. The interview was transcribed, annotated for coding and confirmed as delivering the necessary data with the research supervisor. A debriefing with the pilot participant reaffirmed the interview approach selected as he confirmed, “Enjoyed it … comfortable. I liked the flow. It didn’t feel like any one question came from out of nowhere. It felt like a conversation”. No changes were necessary and thus data production commenced on completion of the pilot.

5.6.2 Data production process

Due to the timing of the research interviews, participating teachers would have completed the college restructuring process, based on a two-tier model of schools and colleges, in the months prior to being interviewed for this study. Twining et al. (2017, p. A6) suggested that because the data collected during interviews is effectively produced through a 'researcher-lens' it is important to describe the interviewer, the data production process and the interview and institutional context.

Data was produced via interviews performed from 4 September to 13 November 2012. Participants were interviewed in their work offices, except for P2 who was interviewed at home. Of the 18 interviews, one interview (P9) was only a 10-minute discussion as an additional part of the discussion with P8 (65 minutes). Excluding this case, interviews were on average 80 minutes with the shortest being 40 minutes (P14) and the longest two hours (P1). All interviews were performed by the researcher, excluding her own interview. Her interview was performed by another study participant belonging to the same academic discipline and who was thus familiar with the context of her teaching as well as the academic content. All interviews were recorded on two digital recorders to ensure a backup of the interview data.

5.6.3 Data transcription and verification

A professional transcriber transcribed all participant interviews into MSWord documents. The researcher then checked the transcription against the audio recordings to verify the transcribed content. The verification process identified a number of educational terms and SC applications had not been recorded correctly. Due to the number of corrections required to the transcripts, the verification process was repeated with no additional errors noted.

Participants had identified that they did not feel a need to review the transcriptions of their interviews. The researcher however arranged to supply participants with a document containing the sections of analysis pertaining to their content on finalisation of the analytical process. This is a verification approach suggested by Gillham (2003). Five participants responded to the provision of their documents: P1 requested a change to one sentence accompanying a quotation that provided a more nuanced perspective of the content of the quotation; P7 corrected the spelling of a word in a quotation; and P5, P8, P17 and P18 noted that no changes were required. All respondents confirmed the essence of their comments had been correctly reflected in the analysis.

5.7 Data quality

> *The case study contains no greater bias toward verification of the researcher' s preconceived notions than other methods of inquiry. On the contrary, experience indicates that the case study contains a greater bias toward falsification of preconceived notions than toward verification. (Flyvbjerg, 2006, p. 237)*

Attempting to apply the concepts of validity and reliability as applicable in quantitative research to qualitative research is seen as a contentious position because qualitative research differs substantively from quantitative (Cohen et al., 2007). However, the importance of ensuring data quality should not be neglected, as suggested by this anecdotal comment from one of the people interviewed by Lamont (2009, p. 89): "Geertz himself has been very critical of this position. As he puts it, [just] because we can never get the operation room one hundred percent antiseptic, does not mean that we may as well operate in the sewers". In qualitative studies, the quality of data can be described in terms of "credibility, neutrality, confirmability, dependability, consistency, applicability, trustworthiness and transferability, in particular the notion of dependability" (Cohen et al., 2007, p. 148). As this suggests, a variety of terms can be used to assess data quality but truthfulness, credibility and trustworthiness appear to have particular traction (Twining et al., 2017).

It is suggested that an 'insider' researcher has the resources to determine the accuracy, or truthfulness, of participants' information and is able to identify distortion of the truth (Matthews, 2008). In addition, the existing network that exists between the majority of participants, provides instances where a comment by one participant can be seen to verify another participant's claims. The analysis will show this for all participants, excluding P2, P16, P17 and P18 who have worked in a space isolated from other participants.

The dependability and integrity of the data is supported by the transparent and detailed audit trail records maintained during the study, some of which have been shared in this chapter

(Porter et al., 2016). It is suggested that dependability is enhanced by researchers going back to the participants to confirm the analysis performed (Miles & Huberman, 1994). The feedback provided to participants was provided at the end of the write-up of the analysis chapters (Gee, 2005). It should be noted that although this was performed, the researcher agrees with Cohen et al. (2007) that this does not mean that the participant's interpretation takes precedence over the researcher's. When this was discussed at the start of an interview it was clarified that although the participant would receive copies of the analysis, the researcher would not change the analysis to what the participant suggested, but would rather enter into dialogue with the suggestion from the participant. Ultimately, this was not necessary as the participants agreed with the researcher's analysis.

Face validity of interview questions ensures questions are designed to minimise bias. This would have been considered both by the research supervisor as well as the UKZN ethics committee, who review the research instruments as part of their review process. In addition, this was raised in the debriefing session held with the pilot participant:

> *Researcher: Did it feel like I was only open to positive comments and 'forcing' a pro-tech approach?*
>
> *Pilot participant: No – it felt like there was a sense of balance, although I think this will be your big challenge*

The consistency in interviewer for 17 of 18 cases, and the interviewer being the eighteenth participant, assists in limiting opportunities for variability in approach to posing questions and probes.

The researcher is not a senior, nor a junior academic in the university, but has an intermediate academic position. As a senior lecturer, the researcher was well positioned to interview a range of academics without a distinct positional power entering the interview space (Silva, 2007). There were, however, some participants who were aware of the researcher's use of educational technology and initially seemed a little uncomfortable discussing their use of SC. This hesitation rapidly disappeared as the researcher took a supportive and questioning approach focusing on what they were using, rather than an interrogative tone stressing what they perhaps were not using (P8, P14 & P16). Other respondents were either senior academics or confident in their technology use, or both. Power relations are however fluid in an interview as the interviewee can also choose to withhold information. This was initially experienced with P2 until he realised the researcher had a genuine interest in determining 'HE teacher use' rather than confirming a managerial position on the issue. The trustworthiness of data can be further enhanced if the researcher has extensive knowledge of the practitioner's context and has established a position of trust with participants (Baxter & Jack, 2008). The researcher is a participant of the study, and is thus a practitioner who is embedded in the research domain. The nature of the trust between interviewer and interviewee has been discussed.

Discourse analysis is not simply the opinion of the researcher, but is an interpretation of text which should be viewed as set in a specific context. Gee (2005, p. 113) explained the validity of an analysis of a discourse as follows: "The analyst interprets his or her data in a certain way and those data so interpreted, in turn, render the analysis meaningful in certain ways and not others … I take validity to be something that different analyses can have more or less of, i.e. some analyses are more or less valid than others … All analyses are open to further discussion and dispute, and their status can go up or down with time as work goes on in the field." He thus stressed that all analysis is developed in a specific context, by a specific researcher and for a specific audience. The analysis is located in the body of knowledge at a certain point in time, and thus the validity of the analysis and the conclusions drawn, are relative to the position of the reader in relation to how the knowledge domain may have altered over time.

Although multiple coding of the dataset was not appropriate because the research is part of a thesis, the process was reviewed, and quality controlled by the supervisor. In addition, a form of double coding was implemented. Double coding involves a researcher returning to the data after a period of time and recoding the data and comparing results (Baxter & Jack, 2008). After an extended period away from analysis in 2018, coding analysis in Atlas.ti could not continue due to software licencing challenges. The analysis was thus restarted using NVivo and the code book recovered from Atlas.ti. This provided an opportunity to review the coding process, adjust the strategy and restart coding in November/ December 2018. This revisiting of the analytical constructs and framing of the research provided a valuable tool to enhance the quality of the second round of coding and the analytical outcome.

5.8 Analytical process

> *In other words, rather than be caught up in the infinite regress of postmodern skepticism, it [Tilly's approach to mechanisms] challenges us to observe and understand social regularities within and across social sites, while recognizing that this understanding will never be perfect and unmediated by our own processes of social construction. It acknowledges that analysts' constructions are observable and amenable to parallel sorts of analysis, but it is simply unbothered by this. (Krinsky & Mische, 2013, p. 16)*

Analysis commenced while data production was still underway. The NVivo coding process (creation of nodes) was based on the theoretical framing of the study as discussed in Chapter 4. CR as the underlabourer of the study requires annotation of observations and perceptions in the empirical layer, and events occurring in the actual layer. These events are recognised as a result of the interaction of actors, exercising their agency in relation to each other and the generative structures and mechanisms within the layer of the real.

5.8.1 Discourse analysis

This coding process is based on discourse analysis rather than purely textual or content analysis. The term discourse has been used 'cavalierly' and thus warrants clarification (Kress, 2010). 'Big D' (or upper case) Discourse refers to both the language aspects of discourse as well as the cultural models associated with Discourse. 'Little d' (or lower case) discourse refers to the linguistic elements which support Discourse (Rogers et al., 2005). They are however both "social and political and have histories of participation that are saturated by power relations" (Rogers et al., 2005, p. 370). There are similar distinctions in the use of critical discourse analysis (namely, CDA and cda). Two definitions of discourse are considered: Gee (1989, pp. 6-7) spoke of Discourse (with a capital D) as:

> *saying (writing) – doing – being – valuing - believing combinations … ways of being in the world; they are the forms of life which integrate words, acts, values, beliefs, attitudes and social identities as well as gestures, glances, body positions and clothes. A Discourse is a sort of 'identity kit' which comes complete with the appropriate*

costume and instructions on how to act, talk and often write, so as to take on a particular role that others will recognise.

Kress (1989, p. 7) spoke of:

systematically organised sets of statements which give expression to the meanings and values of an institution. Beyond that, they define, describe and delimit what it is possible to say and not possible to say (and by extension – what is possible to do or not to do) with respect to an area of concern of that institution, whether marginally or centrally.

Critical discourse analysis (CDA) thus focuses on all of the ways in which an individual ‘is’ in the world and the total of actions they exhibit which makes them recognisable. Discourse consists of more than words, and can suggest possibilities, as well as constraints on the individual. CDA refers to the specific form of critical discourse analysis performed by Fairclough, Hodge, Kress, Wodak, van Dijk, van Leeuwen and followers. Lower case critical discourse analysis (cda) refers to a broader range of approaches as practiced by Gee, Gumperz, Hymes, Michaels and Scollon and Scollon, amongst others, who do not necessarily identify their work as CDA (Rogers et al., 2005). The distinction of these approaches is not a focus of this study: analysis was not performed at a linguistic level but was viewed as ‘critical’ and focused on a ‘Discourse’ level of analysis. For ease of use, the conventions of ‘discourse’ and ‘CDA’ are employed.

CDA does not aim to be a specific theory or require a single predetermined methodology; it rather suggests tenets to guide its use (Wodak, 2002). There are three central aspects to CDA, namely: firstly, discourse is shaped and constrained by social structure; secondly, it is shaped and constrained by culture; and thirdly, discourse shapes and reveals our identities, relationships, systems of knowledge and beliefs (McGregor, 2004). Fairclough (2005) suggested that CR research should use CDA because of its potential to uncover the various ontological layers of reality. In this study, in addition to the analysis of the interactions between these elements, the role of SC technology in the teaching and learning space is foregrounded. It should be noted that SC does not support a particular construction of knowledge, rather it is shaped by practice and itself shapes practice (Greenhow & Gleason, 2014).

5.8.2 Coding: An iterative process

NVivo 12 Pro software from QSR International was used for interview data management and analysis (https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/home). A full copy of the NVivo 12 Pro final codebook is available in Appendix G.

The first iteration of nodal coding was deductive based on the research questions, for example, *WhatSCisUsed (RQ1 What)* and *WhyTeacherUseSC (RQ3 Why)*. This included variables related to the theoretical framing, namely aspects of community of practice and TPACK. These nodes include, for example, *C~BoundaryX…* nodes which relate to community boundary crossing behaviour; *C~ Teaching* which relates to a community of teaching; *IdentityConstruction* and *Pedagogy~Student oriented*. During this coding it also became clear that other concepts encountered during the literature review needed to be captured, for example, different aspects of identity such as *Identity-N-ature* from Gee (2000) and power, *Power Individual-Episodic* from Silva (2007). This process required additional iterations to ensure those NVivo nodes added during coding of specific transcripts, were then also coded in all other participant files. Rationalisation of nodes to remove duplications and refinement of constructs occurred at numerous stages in the process.

At that point it was determined the existing theoretical underpinnings were insufficient to explain behaviour and forces in a way that highlighted the mechanisms and processes impacting SC use in HE teaching. Approaching the use of SC as an innovation within a system, as theorised by Repenning (2002) (see section 4.4.6), created the opportunity to identify processes involving the individual teacher and the component mechanisms of the innovation process. These logical models are necessary theoretical building blocks (Yin, 2014). The view of the processes within this institutional system were then analysed and coded based on the individual actors in the space. As the teacher is the unit of analysis and case, the reinforcement causal loop representing the individual HE teacher's innovation using SC in teaching is used as the first locus of coding analysis in this second cycle of coding. This coding was both deductive and inductive: the former involved nodes created to represent mechanisms, or relationships between the constructs of commitment, effort and results. Of practical importance to identifying mechanisms was to code the edges (linking lines) or relationships. Coding was explicit in this regard, for example, *Commitment-effort (R1)*, *Effort* *(individual)-results(R1)* and *Results-commitment(R1)*, represent the mechanisms forming the process representing the individual teacher's innovative use of SC in HE teaching. Renaming of NVivo nodes became necessary as inductively coded content coalesced around specific concepts, for example, *PM-MngReaction (B1 & B2)*. Renaming was an ongoing process aimed at clarification of emerging concepts, for example, the addition of labels related to reinforcement (R) and balancing (B) loops. While NVivo provides options to create relationships and hierarchical nodal structures, this was not implemented as free nodes allow for more flexibility.

Specific patterns of use of individual teachers, or combinations of participant teachers and the actors and structures in the space led to the inductive development of numerous additional nodes and explanatory causal loops. Data extractions into NVivo tables have used counts of references. The multiple cases, and cross-case analysis have led to more in-depth and robust models of the system (Yin, 2014).

Diagrams are a valuable device for illustrating data analysis outcomes in this study. The complexity of the interactions and the need to reflect 'flow patterns', that is, the nature of movement between stages, representing mechanisms and processes requires a visual representation to support the discussion. The figures representing the system causal loops were produced using simulation software: Vensim PLE 8.0.6, from Ventana Systems (https://vensim.com/). Explanatory figures that do not represent system models e.g. those included in Chapter 11, were developed using Microsoft Visio Professional version 12 (2019) (https://www.microsoft.com/en-us/microsoft-365/visio/flowchart-software).

5.8.3 The case study report

The case study report is presented in accordance with the academic thesis genre (Rule & John, 2011). This is a thesis structure consisting of an introduction, literature review and applicable theoretical framing, research methodology, data production and analysis and synthesis of results, concluding with a note of any limitations or recommendations for future study. This study's analysis is presented in five chapters in this document (Chapters 6 to 10).

The review of the literature, curation of ideas and writing were performed using Scrivener 2.9 (2005-2017), from Literature and Latte (https://www.literatureandlatte.com/scrivener/overview). The final document was produced in Microsoft Word (2016) (https://www.microsoft.com) including the use of Endnote X8.2 bibliographic software from Clarivate (https://endnote.com), applying the APA 7th template.

5.9 Limitations

The study conclusions are rooted in the data produced during interviews. Any limitations in that regard are thus significant. The study was limited by the teacher list generation exercise. Appropriate structures and individuals were approached for suggestions, and a snowball sampling approach was used with those teachers placed on the list. However, because the majority of SC teaching activities are experimental, small scale and teacher-led (Lwoga, 2012) it is possible numerous other teachers were experimenting with SC but their results had not reached a level of prominence within the institution and they were thus not included on the list. Despite the motivation presented in this chapter to accept the interview statements of participants as trustworthy and representative, it needs to be acknowledged that the study is limited by its reliance on self-reported data (Gebre et al., 2015).

The selection of the research methodology (case study) and the purposive selection of an intensity case site for the research (UKZN), limits the nature of the data produced and hence the conclusions drawn from the research. This site may not even represent a typical South African university site, but the conclusions may still be of broader applicability. The analytical focus is not only on providing a descriptive analysis but a focus on explanatory conclusions, specifically those related to the intransitive layer of the Real, namely generative structures and mechanisms, and the processes which impact actors in the teaching space and are transformed by them. The applicability of the theoretical framing developed as a result of this study will require testing in multiple contexts before its transferability as an explanatory device can be determined.

5.10 Conclusion

The use of a single, intensity case study site, and the purposive sampling of 18 HE teacher participants form the basis for analysis in this study. Analysis chapters initially focus on the demographics of the sample and the ‘what’, ‘how’ and ‘why’ of SC use in HE teaching according to the participants (Chapter 6). The chapter thus addresses the first three research questions of the study. The subsequent analytical chapters are focused on the structures, mechanisms and processes which influence the teacher’s use of SC. They move outwards from focusing on the influences on the individual teacher in a broad sense (Chapter 7), to focusing on the influence of student reinforcement mechanisms (Chapter 8), the influence of academic colleagues and institutional structures and processes (Chapter 9) and finally, an institutional perspective of how these processes interact and play out in practice (Chapter 10). The synthesis chapter (Chapter 11) presents a theoretical framing that integrates the explanation of SC use in HE teaching as presented by the participants, and an explanatory system process-based model that integrates the role of all actors, structures and power that is grounded in the participant experience and knowledge they have shared.

6 UKZN HE teacher use of social computing

The tech is available but the tech is not the solution. The solution is actually a mind-set change, the solution is understanding what your theoretical paradigm is for education. (P5)

6.1 Introduction

This chapter focuses on the demographics of the sample and the 'what', 'how' and 'why' of SC use in HE teaching according to the participants. It will consider the applications and features used by the teachers and the reasons they provide for their use of SC. This chapter thus addresses the first three research questions of the study.

Many teachers participating in this research felt unsure if they understood exactly what 'social computing' was, were hesitant whether they were using it in 'meaningful' ways in their teaching, and were unclear if their experience would provide relevant data for this study. This is exemplified by the following quotes:

I'm just a little bit concerned if I am going to add value to your work. I hope I can, but I mean I don't know, I want to also add value and I'm not so sure how much I can do that. (P13)

I mean you're really trying to keep up with how other people are using it, and that's already a challenge … There's just so many more ways that, you know, technologies are being used for teaching and learning or for just usage in general, so certainly I use it on an everyday basis and I'm Ok with using it, but whether I….? (P17)

…But (that) they (SC) are sort of quite ordinary things that very non-technically minded people could be doing… was also in your ambit. That I find reassuring. (P18)

On the other hand, there's kind of a 'geekery' behind it. There's, like the people, working on this open source platform because they think it will save the world: creating these fundamentally democratic resources that are participatory, and shift, and then there's that – so what makes it interesting is that it operates far beyond any of the intentions of any of the planners or designers. (P2)

I mean social computing; you know that is quite a broad thing, can you explain it to me? I mean I'm assuming it is kind of using Internet, online, information technology to teach – Facebook and all those sorts of things. (P8)

This sense of uncertainty around the meaning of the term ‘social computing’ reflects the reality of daily use of emerging technology terminology (Appendix A). Terms are used conversationally in less than precise ways, but ways that reflect the excitement people feel in relation to a ‘rallying call’ around Internet applications that are designed ‘by the people, for the people’ and rely upon “the appropriation and sharing of content amongst communities of users, resulting in various forms of user-driven communication, collaboration and content (re)creation”(Selwyn & Grant, 2009, p. 79). All participants have engaged in varying ways, and to varying degrees; with applications which can facilitate SC. The use of more loosely defined inclusion criteria allowed those not totally aware, totally committed, nor fully converted to SC use (i.e. those potentially at the periphery) to be included.

The participants were not prompted with potential SC applications they may use, nor potential ways in which they are used. While this means that it is highly likely that participants did not supply exhaustive lists of applications and how they have been used, providing an exhaustive list was not the intention of this study. Knowing what SC participants use and how they use it in their teaching is necessary to, firstly, provide an understanding of their teaching context and, secondly, to consider their use in the light of the existing body of knowledge. Of greater import is the fact that this information serves to provide the observable details of SC use that are the visible evidence of the mechanisms, processes and structures that operate, often unseen or unrecognised, at operational, tactical and strategic levels within the HE institutional context. This chapter thus explores the self-reported details of participants’ use of SC while subsequent analytical chapters focus on untangling and deconstructing the dynamics that underpin these decisions and actions.

6.2 The applications and features used by teachers

Table 7 provides an overview of the participants’ context. The majority of participants were female. During data production a number of males were identified as potential participants, but discussions revealed that their technology use focused on curating their discipline content, rather than focusing on the social processes of teaching and learning. The three males included in the study represent two participants who could be considered to be at the ‘centre’ of a community of SC users (P2 & P5) and one participant on an inbound trajectory

(P15). A variety of disciplines are represented, with the seven participants from the Health Sciences sharing a community of practice mindset, common to their disciplines and occupational practice. There were three participants from Education, two each from Information Systems and Technology and Public Administration (also known as Public Governance). Single representatives were present from Psychology, Languages (Italian), Economic History and Development Studies, and Business Management. Table 7 also indicates whether the use of SC occurred in undergraduate (UG) or postgraduate (PG) modules, delivered on a full-time (FT) or part-time (PT) basis.

Table 7: Participant demographics and social computing use

#	Gender	Discipline	UG	PG	FT/PT	Application	What functions
P1	F	Education		x	PT	Moodle	Discussion, lesson, glossary, forum, journal, wiki, workshop format, quiz
P2	M	Psychology	x	x	FT	OLS*, Moodle, Documentaries & feature films, Facebook, Twitter	Discussion forum, refer to sites, Q&A f2f and online, FB page groups
P3	F	Public Admin	x	x	FT	Moodle	Q&A, open discussion forum
P4	F	Public Admin	x	x	FT/PT	Moodle	Discussion forum
P5	M	IS&T	x	x	FT	Facebook, Edmodo, Moodle, Neatchat, Wikispaces, OLS, Ning, Google docs folder, Dropbox, WebCT, Active Worlds, Second Life	Facebook page, chatroom, events, discussions
P6	F	IS&T		x	FT	OLS*, WebCT, Mahara, Edmodo, Facebook, YouTube, Second Life	Videos, discussion forum, external experts, sharing resources
P7	F	Pharmacology		x	PT	Moodle, Facebook, Skype, BBM chat, WhatsApp, SMS, YouTube	Discussion board, FB discussions, share resources, Video feedback
P8	F	Occupational Therapy	x		FT	Moodle, Skype	Quizzes, assignment, discussion forum, practical consultation
P9	F	Occupational Therapy				*As for P8 (tutor).Limited comments in P8 interview*	

P10	F	Nursing		x	PT	Moodle, YouTube, Adobe Connect, Facebook, Skype, Second Life	Chat, Forums, glossary, "all functions of Moodle", Skype, simulation
P11	F	Nursing	x	x	FT/PT	Moodle (LMS), video conference, Skype, Google presentations, spreadsheets and docs, Gmail chat, Facebook	Interactive activities, meetings, FB page, forum, glossary, journaling, chat, quiz, podcasts (specifically for mobile phones)
P12	F	Nursing (tech support)		x	PT	Skype, video conference	
P13	F	Dentistry	x		FT	Moodle	Resources, discussion forum, notices, assignment, quiz
P14	F	Education	x		FT	Moodle	Resource site, discussion, quiz
P15	M	Education	x	x	FT/PT	Moodle	Resources, notices, chat forum, lecturer evaluations
P16	F	Lang (Italian)	x		FT	YouTube, Skype	
P17	F	EconH & Dev Studies	x	x	FT	Moodle, Facebook, Skype, Twitter	Resources, interactive sessions
P18	F	Business Management	x		FT	OLS*	Journaling, discussion forum, peer comments/ collaboration

OLS: Open Learning System. Internal UKZN LMS. Designed to replace WebCT and replaced by Moodle*

The main platforms mentioned by participants were the institutionally provided platforms or LMSs that are considered core technologies (Shelton, 2014). Longer serving teachers mentioned the use of WebCT (P5 and P6), followed by the Open Learning System (OLS) in 2002 developed by ITEd, UKZN (Jackson, 2008) (P2, P5, P6 and P18). This was followed by a pilot implementation of Moodle in 2008, the use of which gained traction from 2010 onwards. Skype, Facebook and YouTube were commonly mentioned. P5 and P6 mentioned a broad variety of applications which may be due to their discipline which has a technology focus (IS&T) and thus would suggest a greater comfort with exploring technology options and dealing with students who are required to develop competencies with technology applications.

The features used suggest a cumulative, potentially hierarchical use. LMS use is common, specifically features such as uploading of resources (including lecture slide presentation files) and notices. These signal early, mostly administratively-focused use which is transmissive in nature (Gebre et al., 2015; Lameras et al., 2012; Pea, 1994). These features are easy to use, used often and have a high intention of use among teachers (Schoonenboom, 2014). Thereafter, more exploratory use includes the use of discussion forums, chatrooms, question and answer sessions (Q&A) and the addition of e-assessment quizzes. These features aim to engage students and focus on application and clarification of concepts (Gebre et al., 2015; Lameras et al., 2012). This communication tends to be transmissive and ritualised but is seldom transformative (Pea, 1994). Schoonenboom (2014) suggested there is a high intention to use these features, and although they are useful they may not be easy to use. The way in which applications and their features are used, either singly or in combination with each other, determines the nature of the interactions. The 'discussion' phase can include a variety of interactions that may involve student peer comments and tutor or teacher input. Discussion forums can be used to exchange and develop ideas but, while student-centred, may still be strongly content focused (Lameras et al., 2012). Thus, while students are learning to become self-reliant, learn more independently and engage in asynchronous communication (Gebre et al., 2015), it may be difficult for the communication to become truly transformational. Voice-over IP (VOIP) services such as Skype, full video Skype, or formal video-conferencing were specifically used in postgraduate situations among participants. These were seen as less commonly used features but were recognised as very important in learning (Schoonenboom, 2014).

SC platforms or those features which can be used for collaboration, knowledge creation and the development of process awareness in students, can be seen as potentially, genuinely transformational (Pea, 1994). In general, however, the conventional features of a LMS are not good at facilitating this kind of use (Schoonenboom, 2014). The development of social networks, social capital and the development of trust are seen as intrinsic aspects of transformational learning (Lameras et al., 2012; Pea, 1994). The associated apps include Facebook, Twitter, Edmodo, Wikispaces, Ning, Active Worlds, Second Life, Mahara, BBM chat and WhatsApp. The use of these apps does not mean that teaching and learning automatically becomes 'transformational'. The features of these apps can be used in instructivist, ritualised and transmissive ways as much as they can be used to create a more active, participatory and egalitarian student learning space. These applications, however, have features which can be leveraged in creative ways to encourage student-led or student-centred learning. Other applications such as YouTube can be used to supply content, or for knowledge creation, if students are encouraged to make their own recordings. It is thus recognised that applications and features do not intrinsically determine pedagogical practice. It is the intent brought to bear by the teacher, or the student, when using technology that determines the nature of the impact on the individual and learning.

6.3 The reasons teachers provide to explain social computing use

The reasons teachers provided for their use can be broadly grouped as personal, related to their academic life, institutional or national factors. It should be noted that aspects of these factors are covered in greater detail in later chapters where their influence, or role in mechanisms are notable. This discussion thus serves as an introduction to a more detailed discussion in Chapters 7 to 10.

6.3.1 Personal factors

Personal aspects can include the individual's personality, their interpersonal skills, attitude towards technology, their prior experience with technology and their technological competence. There were also professional risks a teacher may feel they run by engaging in technology use in their teaching which may reduce their likelihood of using technology.

In terms of personality and interpersonal skills, a number of participants spoke of their passion for teaching and sense of fulfilling a valuable role, over and above their commitment to their discipline content, or specific interest in technology (for example P1, P2 & P5).

> *No, it's the learning, not the teaching… It's the learning that is the focus. (P11)*

> *So they(students) are going to do the research and they are going to publish this for the class using OLS. That was the medium. But you see this is what I was saying; it wasn't that I was thinking 'oh how can I use OLS?' It came from the fact that I want this more authentic research and authentic discussion, so the rest of the class came into the discussion… So in a way as far as I was concerned, it was a developmental process where I began to see the affordances of the technology, and then one was able to work with those affordances. (P18)*

There was also a sense of wanting to make teaching interesting, fun and engaging for the teacher themselves (P1, P5, P10, P14 and P18). There were those teachers who specifically saw their use of SC as a demonstration of a personality that is keen to experiment, be an innovator or even to some extent “trying crazy things” (P2) or “troubling” (P18) conventional ways of doing things (P1, P2, P17 and P18). These teachers did not speak of their interpersonal skills but the nature of their conversations during the interviews highlighted how articulate, engaged and forthcoming they were as speakers. It would thus appear they had good interpersonal skills and were good communicators which are seen as assets in SC teaching (Ocak, 2011).

Teachers spoke of aspects of technology use which seemed aligned to their personalities or interests: P1 naturally chose to curate and share content digitally and found it easy to remember the steps involved in using specific technology features; P2 identified as a lifelong-learner, technophile and someone who believed technology was a fantastic medium to push back against changes in education which limit academic freedom in teaching; P10 liked to be organised, and as a technophile saw technology as a good way to organise one’s personal and work life; for P5 and P6 who were immersed in technology, it was not a case of whether or not to use technology but rather what technology to use and how to use it; and finally, P17 was academically focused on poverty alleviation and saw ‘digital poverty’, both in students’ lives and society at large, as a key disadvantage to be addressed via digital literacy which she viewed as a key component of any curriculum. In all cases, however, these teachers stressed that their focus on enhancing learning was a greater driver than their passion for technology.

Some participants spoke specifically of the decision-making process they engaged in when choosing to use SC: P1 weighted the benefits and costs both in terms of work life but also the potential impact on her personal life; P4 suggested that initially she was not interested in using SC as there was no need, however when class sizes increased it became strategic to move to technology use (Moodle); and P8 was a very “face-to-face (F2F) teaching person” so use of any technology was not a preferred mode but SC was used because of the challenges it solved. This sentiment was echoed by P14 and P15, who were hamstrung by the operational challenges around creating course packs of photocopied materials, posting effective notices via email and large undergraduate marking workloads. P15 provided a slightly different perspective when he suggested that non-participation was not necessarily an "active resistance" to use of SC but was rather because there was no imperative need to use the technology. In his case, he did not engage with SC until he had completed his PhD as he required time to learn how to use the available features of the chosen technology.

There were hints at the potential professional risks teachers faced in terms of protecting their privacy and the privacy of students when selecting platforms (P2). In addition, junior teachers may need to navigate a contentious implementation space when their views of how SC can be used in a shared module are different to the static, content-focus of a senior teacher (P17). A major cost incurred in using SC, stressed consistently by the majority of teachers, was the amount of time such an initiative requires. This was explored in more detail in later analytical chapters where the personal cost in terms of work-life balance, stress, and potentially giving lower priority to other academic responsibilities such as research productivity, may take their toll. Teachers acknowledged that this was an active choice they made, for example:

> *But I just think that for some people it might be more of learning and then you'll be more willing to put emphasis into the social space. Whereas if it is about cutting teaching down, then it becomes a replacement for handing out stuff and it becomes fast assessment, and being able to administer the module in terms of students and… So those are two very different motivations, they can very well overlap but that determines not just whether or not you use it , but how you use it. (P1)*

> *So for me it's a case of how much time can I employ in all of this and I definitely have a sense that using social media, using the social computing, engaging students in this way demands more of me in terms of time. I think that's a very strong aspect to it. I don't see using these kind of engaged forms and forums as helping me spend less time on a course or somehow freeing up time. I think it actually consumes more of my time when I do it that way. (P5)*

> *But anything that is more interactive and also takes work away from me as well. You know that I do not have to do marking, like MCQ marking. I would appreciate it. (P14)*

> *So I then made huge amounts of work for me and everybody else in the way I do, by saying let's have some authentic research and authentic assessment. (P18)*

6.3.2 Academic factors

The academic factors which can influence teachers' use of SC were varied. They included the teacher's academic identity, pedagogical and academic discipline factors, potential negative influences teachers feel SC may bring to their teaching, as well as the role of SC in learning and students' experience.

Teachers' academic identity was not directly interrogated during interviews but was rather inferred based on their comments. In a few cases they used explicit, descriptive terminology to explain their position. All eighteen teachers spoke of the need for social interaction as a fundamental part of the learning experience. They used terms such as 'conversation', 'dialogue', 'meeting space', 'collaboration', 'discussion space', 'shared experience', 'social construction of knowledge', 'engagement' and 'establish a community'. They also shared views of their roles as teachers which involved a sense of a greater responsibility than merely ensuring students gain content knowledge. P1 suggested that students also need to learn how they will need to be in the world; they need to become the professionals who not only have the 'knowledge' of their discipline but also the experience of the 'knower' or practitioner. P3, in the discipline of Public Governance, also suggested that the lecture, or discipline content, was almost the absolute minimum of what students need in their learning:

> *I need to be creating leaders… I need to be creating critical thinkers. I need to be creating people who think out of the box. I need to be creating people who understand that there are a lot of different cultures and perspectives and types of people all over the world and that they are to become a global citizen. And as a global citizen they are not just supposed to tolerate all these differences, but embrace them and even learn to celebrate them and that they have to be able to negotiate divergent perspectives, because people think differently. That's part of being a human being. And that as public sector employees they have to be able to make rapid decisions with incomplete information because in the public sector things are changing every single day and they have to know where to go to get information. They can't pick up a textbook or look on a slide … they have to know where to go to get the information or who to talk to, and how to articulate questions that are going to give the answers in order to get to where it is that they are trying to go. (P3)*

This concept of an 'authentic' education, experience and use of technology, was pervasive in the interviews. Key to this authenticity is teaching and learning which is student-centred, that aims to motivate, engage and stimulate student involvement and thought creation. Flattening the power structure in the 'classroom' allows students to share their 'voices' and take ownership of their processes. Students are encouraged to find relevant material, share their experiences, develop their own informed positions on topics and be able to develop and present arguments in support of this position.

> *Dante's Inferno, because I feel that we can all relate … We all know somebody who's in hell. I found that there is a PlayStation of Dante's Inferno… so we do listen to that one but it does not follow closely to the original. No, not at all. But so we find others, they also help me to look for other information on and they are very happy to bring it in. They are excited to find anything that is grotesque because that is what hell is all about you see. (P16)*

> *It was part of our introduction to argumentation and critical thinking. It was quite fun, novel, troubling way of doing it. And I opted for 'troubling' because I thought if people felt a little bit uncomfortable about what they were seeing it wasn't a bad thing because it sort of motivated dialogue. People's deeper feelings were engaged so it became important to put forward your point of view. (P18)*

In many instances this required teachers to use creative and innovative ways of introducing content and activities. P3 used problem-based learning whereas others based their teaching on a critical pedagogy (P2 and P11). P16 found it liberating to have a smartboard available in her classroom as this allowed for collaboration using SC such as YouTube in a face-to-face environment. P5 and P18 both mentioned social constructivism and P5 mentioned the "construction of artifacts of their learning" (constructionism). P14 saw herself as more of a "facilitator of learning" than a teacher.

While discipline content influenced teachers' view of their subject and hence their view of how the subject should be taught, the operational culture within a discipline may be tinged with shades of both academic discipline cultural norms as well as behavioural or belief elements specific to the context. P1 actively wanted to discuss discipline issues in the context of available perspectives from numerous sources and provided a discussion forum for this purpose, but this seemed to have limited traction among colleagues:

> *Person A (Senior Colleague), is very good in responding ... um…. Person B (Colleague),who now moved on to Cape Town, might respond and but is very … there might be an odd … there might be one or two others but then sort of fizzles out. It's not a discussion…but they don't have that on email either. (P1)*

P7, in contrast, spoke of a broader-based consensus around recurriculation which spanned numerous academic disciplines and focused on the development of a team-based, learning themes approach to the curriculum. Operationally, this would mean numerous disciplines would teach to an agreed upon theme to provide a multidimensional perspective of the theme. While not specifically stated, this initiative appears to support a community of practice approach delivering on a shared common goal. Throughout the discussions with Health Science participants, this fundamental norm was evident as an undertone, even when there were differences of opinion on specific matters.

Participants also suggested that the nature of knowledge in their discipline may play a role in their view of the role of technology in teaching. P1 suggested that a focus on the discipline content (knowledge code) rather than the experience of the professional (knower code) may impact on how the role of technology in teaching is viewed. P5 suggested that universities privilege the discipline expertise of an academic over their potential to share that knowledge and teach. There was no educational qualification required of an academic at UKZN to be allowed to teach in their discipline, other than being an expert in their field. As a case in point, even lecturers in a technology discipline (IS&T) were not seen as focused on the use of technology in their teaching (Singh & Blewett, 2003). In the Health Sciences, however, the knowledge was seen to change so fast that it was critical that practitioners use technology in order to remain current in their field. Academics in this area thus saw the use of technology, and the embedded development of digital literacy as part of teaching (P10). It appeared this perspective had some critical mass amongst health care disciplines at UKZN which may play a key role in the use of SC in teaching.

Participant comments suggested that the institutional LMS (Moodle) was not seen as a fundamental part of teaching. On her campus, where the discipline focused largely on postgraduate, part-time teaching, P1 found there was no formal LMS practice in place initially. P2 also suggested that his colleagues misunderstood the interactive potential of Moodle and rather focused on its use as a repository and notice system:

> *I had no idea of them (LMSs). You come into a space and there is like a kind of practice in place and 'This is how we do things' and it [use of an LMS] was not something that was explored here… partially because we mostly have part-time students with very limited access to computers, so it wasn't even discussed. (P1)*

Almost all of my colleagues use Moodle exclusively for posting lecture notes and I think that's fundamentally to misunderstand what Moodle is. I'm interested in using it as a kind of as an interactive platform but also as a kind of a node of, linking things, and pointing people to things. (P2)

The role of students was essential to teaching, as their active participation was necessary for 'teaching' to produce 'learning'. If students choose not to engage then learning does not occur (Timmis et al., 2010). The drive to capture students' attention was the reason teachers focus on those software applications they perceived as most often used by students.

I think it is the whole social network thing, it's the Twitter, the email, the Facebook, you know that's the way this generation, … the millennials, that's how they work. It's social networking, that's their life, you know?…. So I want to meet them, I want to get into their life. (P3)

But they are able to send me a message and say 'Oh mam, what did you say that book was'? And it does not matter where I am. Thank God for Blackberry. Even when I'm chopping my vegetables I'm able to respond to them and say 'That book is on such and such a shelf in the library, talk to so and so, you will get it'. That kind of engagement; very quick, very easy, very accessible. And that has really been the joy of Moodle. Being able to communicate with my students almost on a one-on-one basis. (P4)

Now to me that's where social computing almost hits like a sweet spot I suppose. Because the way it's being used socially, if we take it totally out of the academic sphere and … the way it's being used socially; it is almost an embedded mode of operation for a lot of young people. Maybe not all, but there is a lot of that, and that it is a form of expression and it gives voice. (P6)

A key advantage of technology is its ability to improve the efficiency of a process. All teachers reported its efficiency at providing access to lecture notes and materials, a notice system and the marking of assessments e.g. multiple choice question quizzes. These features can allow for timely feedback on student requests for information, feedback on tests as well as responses to questions or clarification relating to content or process. Most importantly, the benefit of 'anywhere, anytime' access was useful when students could not travel to teaching centres, missed lecture content, felt isolated from their learning community or had unreliable connectivity.

6.3.3 Institutional factors: UKZN

Institutional factors may relate to operational matters or be broader issues at a tactical or strategic level. The institutional culture was expected to be pervasive although it may be experienced differentially within the institution based on implementation of policies and guidelines.

Operational factors relate to the teacher's working conditions or relate specifically to access to resources. How these were managed institutionally in relation to academics' work could be less than helpful according to P1:

> *The methods that they use to make anyone at this institution do things ... There are only carrot and stick…and preferably both at the same time; and that's not what academics are like. We don't like carrots and we don't like sticks, don't come here and tell me what I should do…you know. (P1)*

The major operational issue related to the effective use of available time. Operationally, this led to difficult decisions for teachers, potentially choosing between optimising teaching and learning efficacy as opposed to optimising teacher efficiency (Scott, 2013). This issue was introduced by P1:

> *But I just think that for some people it might be more (about) learning and then you'll be more willing to put emphasis into the social space. Whereas if it is about cutting teaching (time) down, then it becomes a replacement for handing out stuff and it becomes fast assessment, and being able to administer the module ... So those are two very different motivations. They can very well overlap, but that determines not just whether or not you use it (SC), but how you use it. I mean, that's my position on it, because that's what I see. (P1)*

This was presented as if there was one 'obvious choice' a teacher should make, but P2 presented a more sympathetic explanation of this operational decision: he captured the frustration and despondency of teachers' lived experiences, where they perhaps felt pressured to solve the immediate problem as quickly as possible so as to move on to the next issue demanding their attention:

> *... then there are the lecturers who are for the most part …… 'We're too f*cking busy to understand this thing' ... The students hound them for lecture notes and then they post the lecture notes. They've never thought what Moodle might be… It's like the students demand the lecture notes and so then they're like: So (P2), how do we post*

our lecture notes on Moodle? and I'm like: 'You click that thing there, Ok, that's it' and then they feel 'everything's cool'… (P2)

P5, however, like P1, was also frustrated by teachers who he suggested were not interested in how to improve teaching. Care needs to be taken how this use of an LMS to improve efficiency is explained. While some participants were critical of the transmissive, ritualised use of these technologies, the affordances it presented did not only improve efficiency but were empowering in terms of how they capacitated students. It should be noted that in order for technology to be transformative it is necessary to consider how it can be leveraged to improve the effectiveness of education, not just the efficiency of current processes.

Some of the participants' debates around access to resources were related to availability of teaching staff or teaching support staff:

We've stripped out, what I think is one of the core pillars of social science teaching which is discussion. I mean I don't think when you strip that out you're doing university teaching anymore. … and they have. They've just eviscerated that. We just don't get tutors anymore, we don't have tutorials … with classes of over 250 students it really is just me monologuing and that's not acceptable. So the idea of setting up these (social) networks is an attempt to make a sort of push back against that, … the loss of dialogue in the teaching process. (P2)

Many of the operational issues could be addressed by additional funding, which will be discussed in the subsequent analysis of mechanisms and processes. In addition, online platforms provided the opportunity to create reusable resources that may be applicable to numerous modules, for example, a short lesson on plagiarism was appropriate to numerous teaching contexts (P1). The ability to curate content in response to student queries allowed a teacher to make information available to a wider group of students than the person for whom the response was originally developed. This also allowed a repository of information to grow organically in response to student queries. Such repositories may be created by teachers, students or a combination of both (P1).

Institutional platforms, specifically a LMS, may be configured to ensure appropriate levels of security from an institutional cyber security policy perspective. This applied at UKZN at the time of data production. This limited the ability of teachers to welcome guest academics from other institutions and other countries, into their online Moodle classroom. P5, P6, P7, P10 and P17 specifically mentioned exploring platforms publicly available outside the institution, to provide greater academic freedom in terms of who was able to participate in the teaching and learning space. There was a difference of opinion on whether students take institutional platforms more seriously as they are distinctly separate from their social interaction spaces (e.g. P6), or if they are more likely to engage if the interaction occurs in a familiar social computing space (P2 and P5). This issue was not a focus of this study as it is more relevant to a study focused on student behaviour. Some teachers speculated that both situations could apply, dependent on specific conditions and contexts. The use of SC flattened the power structures because it felt less formal, felt more 'normal' and gave students the freedom to select different ways of working. SC is also designed for collaboration in ways in which lecture halls were never meant to be (P6).

For the widespread implementation of SC in teaching to be educationally useful, the shifts required in discipline, students, and institutional culture are significant. A selection of participant comments are provided as an indicator of the cultural context of UKZN.

6.3.3.1 Dominant culture and morphostasis

There are conventions and cultural norms which challenge teachers and are culturally reproduced and reinforced: a process of morphostasis (Archer, 1996, p. xxviii). When P1 first came to teach in South Africa, her expectation was that she would have a student audience who would respond to her questions and pose questions to clarify anything they did not understand. However, her first experience of teaching in South Africa was at a historically disadvantaged institution (HDI), where the local teacher had to explain her expectations of the class to the students. Her expectations of the class were not the same as what they understood to be normal, polite and deferential lecture attendance behaviour:

> *… and then the lecturer interrupted me and then he said' Just wait a minute.' And then he said to this whole audience: '(P1) comes from a different background and she wants you to actually disagree. If you know that it [her statement] is wrong. It's a different way of teaching you mustn't just agree'… and then he turned to me and he said 'Our students would not disagree with you because you are this big international person'. So I'm not saying that it's that extreme, right? I mean it was a very extreme situation, but I think there is a kind of … understanding of what is the (accepted) social behaviour; where we are playing up against expectations and where we'll see more and more students eventually… but it's still a battle… it's not easy to break a*

pattern of 'I mustn't pose things, I mustn't put myself out there, I must hold my'whole' back'…it's a different way, and we expect a different conduct. (P1)

This example was supported by the experience of P11:

It's quite interesting to see what the students do when they come in. So when they come in, traditionally in the beginning, they very much reflect on how they had been taught themselves. And they would say things like: ' The lecturer is the knowledge, the expert, and the learner is like a passive receiver, and education is to learn lots of knowledge'. (P11)

While this situation was changing and tended to be most evident at first-year level when students have come from more traditional and rural schools, it represented a cultural norm of teaching and learning which was the dominant mode students entering university would historically have experienced, and expect. In addition, teachers were inclined to teach the way they themselves were taught:

A lot of how we train, is also very dependent on how we were taught. Which means that there is somehow this cycle of learning that occurs. So for people that were taught in traditional classroom-based (mode) (they) will obviously stick to the traditional classroom-based approach. (P13)

They [teachers], like the students, have grown up in a certain style… They lecture and students listen, and that's what they are comfortable with so their first push out of their comfort zone was the university saying you have got to have e-learning. So they are like 'ah man, we'll have OLS… whatever… we'll have Moodle. So what do they do? Upload some slides, put up a couple of notices. Fifteen years ago I would have said to you maybe that's e-learning. Now we look at it and it's not actually e-learning. All you are doing is distributing the, material another way. It's because they are just not used to it. …I can force the students …but it's harder to force the lecturer. As a result they have a theoretical paradigm of teaching and its supported by years of them just putting overhead slides on projectors and PowerPoint slides on projectors. 'So you want me to use online? So I'll put my slides online now'. (P5)

Universities mainly, you know outside of tuts, which are typically taken by tutors not even lecturers themselves, [have lectures]….The name 'lecturer' tells you what we do. The name lecture theatres, the whole thing is designed around me lecturing. I'm not a teacher, I'm a lecturer; and that's it – I stand and deliver. So when you say 'no, there is e-learning…', then straight away I'm like'oh it's learning, well that's for the students to do - not for me?' Ok, so all I've got to do is just put up materials and they can go and learn. We are not seeing ourselves as part of the process, we lecture and they learn. If you give me a tool to help them, well hopefully they'll use it. (P5)

6.3.3.2 Morphogenesis

Change is difficult and more radical shifts can be traumatic. (Archer, 1996, p. xxiv), “as a process ‘morphogenesis’ refers to the complex interchanges that produce change in a System’s given form, structure or state (‘morphostasis’ is the reverse), the end-product being termed ‘Elaboration’”. P3 suggested that one solution when stimulating change was to be persistent and to look for small wins which accumulate over time:

> *Yeah, I do dramatic and also I think more holistic. I look at change holistically, and even though I know we can’t go from Point A to Point B overnight. But then when people started telling me things: Well we can’t do that because of this and we can’t do the other because of that, and the reason we haven’t done that is because of this, I don’t want to hear that. And so then I just go (and knock them) down like dominoes, Knock down all these obstacles and then I need to see some kind of progress. It doesn’t have to be the end result, but I have to see that something is different … see it in my eyes, feel it in my bones, other people have to see it [starts laughing]. (P3)*

But this shift is difficult and may involve a teacher having to bide their time along the way especially when not familiar with the dominant culture, as she explained:

> *Yeah, well, I did (give in at times initially). No, I gave in because of all those different variables, but now that I have been here longer… now I’ve created undergraduates who will be ready, now I have influenced my academics and several of them are incorporating elements into the first year, into the Honours, into the Masters, so it’s becoming part of our organizational culture as a discipline. (P3)*

Teachers’ choices when revisiting their pedagogy may impact the discipline content they can accommodate in their curriculum. These may be uncomfortable or even unacceptable choices for some teachers:

> *When I read about active learning techniques in the classroom, one of the things that came up very strongly is that there will be a price to pay. … As compared to an instructivist environment, the price that you pay is that you actually deliver less content. So you choose to get through… if that’s the right term… less actual little blocks of factual knowledge, because your emphasis is not on conveying that particular block … The acknowledgment in that in this philosophy you are learning how to engage with those [blocks] in a more, ultimately constructive fashion. … But then you are going to have to have a lot of stakeholders on board going, ‘so we are not going to get through the 120 sections [exaggeration] that we currently have in the module’, we are only going to get through 6o … and it’s a lot about giving them the space to experience and learn … it’s not that one type of learning is better than the other and it’s not just about the space. It is where the students are at and what the philosophy is that underpins the course. (P6)*

P7 explained how the process of change she began in Pharmacology has had knock-on effects which ripple outwards into other disciplines, programmes and extension initiatives. Her decision to secure funding for her project and determination to stay the course despite the challenges, resulted in the motivation threshold being reached where it became easier for other teachers to participate and expand the zone of influence of the initiatives (Repenning, 2002):

> *When I came here technology wasn't even on the chart, they were using OLS … and so nobody in this school, discipline or any faculty had any idea about it. Nothing, not even as storage aspects. So when I first mooted that this is what I would want to do, that is a post graduate programme, you can imagine the consternation that caused. But you know it is amazing how it has changed in the last couple of years. Since the programme has run, more and more people are coming on board, more and more people are seeing the need. Optometry in fact is supporting a lot of universities all over Africa, so we are actually using our Health Sciences to credential staff all over. We're thinking (and) talking about sharing resources and content and so forth, so they can teach stuff there as well. It's becoming bigger than I expected it to be… (P7)*

> *So it's been ... it's been a hard struggle to get here. I mean … I had three years when this was under accreditation, both at University and at HEQC level where I really had to fight the fight. (P7)*

SC should not be seen as something 'added on' to teaching. Any use of technology should be driven by the pedagogical aims of the teacher. A change in teaching requires that students be prepared for, and supported through this shift as part of the morphogenetic process. P5 explained his pedagogical approach and how it was practically implemented for his students to understand the experience they could anticipate:

> *I'm going to explain (the process to students)… I believe, and I espouse, I experienced a social constructivist style of learning. They have not experienced it, not that they know (anyway). They have experienced it; I believe they learn like that as children and they learnt like that at preschool. But it's been a long time. They learn like that informally. It's how we learn: How do you learn to use a cell phone? How do you learn all sorts of things? That's how they learn, but they don't associate that (with learning) the moment they walk into this university. This is like school and here you only learn a certain way. And so to do that mind shift, that paradigm shift, they do have to track with me on that as well… I want them to understand that if they buy into it, and they want to benefit, they will have to put effort in. I explained that if you put effort in… spread out, not a huge amount… you will benefit. Again I'm telling them that and I believe that some will and some won't. (P5)*

6.3.3.3 Elaborated culture

Through a process of morphogenesis, social interaction can result in a change that transforms the sociocultural space (Archer, 1996). A challenge for those driving the shift to use of SC in teaching was the potential for the misappropriation of an LMS and SC in ways which are detrimental to the advancement of meaningful, student-centred learning. This form of elaboration was observed by P2:

> *Well, clearly Moodle was designed with a higher goal in mind. I mean there's clearly a notion of constructivist stuff going on. But in fact it unfortunately works very, very well for lecturers that have got large classes and very, very bad students who hate education and are simply trying to work out how to scam the system to get a degree that will get them a certain income in the future. And the way they scam that system is through this technological short circuit; Now you can get the lecture notes, you don't even have to be in the lecture, you don't have to write them out by hand, you can get them electronically and then you memorize them; point by point and in most courses that will get you 60 to 70%. (P2)*

There was thus the potential of a negative outcome with the introduction of an LMS or SC application. P15 however suggested that it was important to remember that access to resources may be a legitimate, positive game changer for students previously denied access to resources for learning. While P2 suggested that this technology could be abused, this was true of any resources made available in teaching and learning. What was more important, was the fact that this process of using technology merely for the transmission of content, could also serve as a catalyst. By overcoming the initial motivational threshold that limits teacher use of a technology, this activity moved a teacher into a teaching space where he/she was now able to consider teaching practices that may have previously seemed impractical or inappropriate. P5 suggested that teaching would experience a more noticeable technological shift when the young people who are using SC as an embedded part of their life, enter the teaching profession. He suggested it will:

> *…take a while to change: firstly, because, as I said, we don't have an educational theory training (as academics), and secondly, because that's (instructivist teaching) what we are used to. It will only change, I believe when new generations start to come through who have actually engaged-, and have been learning-, in a digital way and naturally they want to teach that way. (P5)*

When a change occurs which results in an elaboration, or changed form of the sociocultural space, there is a potential impact on the student as well as the teacher. The teacher may choose to be intentional about creating the opportunity for this change in students. P2 saw this objective as his key focus, with the content he taught merely the vehicle to achieving this end:

> *And part of doing that is to make them much less of a victim in class, so that they can actually be humans in a lecture theatre. That they can actually feel stuff and think stuff, and express stuff and ultimately, I suppose what I'm trying to do is to reach the point ... It's a double point: a) where they trust themselves to have reactions to things and b) where they realize that ideas are absolutely the most powerful possible tools in the process of being able to resist their own dehumanization. And that's why being at university is actually an interesting thing to do at a certain point in your life and that's it. That's what I'm trying to do and that, I teach on specific topics. (P2)*

This process of affecting change in students' world view was also mentioned by P6, P10, P11, P12, P17 and P18. Students and other teachers may not see the change in the same terms as P2, but a change in their positioning within the class in relation to the teacher, their peers and the content can equally illustrate how these shifts occur:

> *My group is highly skilled ... they are in the healthcare sector, so their access to computers/ technology is not a problem. What has been interesting is to watch them: When they started the online programme they were very uncertain about it because it is the first time that they have done continuous assessment, ... worked on distant technology, ... are not having someone in class. So the first couple of weeks it's very hesitant with them. They engage with me by email, very few of them are competent enough to put stuff up on the support discussion board. I always respond (to any query, including email) on the support discussion board. But then strangely enough there is a kind of a switch. They start posting a question on this board, and before I can respond they are responding to each other about how they have resolved it. So, especially with bio-stats and things like that, they're working with each other, they're sort of getting around (similar problems):And how they resolve this, and can somebody send me that… or anything of this sort. (P7)*

6.3.4 National (or global) factors

There is a national and global imperative to cater to increased demands for access to HE (Wolhuter, 2014). This challenge of massification of HE was mentioned by P1, P4 and P15. Meeting the need to develop students with 21st century digital skills such as computer literacy was also mentioned by P10, P11 and P17, while P12 spoke of the need to meet the Millennium Development Goals both in terms of education and the teachers' specific academic discipline. The emphasis on students being prepared as professional global citizens, who may become economically active across the globe during their professional lifetime, was highlighted:

> *Maybe it's also that on some level I get irritated when I go around the world and people think 'Africa that's like a dark hole … no knows anything there'. I get really annoyed. I say 'oh no excuse me we also know … we are on top of all these things'. And in fact we're probably more ahead of you on this at a certain level. Part of me also wants to make sure that I am not giving my students a third world education. You know they need to know what's happening in the rest of the world because remember the rest of the health care providers are very fluid they move around the world. I don't want them going in the first place; but if they do have to go I don't want them to not have been prepared for what's there and I think nowadays if you don't know how to use stuff you are almost handicapped. (P10)*

While there is a need for UKZN and its students to be competitive on a national and global scale, P2 suggested that there should be a critical element to education which challenges that the main purpose of HE is to 'produce' graduates who think in a specific way, to serve society and the economy in a predetermined way:

> *I'm interested in teaching because I'm interested in challenging the kind of cultural fascism that is at the heart of South African society… And that education tends to be a really important part of replicating that, and the idea that students are supposed to subordinate themselves to this knowledge, and you're supposed to organise the teaching experience around getting them to kind of negate themselves and submit themselves to that kind of thinking. (P2)*

Finally, from an environmental perspective, P14 and P15 emphasised the reduction of photocopying course packs of materials which has a positive impact on the reduction of paper use, and hence the depletion of natural resources. P1, P7, P10, P11 and P12 mentioned the benefit of reducing the need for students to travel and hence reducing travel costs and their carbon footprint.

6.4 The reasons teachers provided for why social computing was not used in teaching

This study focuses on those teachers who use SC in their teaching, despite the challenges experienced. In addition to these teachers discussing their own challenges, they also provided insights into the challenges they suspected may be limiting further participation from their colleagues. This different, but closely related perspective, provides insight into challenges they may themselves have experienced or considered at some point in time, but which did not stop them engaging with SC. Presenting this perspective of the phenomenon can be likened to considering two sides of the same coin: a way of shifting the lens to a slightly different angle to gain an alternative perspective. This alternate lens provides additional insights into this complex phenomenon.

At a personal level, the time required to learn the applications, design activities and participate with students online was cognitively demanding and onerous (P1 and P8). This cognitive load was even higher in blended learning contexts where both situations, and the associated cohorts must be managed (Bower et al., 2014). In addition, there was the natural resistance to change (P11, P12 and P15), especially when classes were small and social construction of knowledge was possible in the F2F environment (P13 and P16). Using the technology was seldom without challenges and often required technical support (P14) as well as official approval when it depends, for example, on government installing specialised facilities in its hospitals to support video-conferencing for continued professional development of its nursing staff (P11). Many of the SC applications require high-end hardware specifications on computers, greater bandwidth and enhanced technical skills (e.g. Second Life virtual world) (P10). SC applications may not provide optimal usability, for example, at the time of the study, the Moodle implementation did not allow access to any users outside the institution, thereby excluding guest lecturer participation (P2), and international collaborators may use platforms not available at UKZN (P10). Applications such as Facebook ‘lose’ resources in the conversational stream requiring a lecturer to provide an additional application to curate resources for student access (P5).

It was also demotivating for teachers to expend the energy required to provide these SC spaces, only to have students choose not to participate (Backhouse, 2013). Swimming against the stream is a challenge which may not seem worth the effort if it is not appreciated by the students who are the intended recipients. Teachers suggested that perhaps if a critical mass is reached, where numerous modules are using these platforms and students are to some degree forced to engage, this may change the tide (P13). The challenge still remained that students required extensive technical support which often fell to the lecturer if institutional facilities were not sufficiently robust to handle queries, especially outside business hours and during online assessments (P12 and P13). The student situation may, however, be complicated by the fact they were familiar with contact-based teaching environments and many students find it easier to express themselves F2F because they are second-language English speakers while the medium of instruction is English. Crafting a question to pose online was thus more challenging for these students, and much of the interaction online required a certain level of written literacy in English (P11). There was also the reporting of increased 'cut and paste" plagiarism as students were exposed to more online information and increased technical challenges when teachers required them to submit assignments to sites such as Turnitin (P13 and P14). P14 highlighted that this had, however, been a positive addition to her teaching as she had been unaware of the level of plagiarism amongst the student body before she became equally active online and required Turnitin submissions.

6.5 Conclusion

The insights into what SC was used, how it was used, and why teachers suggested they use (or perhaps why others did not use) SC in their teaching, provided some insights into SC use in teaching at UKZN. While there are aspects which are specific to the context, the issues raised were generally consistent with discussions of a similar nature in the body of literature on the topic.

Teachers used SC strategically to pursue their aims, and the institutional LMS, Moodle, was most commonly used because it was convenient and had institutional financial and technical support. In addition, it met the basic requirements of all teachers, namely the high use, low effort features such as provision of resources for student access and posting of notices. This use for administrative functions was followed by exploratory use which introduced more of a conversation between teacher-and-student and student-and-student, albeit more ritualised in terms of discussion forums and question and answer sessions. Use of conventional social networking sites such as Facebook and Twitter as well as services such as Skype were seen as providing the potential for more transformational learning. Teachers, however, highlighted that it was not the features of the application which determined the enacted pedagogy; it was rather the teacher's aim when teaching which would determine which application and technological features would be implemented. For those teachers whose use had moved beyond the transmissive, their activity design was focused on engaging students and providing a student-centred experience. The key challenge teachers face was the competing academic demands on their time that are specifically difficult to navigate because the use of SC was very demanding and required large investments of time. Student, operational and institutional challenges in the use of SC, which is not the teaching norm at UKZN, increased the issues teachers have to battle with on an ongoing basis when working in these spaces.

7 Individual factors influencing HE teacher use of social computing

> *There ought to be ways for us to understand how human events and meanings, actions and intentions, are chained over time, as sticky and disorderly as they may be (Miles & Huberman, 1994, p. 146)*

7.1 Introduction

Generative structures and mechanisms are key to understanding how teachers' actions both influence, and are influenced by their context. In order to understand these processes, it is necessary to understand the actors and structures which form a system as well as the relationships which exist between them. The process of coding the participant transcripts focused on both coding at nodes (variables or entities) and on coding the relationships which exist between nodes. These coding strategies formed the basis of identifying the mechanisms operating within the system. This chapter focuses on the individual teacher who, for this study, is positioned at the centre of the institutional system. Subsequent chapters move outwards from this centre to consider additional actors, structures and mechanisms in the system who play a role in the teachers' use of SC.

Repenning (2002) modelling of innovative activities in an organisation provided Commitment, Effort and Results as the three nodes which form the basic positive reinforcement loop relating to continued individual involvement in the use of SC in teaching. An individual HE teacher's practice is however influenced by a number of different actors and causal loops. Some loops are reinforcement loops whereas others are normative or balancing loops. Deductive analysis focused initially on the individual reinforcement loop R1 which is explained in greater detail in this chapter.

This chapter first discusses the basic, individual HE teacher's reinforcement causal loop (R1). It then discusses points within the cycle at which other factors may come into play, as well as the nature of these influences. The discussion of causal loops focuses on potential mechanisms as entered into by at least one participant. They are thus general explanatory tools based on all transcripts. This means that a single participant may only have experienced, or discussed, a subset of these mechanisms, rather than having experienced them all.

Graphical and tabular representations (numeric values) are used as a point of departure in the discussion because they point to a weight of evidence in the transcripts. This is not to imply that a single specific comment could not carry more weight than numerous others; rather the intent is to provide a summative sense of the discussions of themes as well as a sense of the participants' engagement with such topics. It is hoped that this will also allow the reader a more detailed window into the data. Based on the number of coding references per participant, per node, it is possible to identify those participants who spoke most on a particular issue.

7.2 Basic mechanisms of the HE teacher use of SC reinforcement loop (R1)[4]

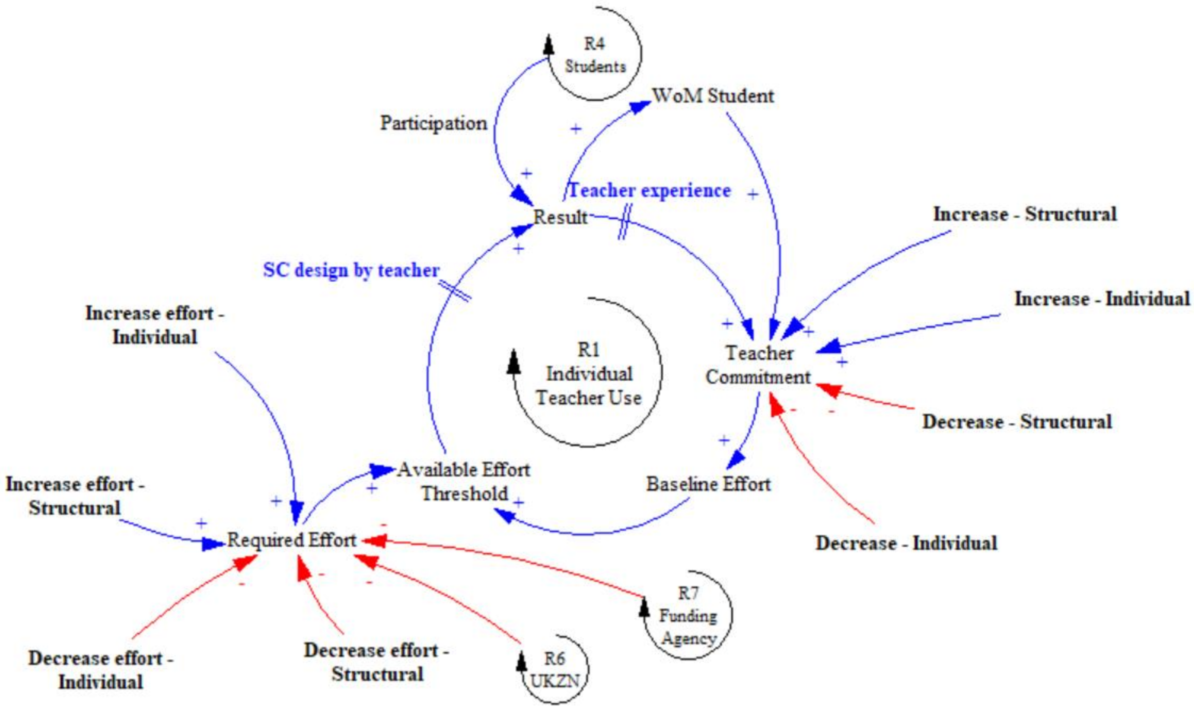


Figure 14: An overview of the individual teacher's use of SC reinforcement loop (R1)

The central causal loop affecting HE teachers' use of SC relates to their decision-making and actions around implementing SC in their teaching (Figure 14). HE teachers need to be committed to the use of social computing before they will expend the necessary effort to gain

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[4] Numbering of system causal loops is based on the order in which they were identified during the NVivo coding process.

the anticipated results. Positive results are self-reinforcing as they are likely to lead to further commitment to the endeavour. If this cycle is uninterrupted, the activity is considered to be a virtuous loop, with results improving over time. The individual teacher's positive feedback loop (R1) is used to represent factors influencing a teacher's commitment and effort to develop the SC interaction and the involvement of other role players. The detailed aspects of each of these are explored later in the text. Impacts may occur at nodes in the cycle i.e. Commitment, Effort or Result. Alternatively, there may be factors which influence the process, or flows between these nodes.

From Figure 15 it is clear that the participants who overall commented most on the basic R1 loop were P5 and P6, followed by P1 and P2. This section focuses on the basic mechanisms which exist between the three nodes i.e. Commitment→Effort, Effort→Result, and Result→Commitment. The following sections in the chapter look at the influences occurring at each of the three nodes (Commitment, Effort, Result). In terms of the weight of evidence supporting the specific mechanisms in the loop, the following was noted: Commitment-Effort (R1) was mentioned by half the participants (9) with P2 and P6 most verbose on the issue . This mechanism focused on moving the teacher from a sense of commitment to SC use, to the necessary action to achieve this (Effort). This occurs if there is an alignment between an individual's beliefs (as a teacher and individual), their motivation, and the effort required.

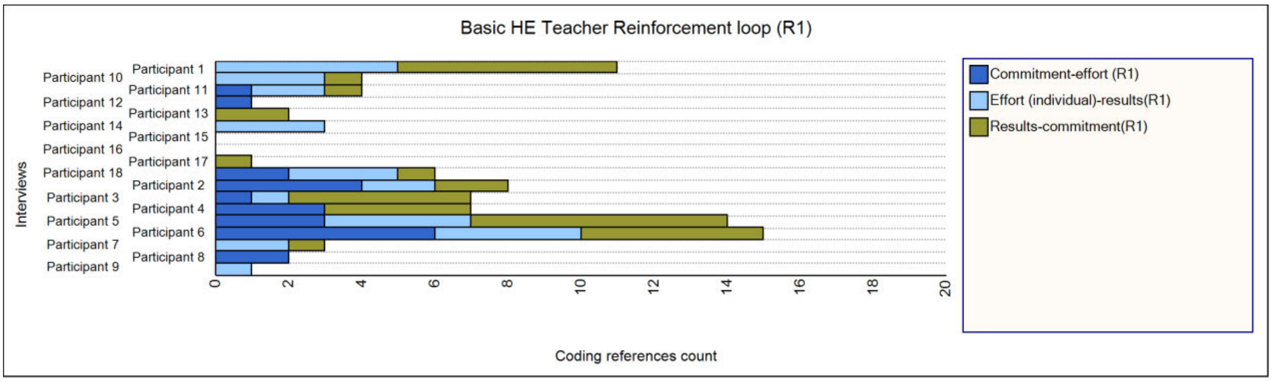

Figure 15: Basic HE teacher reinforcement loop (R1) NVivo reference counts

Meaningful work is a strong motivator (Backhouse, 2013; Porter et al., 2016):

> *Well the existing stuff was just too boring. I mean, my undergrad experience was fantastically disappointing.… It was just utterly worthless and depressing, and so I*

didn't have any motivation to replicate that. So I just teach now whatever I stumble across that I think is kind of interesting to me, and then I teach it, and the students seem to then find it really interesting as well … I don't think of what I'm doing in terms of a job, I think of it in terms of a project that I believe is valuable. (P2)

To me it's always the thing that I keep going back to, is that even before I used technology in the classroom … I was always trying to get students active in their learning … and making them design things and stick them on the wall and talk to it. So for me it was always driven from the point of view of trying to … engage the student and hear the student coming back at me, was I reaching them? (P6)

The learning result achieved by the use of SC in teaching was dependent not only on the teacher but also on the student. The position of the student in relation to the proposed technology, and the format of the proposed interaction, were important parts of the decision to actively use SC. What technology was used and how it would be implemented was part of the mechanism of moving from commitment to effort:

OK so rather than me saying you are going to use Moodle because that is institutional technology. I'd rather say I could probably do this on Moodle, I could do it in Facebook, I could do it in Edmodo, I could do it in Ning, I could do it in a multiple spaces; but let me use the space that I think will actually decrease some of your (student's) barriers, make you more comfortable, make you more likely to engage the conversation. So I am trying to listen to them at that level where they want to technologically be. Also listen to them in terms of how they are engaging and it seems to be a conversational type of engagement at the moment. (P5)

Selecting an appropriate platform, developing the necessary SC activity and engaging students to produce results from the intervention is a multifaceted endeavour. While it is modelled as a single mechanism or linkage in the causal loop, moving from effort to result may involve numerous iterations before an activity is released to students. Repetitions of this mechanism "effort-provisional result" followed by "additional effort- revised result" may form a chain of action that ultimately produces a SC activity.

Effort (individual)-results(R1) were mentioned by 11 teachers. Of all participants, P1, P5 and P6 spoke about this most. If HE teachers decide it is not worth the effort required to use SC, it does not mean they are bad teachers or do not care about their students. Non-engagement may point to a systemic challenge forcing teachers to make difficult choices (Chimbo & Tekere, 2014; Georgina & Olson, 2008), as mentioned by P1:

*We have some sense of how you facilitate the learning. We all know that it would be wonderful to do more. I haven't yet met someone who says 'I'm pretty much doing everything I think I reasonably could'. I think … naw, it's fine, I've reached 80%, and the last 20%… b*gger off, ….you know? But not in the kind of like: 'I don't care' sense, but in a sense of, it would be an enormous effort to reach the last 20%. It's not feasible and 80% is OK. But … most people I hear want to actually reach every single person, they really believe in their teaching.… (P1)*

Selecting a technology requires a change in mindset from selecting the 'best' choice of technology, to a beta-mindset of selecting a 'satisficing' technology. This is necessary because tools are published, modified and disappear more rapidly in the SC space than is the situation with conventional technology:

I don't like the thinking that says you go out and you find the perfect one and then you stick with it. To me that is problematic … things change all the time. So that ability to move between things and test them out because there might be a serendipitous element that comes into it (implied: is important). I think to me where the education plays a role is … I sort of pause on the edge of being careful to not create a cost to learning that is unnecessary. (P6)

In addition, working with technology is challenging if it is not user-friendly and the steps required are difficult to remember (Schoonenboom, 2014; Seaton & Schwier, 2014):

So again, it's too complicated, people don't want to go in, I think that that is the thing if you are not a Moodle user yourself then it becomes a hurdle. You've got to log in, you're got to go on, you're got to find the wiki and … but I notice how irritating it is that there are 6 or 7 clicks: To kind of click, click , click!! (P1)

Systemically, teachers were worn down by the demands they faced. These included demands from students:

*… then there's the lecturers who are for the most part …… 'we're too f*cking busy to understand this thing' and the students just hound them for lecture notes and then they post the lecture notes. They've never thought what Moodle might be. (P2)*

The potentially disheartening aspect is that the success of an SC activity requires student engagement without which it is considered to have failed (Scott, 2013). Students know what they expect from a university lecture, and the use of SC in teaching may seriously disrupt this norm. As a result teachers may need to make an effort to be deliberate in their introduction of the use of the technology to improve the outcomes:

They're going to say 'well why aren't you standing here and giving us lectures in the traditional way over all the six weeks so that we can not-attend?' So I want to explain to them that this is the approach, I want them to understand that there is a plan here. I want them to understand that there is a development of their knowledge. I want them to understand that if they buy into it, and they want to benefit, they will have to put effort in… and I believe that some will and some won't. (P5)

For my current honours course, the encouragement was a simple form of you will post one comment per week as a DP (Duly Performed) requirement, so it's just the law. I mean if you aren't engaging in online discussions, you aren't meeting the course requirements and you're out, so that's the one way of doing it. I haven't tried that with the undergraduate group partly because policing it would be too difficult … I work in a department where the classes are quite big. (P2)

They did [engage with the online discussion]… It was quite a fun, novel, troubling way of doing it. And I opted for 'troubling' because I thought if people felt a little bit uncomfortable about what they were seeing it wasn't a bad thing because it sort of motivated dialogue. People's deeper feelings were engaged so it became important to put forward your point of view. (P18)

The final mechanism, which closes the positive reinforcement loop is the link between results and commitment. Results-Commitment (R1) were mentioned by 12 teachers with P1, and P3 through P6, speaking extensively about this mechanism. Active participation in SC activities increased teacher commitment to modifying and enhancing the activities during a project:

…well, the more things are being used, the more I do that (change things along the way). I mean I also need my motivation. (P1)

It's nice when somebody says 'I enjoyed that' or 'I think you are a good teacher' obviously … I don't feel that if students never say that directly to my face that I'm a lesser teacher … To me the validation, … If you can see it in an artefact then that's almost is like…. A trace that shows that something positive did happen for them. (P6)

So in a way as far as I was concerned, it was a developmental process … My primary thing was let's try and be authentic. Let's get feedback – that would be good. But then when you actually saw the way it worked, it was very exciting. I mean that definitely, it was the technology that enabled those things. (P18)

If student feedback via word-of-mouth (WoM) was positive, this also positively influenced teacher commitment (discussed further in R4).

Teachers also spoke about the feedback cycle between face-to-face (F2F) teaching and the online space. UKZN is largely an attendance university so in the majority of cases where SC is implemented, it is in a blended learning environment.

> *When I started out I had a plan of how I think they are going to interact, but how I think they're going to interact and what works for the students, might be two different things. … but then I'll see what happens in a discussion online and then I might restructure what I would have done in a lecture based on some the things that have come up, on the discussion, you know, about where they might be weak, about what they might misunderstand. (P3)*

But similarly, negative feedback may reduce teacher commitment.

> *Set it up, extra readings so that whoever was researching each little aspect, they could put extra readings up and stuff, and two or three of the external people got all excited, …wow…you know? We had one sitting in America in Texas, ja this was great ….and then nothing happened. People didn't use it, they still would go … to email. So I thought it was like an exciting space, but then when I see that putting stuff on doesn't go anywhere… (P1)*

One of the most challenging aspects was that results were unpredictable and could vary from year to year:

> *But also – you see this is one of the very strange things – it's insanely variable. Sometimes I'll go in and I'll do the exact same thing that I did last year, and nothing will happen, like there will be zero discussion, and the next year I'll be the same person saying the same words in the same room and it will just go crazy, and everyone will be like on board and go krrrrr, and there'll just be this noise of traffic of discussion threads, and it's an autonomous thing. It's like 'aarrghhh'…. (P2)*

The three remaining major sections of the chapter discuss the factors influencing the node variables of the R1 loop, namely: Teacher Commitment (7.3), Effort (7.4) and Result (7.5).

7.3 Teacher commitment

HE teachers' commitment to using SC in their teaching may be influenced by numerous factors. Influences may be positive (increasing commitment) discussed in section 7.3.1 or negative (decreasing commitment) discussed in section 0. Figure 16 provides an overview of the factors influencing teacher commitment to SC use.

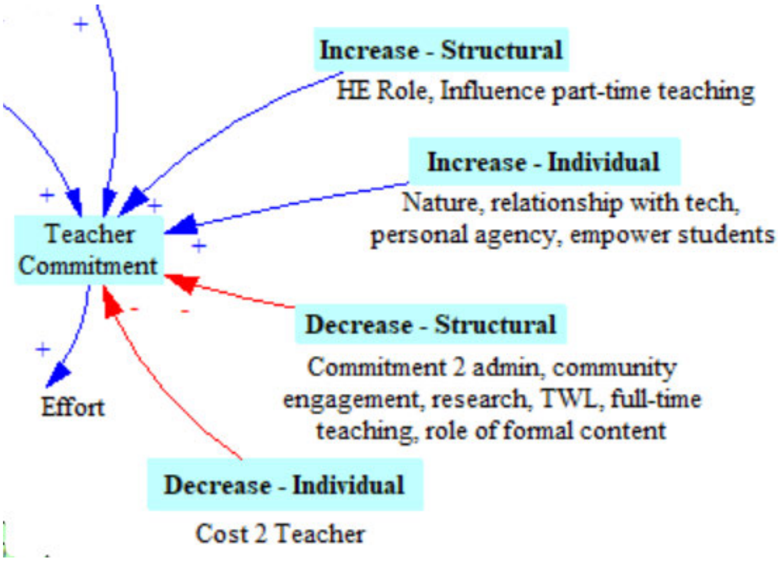

Figure 16: Factors influencing teacher commitment to the use of SC in teaching

7.3.1 Factors increasing teacher commitment

Positive influences on Commitment can be structural or personal (individual). There were six factors that increased HE teachers' commitment (Figure 17). Identity factors were dominant i.e. a teacher's nature (light blue) and their relationship with technology (khaki). Student empowerment (dark green) was also noteworthy.

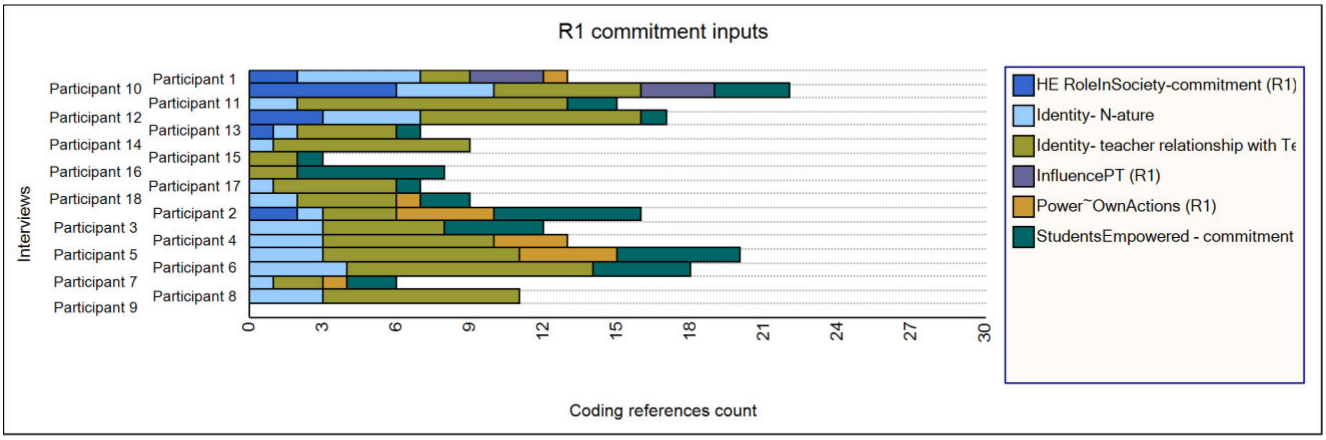

Figure 17: Positive inputs to teacher commitment

The role of general HE factors and a largely part-time teaching load were structural influences that increased teacher commitment. A teacher's nature, relationship with technology, sense of personal agency and the empowerment of students were positive, individual influences on commitment.

7.3.1.1 Higher Education role of teacher

From a structural perspective, teachers may feel committed to using SC if they feel the use of computing is a fundamental skill which the HE sector should provide to students. By committing to using these platforms as part of their teaching they felt they were meeting this need.

> *You can't be a health care professional and not know how to access information … the object that's standing between you and that knowledge is your computer. You can't be somebody coming out of a university and not be able to know about all these things. I don't think it is right for us as teachers to be doing that. (P10)*

7.3.1.2 Part-time teaching workload

In addition, if the teacher had a teaching workload which predominantly consisted of part-time teaching, it provided them greater flexibility in their workday that may lead to a commitment to explore alternative, innovative teaching practices such as the use of SC (discussed by P1). The impact of full-time or part-time sessions on student participation is discussed as part of the student reinforcement loop (R4) in Chapter 8.

The structural influences, however, received relatively limited attention, jointly representing only 10% of the comments related to input commitment factors. While relative emphasis within this data is discussed, care must be taken when interpreting these results because relative levels of importance may be particular to the sample of participants and may present vastly differently in another context.

From a more personal perspective (see Figure 16), the commitment to innovating with SC was enhanced if teachers saw SC use as aligning with their identity i.e. part of their nature, or their relationship with technology. This was also the case if they had the personal power to arrange their responsibilities so that they could commit to the use of SC and if they viewed the use of SC as empowering students. Of these personal factors, extensive commentary relates to the two nodes associated with teacher identity, namely, a teacher's nature and their relationship with technology. The third node receiving significant commentary deals with SC use in teaching as a mechanism for empowering students.

Identity related aspects represented 65% of the comments on teacher commitment: 18% relating to N-Identity (a genetic or intrinsic part of their nature) and 47% teachers' relationship with technology (Figure 17). The data however contained an inherent bias: as all participants used SC in their teaching, it cannot be assumed that the absence of these stimuli would reduce a teacher's commitment to use SC or that participation would be increased by facilitating these stimuli. This would require a research study of a different nature.

7.3.1.3 Teacher's nature

N-Identity (Nature) refers to aspects of identity over which a person has no control and which exist "as a force of nature", such as male or female (Gee, 2000, p. 101). People may however self-identify something as "part of their nature" which is an aspect both predetermined (genetic), as well as a socially-constructed aspect of themselves which they see as predetermined. For this study, teacher's own identification of something that is "part of them" was used as the criterion for determining N-identity. N-identity comments represent 18% of the comments about commitment inputs.

Participants pointed to being inquisitive, with a passion for their field and trying to avoid being bored with their own teaching (Ng'ambi, 2013). As such they could be typified as highly engaged participants who take themselves and their responsibility as teachers quite seriously and as an active challenge to their abilities:

> *But I hear people say some of the same to me, it's just like well, where do you get the energy? Because I get passionate!! And so does Participant 14, she just… her passion then lies not just in the learning but she's teaching environmental stuff… So we all have different passions. (P1)*

> *But I don't want to do it (a specific module) and no one else wants to do it. So OK I'll do it. So I need to make it interesting for myself … It was only this year when I now got it back again and I'm like 'I can't bear to do it the same way again'. I'm trying to innovate on the engagement of it. (P5)*

> *… it's already embedded within myself in trying to better understand, in future, how does one engage with students at this level and at their digital level of literacy. (P17)*

There was also a sense of order and purpose, as well as a sense of deliberate actions designed to provide structure, direction and support for themselves and others, in the following comments:

> *I'm actually on a personal level, I'm strong in constructing scaffolding. I'm quite, you know I can look – I mean it's probably my general strength in most of my work that I do is that I can see structure. [Comment on previous employment requested to be excluded.] So what I do often times if there's masses of work, is that I try to create structure for the students. (P11)*

> *And as my want is, I must be a very awkward person to employ, because I immediately revamped the terms of reference. Because to me there was no point in doing something that didn't involve real development in critical thinking. (P18)*

Participants also spoke of the role of personal values:

> *I was brought up that if you hoard knowledge that you're actually wasting it, because it doesn't go to anyone and it dies with you. If you share knowledge, it grows, multiplies and expands. The more you share knowledge, the more you gain as well … So it has always been part of me. (P7)*

Participants thus self-identified as being inquisitive and passionate about teaching. They saw it as important to provide structure and scaffolding to students and focused on deliberate action that was value-driven. At times these drivers may even work against the self-interest of the individual, demanding more of them personally than was actually reasonable, for example:

> *So I then made huge amounts of work for me and everybody else in the way I do, by saying let's have some authentic research and authentic assessment. (P18)*

7.3.1.4 Teacher's relationship with technology

The teacher's relationship with technology was discussed by 17 of the participants, and these comments represented nearly half (47%) of the comments made related to commitment inputs. Table 8 provides a quote per participant, which can be seen to provide a key insight into how each participant related to technology. In many of these cases, participants made numerous references to their relationship with technology; however there were no cases where the comments showed evidence of personally, conflicting views of technology. All comments were internally consistent to each participant.

Table 8: Participants' relationship with technology

#	Quote: Teacher relationship with technology
P1	So from having been a computer buff in my early life to now being like the last wave before they throw me off the train. There is clearly a desire to not become this antique thing in the cupboard, --- but there is also the curiosity about I wonder what this can do?
P2	I'm a bit of a technophile, --- I was one of those sort of earlier adopters of the horrible open learning system (*OLS*) ... I wouldn't dream of offering a course without a Moodle module.
P3	When I came into school, (*returning to study at a USA college*) after being away for so long --- The students say this old lady she don't know what the ;-) ... She need some help here!! But now I can't imagine teaching a module and not using Moodle.
P4#	You are putting yourself out there. It's not so much that I resisted the computer. I'm not technophobic, I quickly take on things--- I'm putting out ideas that could come back at me; I need to be very, very comfortable with that.
P5	From there, especially once the Net came online I'm constantly looking for what's happening, you know, what's the next big thing, where are people learning, what are they doing? I love technology, so that's a bias that comes into it.
P6	So that ability to move between things and test them (*applications*)--- the idea of 'working in a beta-world , in a beta-space' (*ever changing tech*) really sort of gained traction --- It was actually that the nature of computing had shifted such that you could work like that
P7	My advisor was running and coordinating on-line programs--- he offered me the teaching assistantship that went with that, so I taught his one module for three years --- But I think that was my first exposure; both as a student and both as coordinator.
P8*	I think it is terribly exciting and I think it has got enormous potential but I am still very young at it; but being old, I am also you know kind of still getting into that kind of technology
P9	*Called into P8 interview, limited input overall- no comment on relationship with tech*
P10	it doesn't make any sense to me to not be making use of these amazing facilities that we have. I mean I am very into all the gadgets, I would have a whole wheel barrow with gadgets following me.
P11	there has to be a pedagogical model underneath using technology in education--- it's part of my creating; ... my learning atmosphere
P12	when computers became available at home, --- and back in the day it was all command driven and all that stuff ---I just enjoyed it.
P13*	there is a component available to actually set up discussions online but --- by the nature of what I teach, I prefer the classroom discussions. I would actually like to pursue this quite vigorously in the future
P14*	I do not take easily to new technology. I am very, very resistant to new technology --- Well I think I need to decide if there is a benefit ... but I think then I need to get help in order to get over it --- but just in small bits. I use it as a resource site so I use it for putting information up.
P15*	(*Tech support*) has been instrumental in helping me to set up the Moodle site. But at the moment I am only seeing it as a supplement to my teaching. I suppose as the years go along I would probably see the potential of it
P16*	No (*I don't have a Moodle site*), because I am technically handicapped... I wish I did. They(*students*) are much better than me
P17	I've always been interested in technologies, you know, since I started playing on computers since the age of 7, so it's always been like part of me. So certainly I use it on an everyday basis
P18#	My focus has been different; it has been driven out of pedagogical reasons. And I have looked for just whatever is available that I could access, that the University provided, ... that *(also)* wasn't a bridge too far for me

* Peripheral participation; may not yet include SC # Moved beyond the periphery, not yet fully immersed in SC

Technology is not the focus

Those teachers who were immersed in the use of SC made it very clear that technology should not be the focus of the activity (P11). However, the affordances of the technology provided options for what it allowed the users to achieve (P10, P13 and P18) but this did not mean that a technological solution was the best solution for all teaching:

> *You have to be judicious that you are not trying to force technology on all content where maybe it doesn't fit. (P6)*

Teachers can totally immerse themselves in exploring the opportunities technology provides, but in this study, most teachers did not have the time to do this. The exceptions were P5 and P6 who taught in a technology-related discipline. Their story summarised a historical journey that spanned approximately 20 years. It provides insight into how demanding these explorations can be:

> *Moodle came in when we had already decided that OLS was sort of getting a bit rocky and wasn't being supported that well. Because we are continually using technology we tend to be pushing quite hard. So I think when we use a space… It's not just this slight incidental kind of use, it's quite focused … and we put people in and we make quite high demands of it delivering in the features that we are using. We got to a point where OLS … technically started to fall apart on us. Then we decided we can't actually rely on the institutional thing, we are going to find others (platforms). Let's go into the cloud …but we did nearly get burnt in some cases and I think we dodged those quite well … in a short space of time we went through a whole lot of platforms and tried a whole lot of things , and I think we gained a sense of confidence about what we could achieve without any institutional … And even having had experiences like 'Small worlds' where we did the assessment one week and three weeks later the whole environment disappeared… I think in that phase, for me, that's where the conceptual concretisation of the idea of 'working in a beta-world, in a beta-space' really sort of gained traction and a sense of sort of reality about it … It was actually that the nature of computing had shifted such that you could work like that too [in a beta-state rather than a final, stabilised state]. (P6)*

It is important to note however, that it was not merely a case of technological knowledge acting as the ultimate driver for SC use in teaching. Research showed that technology discipline lecturers may not use technology to facilitate their pedagogy, even though it was the focus of their discipline content:

> *I wrote this paper, [deleted to maintain anonymity], ten years ago, which was an assessment of how many IT lecturers use technology in their teaching, and it was very low. And I thought, 'Man that's amazing' and over the years I don't think that has*

changed…Which probably comes back to my first point, who are the people [using technology in teaching]? It actually has nothing to do with the discipline, it's to do with whether education is something that interests you. (P5)

Pedagogy is a driver

The suggestion was thus that the use of SC in teaching was motivated by an interest in pedagogy, and more specifically requires a paradigm of teaching and learning which is focused on engaging a student actively in their learning, in conversations and the creation of artifacts.

P5 suggested that without pedagogical knowledge, the norm for HE teachers at UKZN was that they believe that using basic online resources (e.g. uploading files and posting messages on bulletin boards) can be classified as implementing e-learning. They potentially did not realise that the focus of e-learning extended further than purely administrative responsibilities and focused on what content was taught; how specific content was taught; and most importantly, what underlying philosophy around teaching and learning was being implemented by the teacher. This was despite the fact that technological competency did play a role in teachers' identities in relation to their use of SC in teaching.

Confidence in technology competence is a driver

Those participants who felt they were operating at the periphery of technology use in their teaching (see participants marked with * in Table 8), perhaps not even totally engaged in the use of SC, clearly illustrated that confidence in the use of technology played a major role in a teacher's use of SC in teaching (see P8, P13-P16):

… but if you like technology you are more open to it. (P11)

Demographics/ culture may be a driver

However, this in itself appeared to be complex. This small sample hints that it could be related to age (P3 and P8) and the nature of the discipline (P13). A single comment also suggests race as a factor:

…but certainly in [discipline] … This is going to seem a very racist comment: The only people who have adopted it are Whites and Indians, I have not managed to get one African lecturer on board yet. (P12)

While race as a factor is highlighted here, it may be more appropriate to see this as evidence of a cultural influence of how people individually engage with technology or view teaching. The work of Hofstede (1998, 2001), for example, pointed to cultural norms of behaviour which are more, or less, aligned with dimensions of technology use in teaching. To illustrate this point, Jung and Woo (2014,9) suggested that “cultural hegemony, strong uncertainty avoidance and the centralized, directive and hierarchical structures in Asian countries make it difficult to contradict the assumptions of the group”, which they suggested favour more instructivist approaches. This may also apply to African cultures where there could be support for specific types of behaviours as a teacher, as opposed to others. Hofstede’s dimensions are however a crude analytical device as they assume a homogeneity exists in a large group of people, for example, that there is such a thing as a ‘typical’ South African person. This may be a deeply flawed argument where cross-cultural interfaces are many and complicated (Jackson, 2011). Potential cultural aspects of technology use in teaching, and elsewhere, form a specific area of study which was not the focus of this research. Such studies may, however, be of interest to researchers with a specific interest in collaborating on cross-disciplinary research.

Institutional LMS is a driver

The discussion of those who are more technology oriented has illustrated how technology choices may be based on personal knowledge, exposure to technology by others, etc. For many however, the choice was more basic in that an institutionally supported software was seen as the default option. Depending on a teacher’s pedagogy, the software which is often an LMS focused on administrative functions, may not be ideally suited to task. Teachers were however skilled at adapting things (including technology) to suit their purpose:

> *I think what I’m seeing is that a lot of people go to that (Moodle) because it’s the institutional one, because it’s the default one and because actually they are not about the technology and they are not actually interested in going to find a lot of technology. They want to be given a really good one. So their focus is really on their teaching and they know what they want to do and now they’ve got to try and like twerk and twist and bend to make the technology that they have got, fit into their plan. (P6)*

There is a potential negative outcome to this approach: P6 also noted that even if a form of technology (such as Facebook) is ideally suited to support student collaboration, a teacher may control what students are allowed to do and hence how the technology may be used. It is thus possible to take a technology designed to support SC and use it in a very structured, limiting way, which robs it of its potentially useful affordances.

Engaging with SC is an iterative process

Engaging with technology in teaching involves change and a learning trajectory. A number of the quotes provided in Table 8 suggested that engaging with SC was an iterative process, consisting of a series of decisions taken at various points in time and requiring support (P2, P3, P5, P6, P8, P13, P14, P15, P18). Individuals faced issues related to change management at a deeply personal level, as these comments illustrated:

> *When I came into school [returning to study at a USA college] after being away for so long – the students say this old lady she don't know what the ;-) … She need some help here!! (P3)*

> *Well, I think I need to decide if there is a benefit … but I think then I need to get help in order to get over it – but just in small bits. (P14)*

> *And I have looked for just whatever is available that I could access, that the University provided, … that (also) wasn't a bridge too far for me. (P18)*

Student reactions promote blended learning

Teachers also speak of how their interaction with students online encouraged them to think of ways in which technology could be used in the classroom, in a blended learning context.

> *Well interestingly, I think what it has done is it has worked both ways: because in experiencing the potential in online teaching it's brought into my own face to face teaching, the use of technologies that I probably wouldn't have done, had I not had the experience. (P8)*

P8, in Occupational Therapy, explained how she has used videos to illustrate real-world aspects of the content which have more visual impact than if they were merely retold e.g. the achievements of high-functioning amputees. The impact of multimedia sources was important because they activated the senses and created a greater sense of engagement or immersion. Because of the range of experiences technologies can provide, a teacher can use the technologies in multiple ways. Different ways of teaching may thus be associated with the use of different types of technology (Amory, 2015,10). The choices teachers make to use technology to empower students may lead to a blended learning experience rather than an exclusively online SC learning event. Technologies such as YouTube that provide a multimedia experience, while not designed initially to enable SC, can be considered to be meeting the requirements specified for this study when teamed with discussion or when used by students to present their work.

The role and use of technology in fostering a commitment to use of SC in teaching is thus complex: exposure and confidence in using technology makes a teacher more confident, motivated and committed to the use of SC, but being highly skilled or knowledgeable about technology does not necessarily mean a teacher will use it in their teaching (Singh & Blewett, 2003). A focus on pedagogy and effective teaching appeared to play a more important role in stimulating use of SC in teaching, than pure technological knowledge and skill. It appeared that demographics or cultural norms as well as the nature of a discipline may be important in selection of SC. However, many teachers do not spend time exploring possible technologies but, in a satisficing strategy, use the technology provided by the institution. Technology use was however reliant on how the teacher chose to deploy it, rather than being specifically linked to its predetermined technological affordances. Use of SC in teaching was more of a journey than a destination: choices and decisions evolved, as a teacher followed a trajectory of learning and engagement. Teachers referred to themselves in comments as returning to SC and re-learning aspects they had previously learnt, and used in their teaching. This suggests that an individual teacher was not necessarily aiming to become more invested in using SC in their teaching.

7.3.1.5 Personal agency

Personal agency relates to the ‘power of own actions’ or teachers’ academic freedom. In the following section, ‘Student empowerment’, the teachers’ decision to share such power by making choices that allow for student agency, is also discussed. (See also Figure 16 and Figure 17).

Academic freedom, i.e. the right of teachers to control their own teaching space, has long been held as central to HE teaching. However, the degree of academic freedom for academics has been reduced due to the market-related pressures of the global, new public management

(NPM) system within universities (Herbert & Tienari, 2013). Simon Marginson (2008) suggested that rather than viewing this change as a negation of the power of academics (and institutions), it is more productive to view it as a transformation process, in the Foucault tradition. He suggested this allows for a more nuanced discussion of power. While the study's breadth as a descriptive study, with attention focused on the structures and mechanisms, may limit the depth of the discussion around power, it was an integral part of the study. Allowing teachers to control how they teach and how that interfaces with other responsibilities is an important part of academic freedom:

> *Well it [class size] varies… at one point I threw such an epic fit that they allowed me to make all of my courses elective. If my courses weren't electives they'd have doubled those numbers, 400-500 Second Years, 250-300 Third Years, 60-70 Honours students, and other people are handling those sizes. I don't understand that, I don't know how that works. (P2)*

> (Researcher: You said that she then made it a requirement – almost to say Look I've got them trained, so now do it this way) *… well she can do that. Because she's the module coordinator, and she says: I'm gonna take them over at 4th year again, you better have had them organized Fair enough, I mean he's a tutor for her… (P1)*

A key aspect of individual agency mentioned by participants was the fact that they were able to share or transfer the power they inherited by nature of their organisational position. Use of SC allowed some of the control around topics and discussions to be placed in the hands of students:

> *… it may not be something that I even posted. Someone else, another student, comes and he puts in something and the guys comment like 'ahh this is amazing' or 'I don't think this should happen or blah blah blah'. On a power level it's quite interesting, you put out something and no one responds but hey they responded to the student, which I find quite interesting and I like that. (P5)*

However, there may be risks associated with handing control over to students:

> (Researcher: You were speaking about the exploding risks, and then having to mediate?) *It didn't happen a lot, but it did happen. The potential was always there … because you have a tutor very present in the classroom, whereas online everybody is kind of the same… level, together. (P18)*

Although risks may initially be perceived as greater threats than they actually are:

> *It's kind of intimidating because … you are putting yourself out … When I go to class and I'm teaching my students, I'm in control. You know? – There is a realisation … It's not as though every student in the university is reading what I'm putting out there on Moodle, or every academic, yes academics can read it but only if I allow them to come in. So the realisation that it is a defined public that I am, and should be, safe with. (P4)*

Teachers who believed it was important to allow students to have some control over the teaching space, and who thus handed over some of their power in the space, were motivated to commit to SC use because it empowered students.

7.3.1.6 Student empowerment

The fact that students are empowered by the use of SC acted as a stimulus to teacher commitment. These comments represented a little under 20% (18%) of the commitment input comments made by participants, i.e. student empowerment was within the top three factors discussed as impacting commitment (Figure 17).

Technology allowed the power differentials between teacher and student, or between different students, to be flattened, to create a more democratic space. Central to this is the provision of a platform where student voices can be heard and where their knowledge artifacts can be presented.

> *… one of the reasons is the power-distance thing [cultural dimension of technology use (Hofstede, 2001)]. People don't want to look stupid, people don't want to ask the question when you are the teacher…whatever the story. You just battle to get any feedback. There is much, much more engagement in an online environment. People are happy to engage and put things out there and ask questions and are even not so afraid of looking silly. Because it's a sort of mixture of social… and learning …and it's OK to mess around a bit. Whereas in a classroom it's a little bit more formal and it's not so easy. (P5)*

Empowering students through the use of SC may involve a gradual progression into a blended learning space which brings a form of technology into the F2F classroom as a means of transitioning from an instructivist to a constructivist (or constructionist) learning space. Once students have experienced video as a means of illustrating content they can be encouraged to use video as a way of explaining their learning or illustrating the knowledge they have gained. P16 spoke of motivating opera students and vision-casting for them, through the use of YouTube – inspiring them to see beyond their limited view of the world:

> *But they need to experience it. Let's take Bocelli (as an example). There is Bocelli … he is blind, look at him, he is there and he has made it to La Scala (Milan) and the reason why he has made it to La Scala is because 100% is not good enough, not in your field; it has got to be 110%. And you can see these kids. You can actually see their faces; they believe they can get there and you know what, if you believe you can get there sometimes you do get there. And ultimately I think that is what teaching is about, hey? It's making them believe in themselves and it does not matter what subject you teach…They do not have access to this (opera). So when I use YouTube and put on Bocelli they are literally…they are…I do not know it is just so wonderful to watch them…(P16)*

She then followed up on this experience by having them develop their own videos as part of their assessments:

> *Yes, they go even further than me, because they are much better than me, because I am actually handicapped when it comes to this [use of technology]. I struggle. They do their power point, they are amazing. You see so now you are bringing their world into your world and they are really good. Sometimes I am shocked at seeing how technically perfect they are. You know they plan, they paste, they select they…music is coming out of there and it is really very good… (P16)*

Students may also begin to see SC tools as resources which they can choose to use as part of their learning. P3 experienced a situation where a student videotaped all examples of industrial theatre (advanced role-playing approach) performed by classmates and posted them on Moodle, to serve as his study material because it allowed the content and discussions around it to be curated online.

Empowering students also involved validating their existing experiences and insights. The process of moving students from 'opinions' to understanding that there are assumptions and theories which underpin their viewpoints, and that these both have value and can be critiqued, was seen to be a key element of their education. Because students' reality was heavily influenced by multimedia and SC, using them as entry points for their learning was a common thread mentioned by the participants. How each participant achieved this, however varied. Two example events, one in Occupational Therapy (P8) and another in Italian (P16), have been presented. Other examples from Psychology (P2) and Business Studies (P18), below, show how these may share some characteristics, but in other senses were unique to the teacher's perspective and the content being taught:

> *I always launch a discussion from a movie, it's much easier than launching it from a text, because the problem is that most of them would not have read the text. … but to talk about a movie, …they do that anyway … all I do then is take the step of showing them that when they are talking about it, they're actually theorising it, using sort of implicit social theories … They really like feeling like their thoughts actually fit in, and that there is not such a gap between their ordinary thinking and their academic thinking…(P2)*

> *I mean some of the students we had [in the Integrated Business Studies module] were not used to using computers … students who came from backgrounds where computers were not a norm, were very empowered by this kind of system [multifaceted use of an LMS]. (P18)*

Another SC application which could be used for collaboration and production of knowledge, embedded in student experience was a wiki that allowed "users to interact by adding, removing, or editing site content. The most well-known wiki implementation is Wikipedia" (Ajjan & Hartshorne, 2008, p. 72). Capturing, and refining content over time allows for knowledge to developed through a crowdsourcing, distributed process (Ng'ambi, 2013). In contexts where indigenous knowledge had not been recorded, or the development of terminology in traditional languages had not been advanced, SC facilities have a major role to play. In South Africa, with 11 official languages, the potential to develop local terminology is great in those disciplines where it does not yet exist. It is also appropriate that the youth, who are entering these fields of study, are encouraged to wrestle with ways of presenting this knowledge which is contextually and socially aware, so that it can serve as an appropriate vehicle to explain ideas to other mother-tongue speakers.

> *One of the things that I'm really keen to work on is the wiki kind of thing and … to try and get a Zulu-wiki going, where the students translate key terms into Zulu, that they actually create a Zulu terminology. I think that, that's a really interesting project: To see if they can thrash out between themselves how they would explain key concepts. (P2)*

7.3.2 Factors decreasing teacher commitment

Negative influences on Commitment could also be structural or personal (Figure 16). Structurally the teachers' commitment to the use of SC would be limited by other commitments which they are expected to fulfil as academics.

7.3.2.1 Commitment to academic administration and community engagement

As in many HE institutions, UKZN teaching staff were also required to complete administrative work and participate in the structures of the institution to aid its academic functioning (Commitment2Admin): P3 suggested her responsibilities had changed as she was currently serving as the Academic Leader for the discipline. They were also encouraged to participate in community engagement (Commitment 2CommunityEngagement) and to be active researchers producing research productivity units (PU) (Commitment2PU).

P3 and P8 both felt that their students needed to understand the importance of their connection to the community as a fundamental part of their education. Community engagement was thus an important part of their commitments:

> *We need to know why? Why are things this way and what can we do to make it better, and not just that…What will make it better, how can we go research and talk to people in our community and find out what will make them feel better or make the government perform better? What do the people in the community think performance indicators should be, how will the people know if they're satisfied? So I need a student who is gonna leave my class able to do these things. (P3)*

> *What we are trying to develop with this, is that we have students that go out on a community practical …and they then do things like home visits and school visits. So you might for example have a lady who has had a stroke, who has been discharged from hospital, she has got speech problems, paralysis on the one side etc. And then a little group of students (from a range of disciplines) will go to her home …(P8)*

7.3.2.2 Commitment to research and teaching workload

The commitment to research was a high priority for academic staff at UKZN as there has been a concerted drive to increase research productivity.

> *I'm a project manager for the SARChI, the South African Research Chair Initiative, so Person AN [Senior Colleague] recruited me on a three-year contract to help move forward his project portfolio.(P17)*

…this huge thing about publications? Publish or perish. We are just not getting the time to do it. So it would be very nice for me to be able to sit here (in my office) … and work on publications and have this [Skype] connection with the students; instead of having to go out and sit in the field and wait (for them to approach me with queries) every week. (P8)

In addition, teachers had a specific teaching workload (TWL) which included their F2F teaching or full-time teaching, as well as part-time teaching and supervision (Commitment2TWL). The workload allocation model had pre-set time allocations for preparation, teaching, assessments etc. based on the official module template, and these were often seen as insufficient:

Because people are so busy and barely coping …, rather than planning creative teaching sessions they kind of revert back to just quickly go and give a lecture.(P11)

In addition, the monitoring of student activity online required effort which reduced teacher commitment to trying to use SC. The TWL model did not take these aspects into account as it was linked to a pre-approved module template that was not geared to blended learning:

I sat down to prepare for the semester and I spent two days sort of mapping out what I expected of the outcome, what are the kind of progressions in learning that I expect, what are some of the sorts of different readings … and I thought: Wow, I did that so quickly, two days and I planned an entire course. And I looked at what was allocated for preparation and it was gone … There is no understanding that formative assessment plays a role … and then the amount of time set out for marking! What is it? 15 minutes per student? That's not enough. You can't even set the exam paper… So what is the trade off? if you now begin to say …You're going to have a forum? …more work, students have journals in there? …more work, …that's, in my view, why they're not being used…(P1)

7.3.2.3 Full-time teaching workload

As already mentioned, if the TWL contained only full-time responsibilities it reduced the teacher's flexibility in terms of when they choose to engage in certain tasks. This may reduce the commitment to use of SC as they feel pressured by the need to prepare and deliver lectures.

So for me it's a case of how much time can I employ in all of this …I don't see using these kind of engaged forms … as helping me spend less time on a course or somehow freeing up time. I think it actually consumes more of my time when I do it that way. (P6)

7.3.2.4 Role of formal content

The discipline in which the teacher teaches was important, as the role of formal content, or the knowledge structure in a discipline, may make it appear less suited to the use of SC from the teacher's perspective (Arbaugh et al., 2010; Arbaugh & Rau, 2007). This reduced commitment to SC use.

> *I think there is also that perception with some people, they can't see how they can integrate it into their curriculum and some of them just perceive their course as being more clinical as opposed to…, but I mean there is always a theory side to the course. (P12)*

> *Another problem that we have specifically in dentistry is that a lot of our work is skills based, in fact all of our work is skills based, it's clinical skills, it's patient interaction, it's a lot of hands on work … Our entire programme hinges on contact. (P13)*

7.3.2.5 Personal cost to the teacher

From a personal perspective the major factor limiting an individual teacher committing to the use of SC was the perceived cost to the individual (Cost2Teacher). HE academics pay a heavy price for commitment in the workplace in terms of stress, balancing work responsibilities and work-life balance. Although academics regularly work more than a 40-hour week, this dedication should not be misconstrued as being an acceptable sector norm (Griffith & Altinay, 2020). Numerous opinion pieces published are now highlighting the mental health challenges associated with working in the HE sector (Deacon, 2018; Morrish, 2019; Personnel Today, 2013; Shaw & Ward, 2014; Weale, 2019). Teachers may thus be struggling to complete the most urgent of their responsibilities and feel that committing to the use of SC is not worth the cost to themselves in terms of anxiety and stress, as evidenced in this comment below.

> *But I almost see it like part of my brief when I'm teaching to actually engage them, to catch their interest. So I do see that element that it is up to me to spark interest so when you say 'but don't you think you can use it to spark interest' … yes I do think you can, but I have an intrinsic sense that it's going to demand more of me to actually foster the engagement. (P6)*

While teachers used a variety of strategies to meet these kind of challenges, the majority did not accept the corporate logic which is prevalent in HE (Vican et al., 2020). If they do not receive the necessary supportive resources to allow them to follow their intellectual curiosity, while still retaining a healthy work life balance, they will consider leaving the institution (Griffith & Altinay, 2020; Vican et al., 2020).

7.4 Teacher effort

The effort teachers need to expend once they have committed to using SC is itself multifaceted (see Figure 18). While a teacher may have a ‘baseline’ level of effort they were prepared to commit based on their initial level of commitment, this may be impacted by other factors.

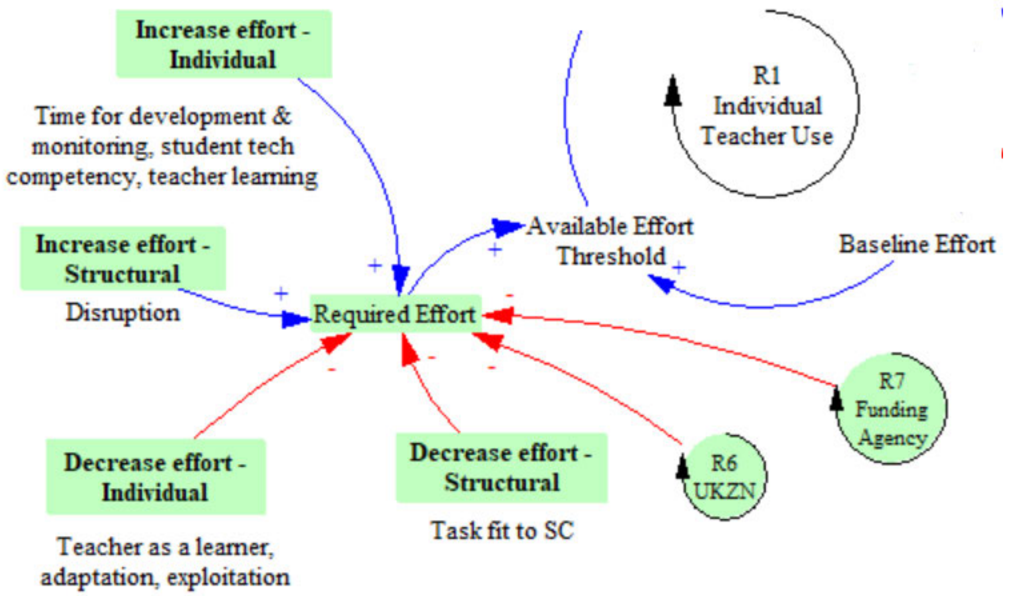

Figure 18: Factors influencing the effort required by HE teachers

The ‘available effort threshold’ of a teacher was based not only on the effort they had initially committed to, but was also dependent on the factors which impacted on this available effort. The ‘required effort’ to achieve the outcome is a primary factor influencing this threshold. The required effort was impacted by factors which added to, and reduced, the amount of effort required.

7.4.1 Factors increasing required teacher effort

The factors which increased the amount of effort required were both structural and related to individual agency.

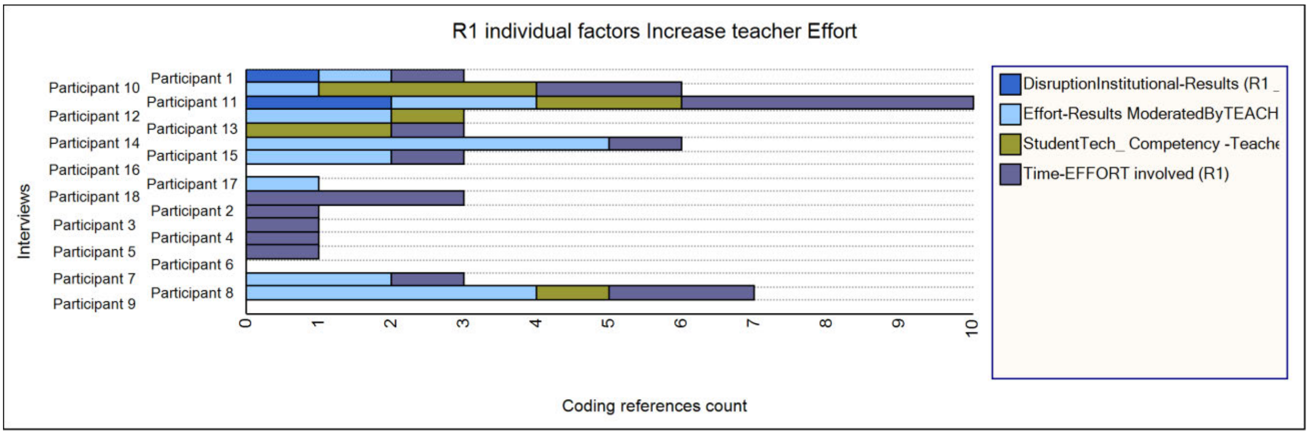

Figure 19: Factors which increase the amount of effort required

Most commented on in this section was the time commitment required to use SC in teaching (Time-EFFORT involved) in purple, as well as the impact of teachers' learning as part of the effort required to produce results (Effort-Results ModeratedByTEACHERlearning) shown in light blue. To a lesser extent, disruptions to the university's structures and operations (dark blue), as well as a lack of student technological competency (khaki) also increased teacher effort in using SC in their teaching.

7.4.1.1 Institutional disruptions

Institutional disruptions can have an operational impact on SC initiatives. Operating in a 'new' teaching space, specifically online, required alignment of structures and procedures. UKZN went through two major restructuring events within less than a decade prior to the data generation for this study. In 2004 UKZN was formed in a merger of two institutions, UND and UDW. In 2011 a revised college structure replaced the previous faculty-based structure (UKZN, 2010). The impacts of this were not insignificant as institutional structures were disrupted and office bearers in leadership positions were reviewed. The frustration and additional effort caused by this restructuring was clear in the following:

> *…it was also irritating … with the whole restructuring. Before that I had just got the Deputy-Dean to say "No, no, we are going to direct all students onto this site (implied: from both campuses)", and then it (the previous faculty) was restructured and nobody remembered…So here we go again…(P1)*

> *But it's just changed and that's where there was confusion … I used to have a much bigger role in it because I used to teach all the quantitative, but because our Faculty*

> *is split and we're no longer in Health Sciences I just do a guest lecture now … and we've tried… to get them to take back their module, because they have to…(P11)*

If there is a disruption of the academic calendar due to unrest, this influences the results achieved (DisruptionInstitutional-Results) as it reduces time available to both staff and students. This section considers the impact on teachers as student impacts are discussed under R4.

It is difficult to assess how disruption may impact the SC results: the disruptions can reduce the time available for both teaching and learning, reducing the time the teacher has available for SC as well as reducing the available time for student participation, which can negatively impact results. Alternatively, being unable to access a physical classroom may stimulate a teacher to focus on providing SC activities. Students may still be able to continue with these activities, in lieu of classroom attendance, during periods of disruption. This issue was not specifically targeted during data production and thus cannot be commented on. It would however offer an interesting area for future study in institutions where disruptions of the academic programme have occurred. The COVID-19 pandemic has created an enforced experimental space globally that will provide input into this aspect of the domain knowledge. While both a positive and negative outcome is possible (as mentioned above), the availability of infrastructure may still be an overwhelming issue which limits use of SC:

> *…it has also been disrupted by the student protests and the various things, because one or two of the students come in to sit in our LAN, to participate online. The classes didn't take place even though it could have taken place, because it would have disadvantaged the students that didn't have access to the LAN here. (P11)*

Changes in UKZN policies have in the interim also impacted the infrastructural landscape as UKZN now requires all students to have their own laptops to facilitate their learning. This programme commenced in 2016, when first- and second-year students were first required to provide their own laptops on registration (UKZN, 2015). Lack of access to a computer should thus no longer present an impediment, although access to data to facilitate an Internet connection may still present challenges for students, especially off-campus.

There are a few different aspects to individual factors which increase the effort required by the teacher. These included the different views of participants regarding the time commitment required to develop, monitor and sustain SC use and the time required for teachers to learn about the use of SC.

7.4.1.2 Different perspectives of the time commitment

The amount of time required in the effort of achieving the anticipated result may be high (Time-EFFORT involved). This aspect was commented on by 13 of the 18 participants which suggested this was an issue which occupied extensive teacher headspace:

> *But also basically it's as simple as people are too busy, they are too busy to do anything new. (P2)*

> *For my third years for first semester we used Moodle but that was probably because we didn't have time to do anything new [implied: to try alternative platforms/ apps] and I was trying to save time. (P5)*

The time required included the effort of developing the SC activity and the necessary support, such as technological orientation for students:

> *I think things are improving in our students …Having said that, I had to spend a lot of time and effort making sure that they understand the basics and have enough grounding to move … in the beginning what I do is use Participant 12 and say give them all the basics. What we were saying is that we need to make sure that we do that twice, we do one orientation and it's actually not enough … Having said that, all of these things are EXTREMELY labour intensive for the teacher. It would have been so much easier if I just sat and did my lecturing. (P10)*

This time and effort overhead also related to student technological competence. The more competent students were at using technology and the platforms selected for teaching, the easier it was for the teacher to facilitate interactions. Without this competency, students require extensive training and support which was time intensive (StudentTechCompetency - Teacher Effort) and for which there may not have been space in the programme.

> *I'm sure Participant 11 would talk to you for hours, on the huge lack of computer literacy that we have. (P10)* – and within the same discipline – *That's why I'm wanting Participant 12 to do the guidelines …because with other people, when they're new to the technology, they don't think about those things. (P11)*

> *They are actually resistant to the change in terms of their teaching or in terms of their learning but yet they are prepared to use the technology for their socialising methods? So there is that kind of mismatch between the two that we need to pick up on … [And yet within the discipline] … our programme is such that we don't have*

> *time or space in our programme to actually take the students to a LAN and then actually help to give them these basic skills to work with these websites as well. (P13)*

Effort also included the time which may then need to be spent in operationalising the activity e.g. monitoring student responses and prompting or seeding specific interactions.

> *Oh I definitely think it takes more time. It takes more time, because I have to set it all up, and then I have to monitor it and then I have to read it to see what is going on with them, so definitely I think it takes more time. (P3)*

> *I actually support my students' research … [previously] you would just* ***tell*** *people and now you've got to actually* ***write*** *"you must fix that and you must fix that" and you've got to be more specific in your writings… I've been teaching with technology for, I would say, about five years now, and I've been here for seven years… So I don't know if it is more work? It is a lot of work …(P11)*

Teachers in some cases were ambivalent about whether or not it represented more time and effort, which appeared to depend on how they employed the platform:

> *I think it needs lots of work in the initial preparation. But once you have done that and you have got the feel for it, it is kind of like an annual update you know? Revising your lectures, adding a few more you know little snippets or YouTube or videos or whatever, changing your assignments a little bit but then it does free you more. But I think …I don't know enough about it yet and that is where I might be wrong. I think once all the stuff starts coming back, you still got to mark it. (P8)*

Participant 11 was adamant, stressing that it should not take more time than classroom-based activities but her comments suggested that in reality she found herself drawn into the interaction, and spending more time on a discussion than she would if it were F2F:

> *I think it should be equivalent, but it can be, you know…I mean what I find is that I'm tempted to, like I have an idea while I'm at home, and I think, oooo I want the students to think about that! … now I would post it on Moodle…You know, then I want them to respond and then I go look and see, and then I complain if they don't respond. I think it has potential. I think what you have to have is a balance. I mean I think you can overwhelm the students as well and you can overwhelm yourself…(P11)*

Those teachers who used these online platforms to address administrative challenges were, however, unanimous in its benefits in saving time and effort. These features did not however relate to supporting collaborative, conversation-based learning, nor the sharing of student knowledge or artifacts:

It maybe takes some time in the beginning when you're starting, but once you get used to it. I mean I used to literally say 'I am leaving at quarter to two' and at half past one I remembered that I need to put a document on and within 15 minutes I used to have stuff put on and sent to students and before I can reach my car I am getting emails from students to say thank you very much for this … I mean if you look at the number of days and the kind of bureaucracy involved in that (photocopying), you need permission from nobody. (P15)

This form of peripheral participation can serve to create an inbound learning trajectory for a teacher. Specific mention was made of posting materials and notices which then led to the use of online quizzes. Alternatively, a teacher may choose to remain at a specific comfort level of technology use.

In addition to the time and effort required to develop activities, these types of innovative initiatives often come with added responsibilities:

So it's been a hard struggle to get here. I mean I won't admit it … I had three years when this was under accreditation, both at University and at HEQC level where I really had to fight the fight, and when I thought that I would have a quiet year of implementation and doing things I want? The spin-off, or the implication for me had been the fact that it has become suddenly such a thing to do, that I'm now using my time also to train other people, which was an unanticipated addition to this whole thing. (P7)

7.4.1.3 Student technological competency

The influence of students' technological competency on increasing teacher effort is discussed in section 8.2.2.5.

7.4.1.4 Teacher learning takes time

If the teacher is also learning how to develop the SC activity or is adding new aspects to an existing activity, this was likely to take more effort to achieve the desired result which may hamper the achievement of the goal (Effort-Results ModeratedByTEACHERlearning). Half the participants commented on either their own learning experiences or the experiences of other teachers that they had observed.

While it is possible to learn from the experiences of other teachers, each teacher has to tailor ideas to their own context and be clear about their expectations. This regulative discourse must be developed by teachers and learnt by students. The realisation rules are learnt through social interaction within the institution. These prescribe the expectations in a learning space as well as providing a sense of the expected identities and roles of the participants (Jump, 2011).

> *And then there's rules for how activities are being run…That the remotes sites have to function as a social group, so that within that group they can identify all the rules for group learning: They can identify whose going to give feedback, and how they're going to give feedback. (P11)*

Teachers may not understand how SC fits appropriately into an academic space if they have limited exposure. The danger is that a teacher may be seduced by the use of technology, rather than considering if it can serve a functional purpose. SC in many senses is not 'plug and play' but needs the teacher to determine the purpose for its use. Without this intentional design, SC will not achieve the desired result:

> *Now Person AD [colleague] … does not embrace technology at all… was totally taken with this thing [Skype video] … So the next time she was going to Seychelles she was like "seriously now I want to have this Skype thing on my computer'. So I said to her, "Ok I can do that but who do you want to contact with?" …"No, no, I want to contact the School". So I said to her "No but it is not that easy …you've got to choose who you want to speak to" … So we have not got quite around that. (P12)*

Individuals work at different paces and for those who found use of computers a slow and arduous process, this served to increase the effort required even more.

> *I don't battle to remember! Some people battle and some people tell me "Ag, I can't remember what to do and then it takes me five mins to sit and figure it out". So I don't battle to remember, but I think everything we do is weighing up advantages and disadvantages. (P1)*

One of the repercussions of experiencing difficulty in using the SC platform was that a teacher may arrange for the setup of an activity to be done by someone else such as a technical or postgraduate assistant, tutor or administrator. This appeared to be more prevalent in the case of peripheral participants who were mainly focused on using the administrative tools such as posting lecture slides, documents and notices.

The relationship a teacher forms with their own learning process and engagement with technology did not appear to present as discrete archetypes but rather appeared to occur on a continuum e.g. P14 operated on the periphery of the community who engage in the use of SC in their teaching but did not wish to remain in a static position. She had a clear idea of how she would like her learning trajectory to proceed:

> *And she (P1) said, basically it is kind of a matter of biting the bullet and struggling through learning how to use it …So I sort of decided to do that and I think she was the one who ran a small workshop … I feel like I am sort of stuck at one level and I would like to go further … but to go slowly through the process of doing it because I cannot deal with the speed at which Participant 1 thinks…* [And then later] *… It is almost like you need to learn a basic thing and then use it and then learn another thing and then use it. (P14)*

Learning about the use of SC was an ongoing exercise and teachers with a 'growth mindset' (Dweck, 2015; Heggart, 2015) appeared to cope with the challenges more easily.

> *I'm trying to take it one step at a time so that I solve all the problems first … So as a slow evolution I am hoping to get to the point where we do have a lot more discussion, debate, and so forth. We also at the moment are trying to put up all the recent articles and research to stimulate debate. (P7)*

But it is also evident that part of this growth process for teachers involved learning through conversation (Laurillard, 2002). While the use of SC in teaching was designed to encourage collaboration between, and with, students, the same process was noted in the teacher's learning about use of these tools. How these interactions may influence individual teachers is explained in greater detail in the discussion of a number of the subsequent reinforcement loops (to be discussed in Chapter 9).

> *But when you talk to staff … They're thinking about their own teaching and academic development. Then they want to learn about policies that are happening within the College and Faculty and things like that. So everybody gets exposed to the postgraduate and supervisory research responsibilities, but then staff will email me and ask about processes, so they want to learn about all of that as well. (P7)*

> *So the basics are there. It is when new and maybe exciting new things come in that I don't know about… So one needs to almost - you know? You talk about them. If you're talking about creating spaces and all these sorts of things, those are the things that I need to learn more about and how to use them. (P8)*

Being able to learn from others, but also to be able to embrace change, was important, as many of the issues related to the use of technology occurred during an event and may not have been anticipated in advance.

7.4.2 Factors decreasing required teacher effort

Thankfully, there were also factors which played a role in reducing the amount of effort required in developing a SC activity (Figure 18). Both structural and individual agency factors played a role in this reduction. From a structural perspective, institutional or external agency support may reduce the effort required. These positive reinforcement loops will be discussed as causal loops R6 and R7 (Sections 9.7 and 9.8) influencing the teachers in the UKZN teaching space. If the SC application was suited to the teaching activity being designed i.e. the task and the technology were well aligned, then the effort required by the teacher was reduced (Task fit to SC) (Goodhue & Thompson, 1995). In addition, while learning new skills does require effort (as already discussed), identifying as a 'learner' may assist a teacher to embrace the challenges associated with using a new application as part of personal growth.

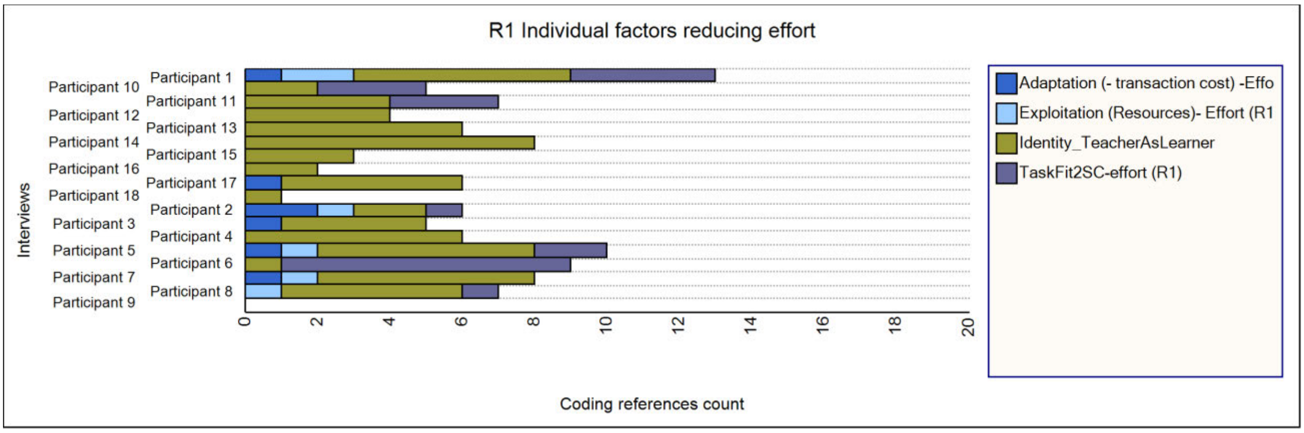

Figure 20: R1 Individual factors that reduce effort required

The perception of the amount of effort required may be equally as important as the actual effort which needs to be expended. As evident from Figure 20, of the four factors highlighted, the factor which received the most commentary related to a teacher's perception of themselves as a learner (17 of 18 participants). Teachers were also more likely to see the overall effort required as being reduced by actions which allowed them to (a) adapt existing practices or resources to suit their new circumstance and hence reduce the potential transaction costs, or (b) exploit existing resources.

7.4.2.1 Identity: Teacher as a learner

An extensive discussion has already been presented on how the development and implementation of SC activities created additional effort for HE teachers. In all cases though, participants were keen to learn new skills. This positive view of learning made the process interesting, stimulating and an experience which they actively sought. Where there were differences between them, it was how they preferred to learn, as well as the scope of the learning.

Many of the participants, particularly those who were active users of SC and hoped to extend their use even further, were self-motivated learners who actively sought opportunities to experience and learn more about these technologies (
Table 9). In many cases they also spoke of more than one platform as part of their explorations or use. This group represented the vast majority of these participants (12), namely P1, P2, P3, P5, P6, P7, P10, P11, P12, P13, P17 and P18. This was to be expected as the sample was purposive and selected to represent active users of SC, as well as those referred by the initial participants via snowball sampling.

P4's position was slightly different. She was clearly focused on specifically learning to use Moodle. She was hesitant about engaging with these tools as it was not initially a priority for her. She also had concerns related to maintaining the trust relationship she established in her F2F classroom with students online. She expressed a perceived risk to her position as the discipline authority in the teaching space because of the permanency of comments made online. This initial fear was however allayed once she realised the teaching space would be a private forum in which she would still have control and her comments would be seen by students rather than being public and available to be hypercritically assessed in the way one's comments would perhaps be scrutinised in an expert international online panel.

This is a non-trivial concern in an era where the active critique of established academic approaches to knowledge, and the rise of echo-chambers of thought based on fake news, are prevalent (Bartlett, 2015). The potential for passing comments to be misconstrued or used against the teacher at a later date, is a reality. P4's active participation was also only secured when a colleague from within her own discipline, presented herself as a mentor. This suggested that she may not have ventured into this space (at this time) if the value within her own disciple had not already been demonstrated and that a trusted discipline mentor (P3) was available.

Table 9: 'Teacher as a learner' participant quotes

#	Quote: Teacher as a learner
P1	People always say to me why do you have so much time, … I can't stop thinking about this stuff, and I think I can learn from it … I wonder if there is something I can do better? And that doesn't mean that I'm a "techno-lover" in the sense that I have to use if for everything…
P2	Well the existing stuff was just too boring … My undergrad experience was fantastically disappointing… So I didn't have any motivation to replicate that. So I teach now whatever I stumble across that I think is kind of interesting to me … and the students seem to then find it really interesting as well.
P3#	I'm still teaching myself Moodle in a lot of ways, you know… There are things that Moodle might do that I don't know
P4#	I think what I realised is this fear of putting ourselves out there? It's a natural reaction… So this year P3 introduced us to Moodle. So in that safe space I actually peeked an interest in it. I thought 'let me try it' and her being around the corner just next door to me, I thought, this is good …
P5	So I think that's been a learning experience so far as what works and doesn't work… I'm constantly looking for what's happening, where are people learning, what are they doing?… and started to look into them and try and fiddle with them
P6	I'm continually looking for ways of expanding their educational experience; … moving outside the institutional platform was driven by the fact that it allowed us to speak to so many other people and bring so many other people into our course
P7	When I went to the US … I took some courses on-line to fit my schedule, I kinda like the idea of being able to build a schedule that allows you to do stuff, because some of the modules were offered in class or on-line, and I liked that
P8*	I generally have a vague plan, but on route to getting to that plan I might do some detours and in the process you know sort of bring in other things as well… I am still a little bit inexperienced in it but I think as I develop more …it will be a wonderful way to do that (*use creative techniques*)
P9	
P10	You know you have all these good ideas? And just the headspace to do it (*indicates: is challenging)* … I think for a teacher you need to be a role model. I'm also trying to show it to them…I like to be doing things that are current… I am very into all the gadgets
P11	What you have to be is a reflective practitioner… I try to be consistent … but you've got to be flexible and it depends on how your students are doing. I've tried some things which did not work at all.
P12	I was not brought up with it (*computer technologies*). So the whole time you're having to reinvent yourself… I mean this whole Moodle thing, I do not have to take it on … But I have an interest in it…
P13*	(*I'm continually looking for*) different learning experiences and different shared experiences as well… A lot of what I found is by the way I am exploring … A lot of how we train, is also very dependent on how we were taught.
P14*	I would like to take it further but I have to do it, somebody cannot just tell me about it theoretically. I have got to actually sit there with the computer and work it out, write notes and go back to my notes. I do not remember those things.
P15*	I find that if I sit and I battle around with things… It works. … if I am stuck he (*edu-tech person*) helps with stuff and then we (*teachers*) ask around. … Not being bad to the people that were teaching (*the Moodle course*) … but for me it was not going to work.
P16*	I f I could just step down from the platform that the teacher is on, I would 'have' my students … and it works. … I am actually handicapped when it comes to this (*technology*). I struggle… they (*students*) are amazing. You see? So now you are bringing their world into your world
P17	… maybe my expectation were too high?… You just need to keep going … that whole pedagogy I was still testing out myself…I mean you're really trying to keep up with how other people are using it, and that's already a challenge because people are using it in so many different ways
P18#	At first it was the e-journals; but when I began to feel 'we really need more authentic situations in which you present your view point' … i.e. about 3 years into the module… I began developing these sorts of things (*discussions, online collaboration etc.)*

* Peripheral participation; may not yet include SC # Moved beyond the periphery, not yet fully immersed in SC

Participants 8, 14 and 15 were not actively exploring SC but were stimulated by colleagues to consider this as an option. P8, stimulated by P7, who worked in an allied health-related discipline, was stimulated to not only look at the potential offered by Moodle but also other SC technologies such as Skype. P14 and P15, both within the same discipline as P1, were more focused on Moodle as an administrative platform. Both appeared to be weighed down by the administration involved in large undergraduate classes and were particularly focused on solving those issues. P15 had however also used the discussion features in a postgraduate class. While P14 appeared less confident and more hesitant in the use of Moodle, P15 was confident of his technology skills in relation to Moodle, and was keen to explore postgraduate use further.

P16 was an unusual case: her use of YouTube, teamed with class discussion and collaboration around the student construction of video artifacts, fitted within a constructivist and constructionist pedagogy which was ideally suited to the use of SC tools. However, because she had small classes (six students), she had no need to rely on such tools for the interactive aspects of her teaching and instead had sufficient time within her F2F meetings with students, that each student's voice could be heard and input obtained. She also called on her experience with her young adult children to use contexts, technology and youth culture references to which she felt her students could relate. Even though she saw herself as 'technologically challenged', she was always learning and adapting her pedagogy in ways reminiscent of other SC teacher users. Her experiences, while not mediated through SC tools (other than for the use of YouTube), nonetheless was reminiscent of the experiences of other, more technologically immersed participants. This raises a topic for further investigation which extends beyond the scope of this study: to what degree are the factors which impact teachers' use of SC in their teaching, equally relevant to teachers using interactive, constructivist and constructionist pedagogies in F2F environments?

Participant 7 was at the centre of a learning community within the health sciences at UKZN. As such, she had mentored individual staff and provided training opportunities to scaffold academic staff use of technology in general, and SC features in particular, as part of the pedagogy within these disciplines. Previously, many of these disciplines resided within a single faculty but with restructuring to a college and school two-tier model in 2011, some of the disciplines were housed in a different college. There were, however, still numerous commonalties and intersection points which connected the community of health- and allied-sciences teachers. There may, however, have been times when this reorganisation led to operational challenges. P7 drove an extensive initiative to move postgraduate modules online and develop online master's by coursework programmes. This initiative required numerous new module templates and a degree structure which allowed the sharing of some compulsory modules, and the development of discipline-specific elective modules. As part of the preparation for this curriculation, P7 developed an online module in which the module template developers were required to participate. This design allowed them to immersively experience the interactions as students, and become aware of the challenges participants could face. P7 described these HE teacher reactions as follows:

> *They were like 'We forgot that our students that are doing this course, also are full time on other things, and that they might have to fit it in a busy schedule, so we have to understand about time management issues and be very clear about that with our students. Too, we understand how much we can put up and how much we can't, and how much we can engage with'… You can tell them, but unless they experience it, it's not going to be a deep memory for them. (P7)*

The challenges which can arise due to poor design and scaffolding thus became clear to participants as they experienced the pain of these design flaws. These included insufficient guidance being provided, managing group work and providing too much content to cover in the specified time. P8 was one of the teachers involved in this training and in her interview, unsolicited, she reflected on how she first experienced this form of online module interaction.

> *Participant 7 did that with us. What she did very cleverly … in the process of getting us to design our modules for this new masters, she made us into students. So we came in as students in the beginning, not very good students, you know what academics are like ?! … So we had the experience of a student in using all these various types of technologies which was very good for us … but I don't have enough background to use them very effectively at the moment. So I am very much developing. (P8)*

This initiative suggested an approach which may have allowed for participants with different preferred approaches to learning to be successfully accommodated: there was sufficient support provided for those participants, such as P14, who wished to gradually be introduced to tools while also being provided the opportunity to experiment with them, before moving on to the next aspect. At the same time it would accommodate people who preferred to work on their own and 'teach themselves' in the process of completing a task, such as preferred by P15.

Within the same community of academic staff, some of the HE teachers were themselves still credentialing (completing their PhDs) and thus were 'student' participants in postgraduate modules provided to support master's and PhD candidates. P7's comments suggested that those teachers engaged with the module in two parallel modes: the one as a student on the course, and the other as a teacher learning how to operationalise this mode of teaching:

> *There are some staff credentialing … But when you talk to staff, it is interesting, because yes they have that area (their research), but they are trying to learn … then staff will email me and ask about processes, … so they want to learn about all of that as well. (P7)*

The teacher effort required to produce the SC interaction represents the transaction cost. Tilly (Krinsky & Mische, 2013) described four mechanisms which are used to cope with a variety of situations: opportunity hoarding, emulation, adaptation and exploitation. Opportunity hoarding and exploitation aim to address issues of inequality whereas adaptation and emulation aim to reduce transaction costs. Opportunity hoarding was not mentioned as a strategy employed by any of the participants in the study. While P2 operated in isolation from his colleagues, this appeared to be a protectionist strategy – trying to ensure there was no need to engage with colleagues who did not share his teaching philosophy, rather than opportunity hoarding. Most participants in the study either actively or passively (in the case of P16), tried to engage their colleagues in their endeavours, encouraging emulation, and diffusion of SC use in teaching. Emulation, or the diffusion, of an idea are discussed in section 9.6, R5 reinforcement loop.

It has already been noted that participants who use SC in their teaching also appear to be able to cope with change and are flexible when the academic situation demands this. Some of the participants discussed events which highlighted an ability to reduce their transaction costs by adapting their approach or by exploiting a resource they already had in place. How adaptation and exploitation were used by teachers is discussed in the following two sections.

7.4.2.2 Adaptation

Once a teacher is familiar with online tools and the use of SC they begin to consider how the SC affordances can be adapted to other contexts. P1 was asked to lead an academic article writing series of workshops, at another campus, and suggested the use of an online format to save on traveling time. While this approach was not successful, it did demonstrate how adaptation can reduce effort:

> *So I said well I'm not going to drive down to (other campus) once a month to do this. And then I want people to be able to engage it in their own times: Set up a course. You know, put some deadlines in, otherwise you can never move forward … But well, nobody does it.… And after just a few months, I thought nobody's doing this – and then 'out'. So that never got built very far. (P1)*

Adaptation was an intrinsic part of the agility associated with SC use, but may also have been a personal characteristic of these teachers. This is a 'chicken and egg' situation: it is difficult to determine if use of SC results in a teacher having a more agile, beta-mindset that is open to flexible approaches or, if an adaptable teacher more easily engages in the use of SC, e.g. P17 demonstrated this adaptability when she suggested, firstly, adjusting an SC-based teaching project that was grant funded, to allow a colleague to use the module as a basis for his postgraduate data production; and secondly, undertook the dynamic adjustment of the nature of the study and who would be involved, to facilitate this change.

Use of an SC platform can also be adapted to achieve higher aims that relate to the teacher's positioning in terms of their overall purpose. P2 spoke of solving the problem of large tutorial class sizes by using SC to engage individual students in discussion. Commodification of HE and financial pressure has reduced access to tutors or teaching assistants and thus tutorial class size has ballooned, which makes development of critical thinking skills extremely difficult. He believed this was robbing students of the experience of a higher level of learning and critical thought which is the fundamental role of HE:

> *Tutor budgets have been destroyed… So we're teaching these stripped out … pillars of humanities in social science teaching which is discussion. … when you strip that out, I don't think you're doing university teaching anymore. … they've just eviscerated that …(we) have tutorials, with classes of over 250 students, which really is just me monologuing. … and that's not acceptable, so the idea of setting up these networks is an attempt to make a sort of push back against that, … the loss of dialogue in the teaching process. (P2)*

This was not simply about aiding discussion; it was an attempt to wrestle power back into the hands of the teacher and student – for this participant it was about justice and empowerment. While few of the participants explicitly stated this (with the exception of P2 and P11 who cited Paulo Freire), this appropriation of a tool to solve an operational problem that is underpinned by a deeper philosophical concern, did permeate the study. The adaptation of SC to serve an extended purpose was also demonstrated by P3 when she redefined the academic practices to support a problem-based, organisational governance world view to inculcate students into an approach they could deploy when they left university: A class is broken into a ‘strategic cluster’ which consists of a number of ‘outcome development organisations’ each focused on solving a particular problem within her problem-based learning (PBL) pedagogy. This focus was practitioner driven rather than content driven.

> *I don’t use the term tutorial sessions because you’re not going there to be tutored; you’re going there to strategise on how to solve problems. So we divide them into two strategic clusters. … I think nomenclature plays a role in perception, so that’s why I redefined all these roles and names… within that strategic cluster, it’s broken down into outcome development organizations, which I call ODOs, … no more than four or five people. Now the ODO is the main group that has to have this online conversation about the problems that they’re solving, about case studies and issues that come up. (P3)*

Sometimes the teachers had to resort to the use of a suite of tools. It is important to remember that SC tools are not a solution per se. It was not unusual to have to cobble together different tools to meet teacher needs and it may have been difficult to make this seamless.

> *Now sometimes the space, for example Facebook, is actually not that good at handling the admin side… you upload the module outline … in an hour its run down the stream… (it’s) halfway down the page and it’s gone. Now some of the students are like ‘ah I can’t find stuff’. Now that’s important but it mustn’t be confused with learning. … I would rather find other ways of managing that… I’ve created a Google docs folder and I’ve said ‘right all your stuff is in Google docs or share with drop box’. … The space (SC/ Facebook page) itself is primarily around the learning. (P5)*

While some cases of adaptation appear to create more work, e.g. creating additional platforms for file handling, this ultimately required less effort than trying to re-post documents in Facebook and deal with student issues around access to materials.

7.4.2.3 Exploitation

Exploitation refers to "relationships in which the benefits of the relation systematically flow from one party to another" (Krinsky & Mische, 2013, p. 15). There were numerous situations where resources were shared between actors that have already been introduced, and more will be commented on within other causal loops in the following chapters. The value of the exploitation mechanism is that it reduces the effort required to achieve a necessary outcome. Teachers could exploit existing resources to reduce setup overheads or to leverage existing spaces for a broader spectrum of academic tasks:

> *… you can't have a (new Moodle) course each time you have a project together with colleagues, I'll just do it via that [indicating the existing course]. … So what I've done, I've got all these different groups going… So it's available to others … (then) Person A [Senior Colleague] came and said "I'd like to use this site for a small group that I … is there a way that we can work together instead of sending files back and forth?" So I said "Sure you set up a wiki." So I set up a wiki (within the same site). (P1)*

> *The other thing was then of course to also use it (the computer tablet) to record data (interviewing patients in the field) that we can then use for teaching the group.… So instead of talking about it (case history) they can actually show you on a video recording the kind of challenge they had. (P8)*

Teachers also spoke of exploiting student resources to reduce the effort required in teaching. Platforming off student interests and prior experiences can motivate students to participate, as well as reduce the amount of scaffolding required for specific activities e.g. recognising existing student networking and SC experience (P2), and students' natural, informal, constructivist learning experiences (P5):

> *So for them (students) that kind of electronic networking is just absolutely second nature now. I'm trying to piggyback on it …(P2)*

> *Yet I believe they already have some experience of the other (constructivism), and as soon as they start to see that this is how they learn informally anyway, they can make the switch. (P5)*

7.4.2.4 Alignment of technology and teaching task

While SC tools are supportive of numerous collaborative and interactive learning tasks, it was evident that no single technology was perfectly suited to achieve all teaching aims.

There is always something that's wrong with them [application which can be used for teaching]. (P10)

Likewise, it was possible to achieve satisficing goals even if a tool did not meet all of the requirements of a specific teacher. However, if a teacher uses technology which is fit to purpose, it will reduce the amount of effort required to develop and support an online activity (TaskFit2SC). There are also activities which are not geared towards online or SC teaching and it is important teachers are not blinded by the allure of a technology. Task technology fit theorises that if a technology is well suited to perform a specific task (i.e. there is a good 'fit'), the implementation has a higher chance of being successful (Goodhue & Thompson, 1995). The importance of selecting an appropriate technology to suit the audience was also raised.

There's no social interaction with these students on it [Moodle] because the technology is foreign for them. I think they do BBM [Blackberry Messenger] each other, and I do think they SMS [Short Message Service], so that's why if we want to have some learning that is collaborative, and socially constructed, we are going to have to move to a different kind of technology. (P11)

Teachers may have to accept, or work around, the aspects of a technology which are not suited to task, in order to have access to other features they require:

Now sometimes the spaces… for example Facebook, is actually not that good at handling the admin side. (P5)

Some content may seem less suited to SC applications, or require more effort from the teacher to explore how the technology may be able to be used:

I think the second year requires a chunk of investment of time from me, in thinking creatively about how that content can be delivered differently… I do a lot of very interactive things in the classroom but not using social computing. And it's because of the nature of it, because it's analysis and it's modelling. And so I do lots of very hands-on things… lectures are kind of more like workshops because I actually make them sit and work in class. But I think the thing is the content there challenges my use of social computing more. (P6)

… and again writing papers is very hard. I think it's a hard thing to learn. It takes us a long time - different people have different hurdles. So it is a very difficult thing to do online, it's not… I don't think for that… it's a good medium. (P1)

But likewise, teachers could be quite determined to make the technology work in the way they chose, even though this may have resulted in the misappropriation of the technology and result in its benefits not being realised.

> *A lot of people go to that [Moodle] because it's the institutional one… and because actually they are not about the technology … They want to be given a really good one [platform]. So their focus is really on their teaching and they know what they want to do and now they've got to try and like twerk and twist and bend and make the technology that they have got, fit … but I don't think that there is necessarily one (common) view of any of these platforms. (P6)*

Experienced teachers were also able to ameliorate those aspects of SC use which had the potential to negatively impact learning, such as online flaming wars:

> *Well, there'll be an interaction between the two [online and F2F], that some of it will happen online and I'll bring it to the class and I'll work with it in class… and it typically will go back online afterwards but it will de-escalate and that I suppose is what I have gotten good at: is de-escalating stuff and using it as opportunities for people to understand each other better. (P2)*

7.4.3 'Available effort' represents 'nett effort'

The factors discussed combine to provide a qualitative sense of nett Effort Required to produce results. There is thus an Available Effort Threshold which compares the Baseline Effort of the teacher (based on their level of commitment) with the Required Effort, to gauge whether or not the teacher will produce a Result. It should be noted that this model does not include a time dimension within the causal loop. Actions either precede or succeed each other but the modelling cannot accommodate different time slices within a single cycle. It is thus not possible to accommodate cases where a teacher may consider all the effort they perceive as being required, prior to making a 'commitment' decision. Rather the model suggests that some form of a commitment is made and then the repercussions in terms of the required effort are considered. This is an assumption which may limit the applicability of the model in certain circumstances.

7.5 Result

The Result of the use of SC may be dampened by the impact of two additional factors: the specific SC design choice implemented by the teacher (Effort-Results ModeratedBySCdesign

ByTEACHER (Delay) (R1)); and the negative impact of low student participation in engaging with the SC activity (Student Commitment/Effort- results (R1 R4)).

7.5.1 Effort-Result delay

As already discussed, an ineffectual design or the use of inappropriate tools can limit the success of the intervention.

> *Because we can't talk to each other [Swedish and local participants] because our platforms and things don't seem to be able to link in… it just doesn't seem to be worth the headache. That's the problem with technology. You know? (P10)*

> *How do you actually construct that experience for them in such a way that they can engage with the material? …You have got to create two things…(1) you've got to construct some kind of engagement back with the material and then [provide] feedback… … and (2) to facilitate a learning space whereby they can actually collaborate, chat to each other, assist each other. (P10)*

> *There's a whole lot of work around personal learning environments which are cobbling together bits and pieces. My experience is that students just don't do that. … All I'm looking for is… the stream of discussion and some of the admin side. (P5)*

Student participation may thus have been related to the successful design of the platform:

> *Is it [the SC activity] a learning experience? …a whole lot of the time investment upfront doesn't actually bear that much fruit but it's almost like a warming up to getting into it, and then ultimately there is this sudden stage later where things sort of click and gel …consider the fact that they[students] are the ones learning; that everybody else is about facilitating that learning… [also there is] this absolute abundance of information, knowledge, media on every single topic… that in itself can be intimidating … if there was no scaffolding it would actually be a hellishly scary place. (P6)*

Ultimately, achieving successful results required student participation. The mechanism linking student participation to results is discussed in more detail in causal loop R4 and deals with the teachers' perceptions of students' engagement with SC in their learning. In addition to student results, the word-of-mouth (WoM) feedback from students directly to their lecturer also feeds back into teacher commitment. Once again teacher experience moderated the impact this feedback may have had on the teacher.

Table 10: Feedback into teacher commitment moderated by teaching experience

#	Quote: Impact of results on commitment is moderated by teacher experience (Delay)
P1	(*they did not even do it?)* No… But I didn't feel particularly bad about it. I didn't feel that it was my failure, because they didn't even do any of the regular stuff in class. … that was the only year where I had really bad attendance and participation. Generally it's a very, very good class and I love teaching it.
P2	Part of me is a little bit Zen … now, having seen that happen cyclically. … you have good years and you have bad years, and the interesting thing is that there is an autonomous class dynamic, that is over and above anything that I might do or not do, and you just have to be Ok with that.
P3	When I start out I have a plan of how I think they are going to interact, and what works for the students, might be two different things … I'll see what happens in a discussion online and then I might restructure based on some of the things that have come up …
P4	
P5	The one year we used Edmodo, the second year Moodle. Edmodo we had a fair amount of conversation …. Moodle we just got nothing. Silence. Put out a thing and nothing. But even across all of them (*platforms*) you will still sometimes get … no one responds. Now that could be for a lot of reasons. Maybe they just didn't happen to read it that day, maybe they are tired from something else?
P6	So I'd have to get into this internal debate 'is it just -the students have chosen not to engage and I need to work out a way to engage them better or; was the actual process that I was setting out for them not worthwhile?'
P7	I was a little bit more realistic about what students could manage… So I'm trying to take it one step at a time so that I solve all the problems first … what did it look like? the feedback involved and so forth? So as a slow evolution I am hoping to get to the point where we do have a lot more discussion
P8	
P9	I think generally they see the usefulness of it, but … the full potential of it has not been used yet.
P10	So I think that for me I find that if we try and have these different things hopefully there is something interesting that they find. Then they say 'oh that's quite nice.'
P11	I found in another module we've got, …where they have the chat sessions as well; There's a level of where I think the students are overwhelmed with the amount of typing (*and*) working stuff that they've got to do
P12	
P13	That they are actually resistant to the change in terms of their learning but yet they are prepared to use the technology for their socialising methods? So there is that kind of mismatch between the two that we need to pick up…
P14	
P15	Students see that as a platform to iron out administrative issues … So maybe what we need to do from next year is to impress upon students that it is there for that but more it is for you to clarify issues of the content that we are doing in class.
P16	
P17	… trying to do these side things … You know they consider them (*quizzes*) as separate? … a bit of a burden. And I think that could be the possibility why interaction in it is not as much as I had hoped for … But the students said 'You know, you must just keep on with it' … and I'm like 'oh, ok'
P18	And students were fascinated by going online and seeing what people had written … and of course we had lots of problems because it was group work. We had complaints about 'so and so is not pulling their weight' but I mean that's nothing to do with the technology, that's to do with the '*technology* 'of the group (*laughs*).

7.5.2 Result-Commitment delay

The final mechanism to complete the reinforcement loop was the relationship between Results and Commitment. This was discussed in section 7.2. A delay is present on this flow as teacher experience may play a role in determining how the results impact the teacher's further commitment to the use of SC. While positive results were likely to increase the teacher's commitment, a negative result would not necessarily result in a decrease in commitment as one would anticipate. They relied on their experience to guide them in terms of the impact of a specific result on their commitment to the endeavour (
Table 10).

Experienced teachers recognised that results were very dependent on student participation, which could vary from year to year and may be influenced by a variety of factors which may not be under the control of the teacher (P1, P2, P5 and P10). Teachers also recognised that the development and implementation of SC in teaching was an iterative process. It may require different interventions to improve the results over numerous cycles, or even require adjustment of interactions during the running of the module (P3, P6, P7, P9, P11 and P15). Sometimes the use of SC required students to change how they saw their own action (P13 and P17) and may have resulted in students identifying aspects which were totally unrelated to the use of SC as challenges e.g. group work, which occurred equally in F2F projects (P18). Being able to process feedback in this way required the teacher to be reflective about their practice (Archer, 1996; Means et al., 2010) and sufficiently experienced to be able to make a judgement call related to feedback received. A young teacher with limited overall teaching experience and a teacher new to SC use, may find it difficult to make these judgements and may see this feedback as a sign of failure. This could result in a premature assessment that the SC is not appropriate for the activity or that it does not work.

7.6 Conclusion

As summarised in Figure 21 (a duplication of Figure 14), the R1 positive feedback causal loop explains a wide variety of factors influencing an individual teacher's use of SC in their teaching. Their activities, however, take place within a much broader context which is influenced by a variety of role players and structures. Some of these influences have already been detailed in this chapter as they appear key to explaining the teacher's SC use process. It is however important to realise that the influences on the HE teacher, within their teaching context and which impact SC use, can be seen to occur at numerous levels, from the personal to the institutional, in ever-widening circles.

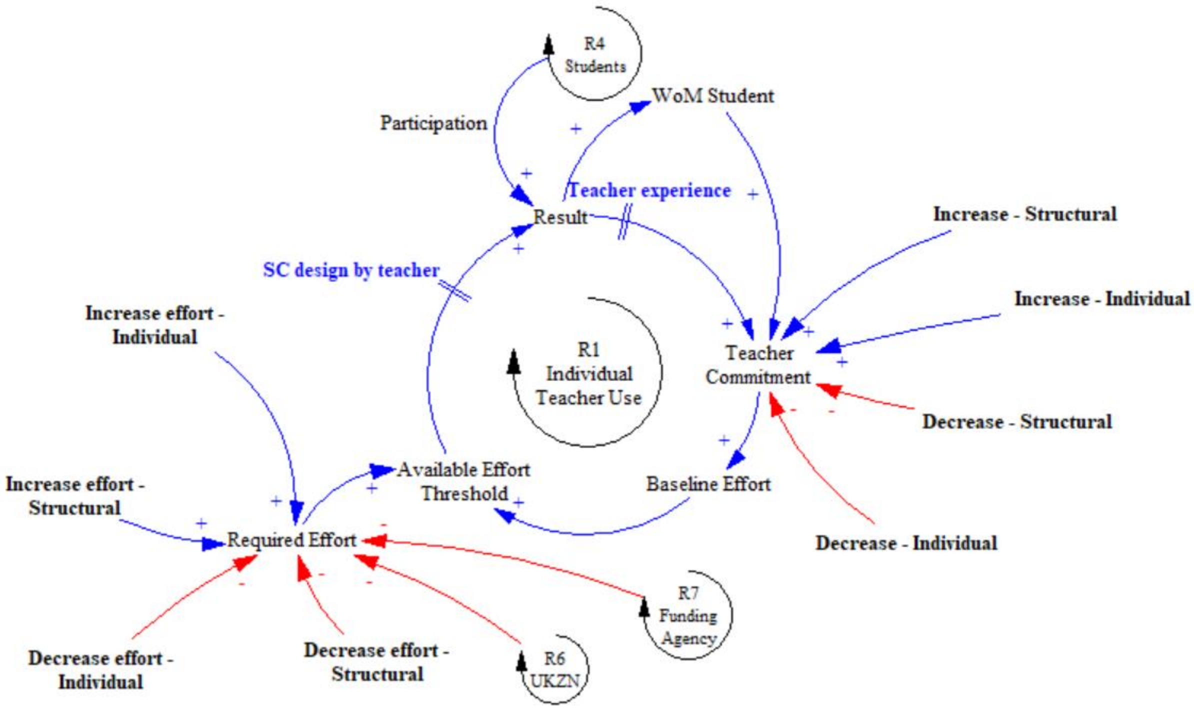

Figure 21: R1 Individual teacher use of SC, positive feedback reinforcement loop

Teaching cannot occur in a vacuum but requires a student and a process of learning. Chapter 8 thus focuses on the mechanisms and processes associated with the students in the SC teaching and learning context and how they influence teacher practices. Chapter 9 focuses on the processes which exist beyond the teacher-student process of teaching and learning. The chapter firstly explores the reinforcement processes formed by pairings of teachers, namely partnership (R8) and mentorship (R9) processes. The relationship with other colleagues who observe the teaching activities, such as discipline or professional colleagues (R2) and other academics (R3), is then considered. The basic process of diffusion of the use of SC in teaching, or the process of emulation (R5), is then presented. The supportive role of institutional resources (R6) or external grant funding (R7) completes the discussion of positive reinforcement loops influencing the teacher. Chapter 9 concludes the discussion of influential processes by considering negative processes which limit teacher use of SC and the balancing or normative influences presented as academic goals, by UKZN, which govern academic purpose and achievement.

8 Student factors influencing HE teacher use of social computing

> *We may note that it is not unusual, on the occasion of a university graduation ceremony, for the proud graduate to say to her or his equally proud parents in front of a key tutor that 'this course has changed my life'. ... We can only make sense of such an observation on the part of the student if we invoke concepts such as being and becoming: through the student's course of study, their being was transformed. ... And so there is this extraordinary and intimate relationship between knowing and becoming. (Barnett, 2009, p. 435)*

8.1 Introduction

Teaching and learning are entwined processes and comments on the success of teaching need to consider the perspective of the teaching as experienced by recipient students. This chapter thus considers the teachers' perspectives of their students experience of their teaching, their reactions and responses. This study only interviewed HE teachers and thus all comments about students are presented from the teacher's perspective. This is a limitation of the study and the study could be extended by gaining the perspective of all role players, including those of students, and viewing their comments in relation to those of the teachers. However, the teachers' approach to their teaching is governed by these assumptions and beliefs and thus they form an intrinsic part of this discussion. They represent the teachers' "reality" even if it differs from the input students might give if interviewed.

The discussion in this chapter deals with the mechanisms that make up the student reinforcement causal loop and then focuses on the influence of social computing's potential to empower students (section 8.3) and students' word-of-mouth reporting of their experience of use of social computing in teaching (section 8.4).

8.2 Basic mechanisms of the student use of social computing reinforcement loop (R4)

From the teachers' perspective it is difficult to separate the impact of student commitment and student effort, on the social computing result. This student reinforcement loop (R4) was thus modelled with student commitment (or more appropriately, student motivation) and their effort (or participation) represented as a single node (Figure 22), rather than as two independent nodes, as modelled in the individual HE teacher case (R1) in Chapter 7.

The mechanisms which form the student reinforcement loop included: students' motivation and participation influence on SC results; six delays which may influence student participation; and the mechanism which closes this loop i.e. how SC results impact student motivation and participation.

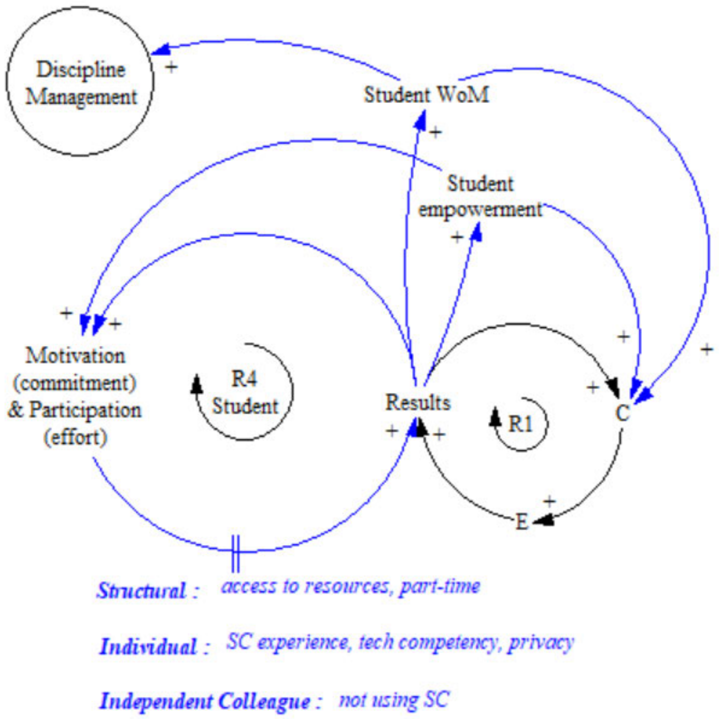

Figure 22: R4 students' reinforcement of HE teachers' social computing use (R1)

8.2.1 Student commitment and effort influence social computing results

As detailed in Table 11, in general, the participants saw their students as preferring F2F communication (P11, P13) and being hesitant and tentative about their online engagement (P1, P4, P6, P7, P11, P14, P17) until they experienced some form of success (P6, P7, P10, P18), after which they were more enthusiastic (P6, P7, P10). P2 suggested that online participation facilitates F2F classroom participation because the online space, which provides a sense of anonymity, helps students to become more confident at expressing their opinions. P8 stressed the importance of students feeling committed to a shared goal as this encourages them to be more engaged, in order not to let down their team. P13 raised a pertinent question when she asked why students appear eager to use SC in their social interactions but are less inclined to use them for their academic work. P5 suggested students have been socially conditioned at school to specific expectations of a formal teaching environment, as opposed to how they use SC e.g. YouTube, to informally learn new skills (see additional detail in section 9.4.3.3).

Table 11:"Student commitment and effort influence on results" participant quotes

#	Quote: Student commitment & effort influence on results
P1	While a few of them were quite happy to log on... it was still very limited what they used of it; ... I don't think there is a single student who has ever posed a question...... It's clear they kind of like the quizzes
P2	I'm trying is to use the online stuff to get them to talk more in class, ... with this sort of anonymity and confidence of posting stuff online they can then warm up to feeling comfortable to actually making those points in class
P3	
P4	My Masters students; those who are very interactive they would follow through a discussion. But it didn't quite pick up in my undergraduate class ... I don't know why.....
P5	Generally looking at it, it does look like the people that are involved in some level of posting and commenting are getting the most out of anything because they are engaging in the conversation.
P6	It's perhaps unfamiliar ... that barrier is off putting. But once they are through the hurdle and once they see some kind of affirmation of the fact, ... I think then it becomes almost like a preferred space
P7	Very few of them are competent enough to put stuff up ... but then strangely enough there is a kind of a switch: They start posting a question on this board, and before I can respond they are responding to each other about how they have resolved it.
P8	Whereas if it is a group of people that you are going to let down if you don't pull your weight... it gets you ...apart from your own motivation; to want to be involved.
P9	And I think that we almost will have to have a rotation basis,(for using the device) so that everyone gets that skill
P10	I think what I found with this bunch is that they like to go back and look at the old chats and they quite like that sort of dynamic kind of thing.
P11	Students I think like to see you face-to-face ... it's easier for them, because it's their socialization to ask you something rather than to try and put this question (in writing) ... There's a level where I think the students are overwhelmed with the amount typing (in a chat)
P12	
P13	When it comes to learning then we want to see our lecturer and we want to see the notes being put up and we want a face put to the entire experience. Yet when we communicate with our friends and with everyone else, then it's perfectly fine for us to have a Facebook environment??
P14	The very first year I used it I did set up a group discussion, which 1 or 2 students kind of pasted something there, but it never really got going ... It was their site; ... the site is there, you can talk to other students
P15	
P16	
P17	I had asked the students to ... post it on the discussion board. And I said that was part of their marks, so the majority of them did it. ... The comment part was a bit more difficult, but there were students that participated in that; mostly it was me, you know, ... answering or replying
P18	But I did think it was more authentic ... it also enabled students to think about the assessment, ... Because of what students were saying ... there was a space made for that kind of collegial feedback which could really only happen online.

P5 found the nature of student participation was related to student performance:

> *You get ...prolific posters, ... prolific commenters, then you get people who are prolific posters and commenters and then you get people that are neither. ...[Those] involved in some level of posting and commenting are getting the most out ... because they are engaging in the conversation. ... It doesn't therefore mean that if you are not, you are not going to learn, but it does appear that those who engage in conversation are more involved in the learning and actually do better. (P5)*

Students who chose a learning trajectory that allowed them to learn to express themselves and participate online, appeared to benefit. Challenges, or limits, to such participation were raised, however, and are discussed in further detail, as system 'delays' in the following section.

8.2.2 Delays affect the influence of student participation on social computing results

Six factors were identified which resulted in the anticipated results of the SC activity being 'moderated' due to a delay affecting the mechanism linking students' participation to the results. The six delays as indicated in Figure 22 were: a lack of resources, studying part-time, SC experience, privacy concerns, technological competence, and independent co-teaching colleagues use of SC.

8.2.2.1 Lack of resources

Structurally, if students do not have access to the necessary resources to participate online then the use of SC in teaching will have limited success. The limitations can relate to access to devices, such as PCs, laptops or smartphones as well as access to infrastructure such as Wi-Fi or Internet access:

> *In the rural areas it is even worse… these students … are registered nurses – they're working in hospitals where there is only 128 KB of intranet in the hospital… and you know that all the computers are sitting in the manager's office and the Charge Nurse's office. (P11)*

> *I mean, when we started with this stuff say five years ago, it was a problem because there was the socio-economic issue around access to computers … I mean they would have to stand in line for an hour to get into a LAN… Now the advantage is that every single student, at UKZN has got a phone and getting the communication network to go through their phones… (P2)*

The technology landscape is however nuanced, and individual situations must be considered. It was possible that teachers and management may not have had a clear picture of their own institutional landscape as it may vary greatly for different disciplines and groups of students. The following quotes by P6 and P7 suggested these issues:

> *And I'm not sure that we have a very good measure of where the large group of our students sit, in terms of the technology they use and their level of comfort with it … I think we make lots of assumptions. (P6)*

The issue that I had to face right at the beginning from the people at the university, …they didn't think that the students will have the access to the computers and everything else. Now my group is highly skilled in that regard: They are in the healthcare sector, so their access to the computers/ technology is not a problem. (P7)

8.2.2.2 Studying part-time

The data also suggested that part-time students were less likely to participate in SC activities due to existing demands on their time. UKZN is generally an attendance university and thus most of the use of SC is part of a blended learning approach to teaching. Students may thus see such activities as supplementary, rather than seeing them as an integral part of the teaching. This may be compounded by other factors e.g. access to resources:

There was the one guy who couldn't come in for class because the road had been rained out. He lived… a detour of kilometres … it took him, I don't know how long, to make the 20kms to the nearby school to borrow the phone because he had no connection … That's the kind of student we deal with. (P1)

… it's no use me developing this lovely, beautiful online module and expecting my students to engage with this when really they have problems accessing basic facilities. … there are transport issues as well… can the student really go and access the LAN after hours?(P13)

In addition to the structural issues there were those aspects which related to individual learning: students' experience using SC either personally or in academic settings and their technology competence can impact the results of SC use in teaching.

8.2.2.3 Social computing experience

SC experience was varied. In specific disciplines, and amongst certain students, there were classes with more or less experience. Comments below highlighted that groups with more experience include postgraduate Nursing (P10) and IS&T (P5) students:

What happened with some of these students is that they have other modules that they are also doing online. That's truly helped … Some students had P11 the year before … and that helps a huge amount. … I think people are using it [Moodle] a lot more and … people sort of use their phones a lot more; they know about Facebook; … things are improving in our students, so it's not so much of a hard sell. (P10)

I think a lot of them have a digital life, if not all of them at some level. … especially as I'm dealing with IT students, 3rd and 4th year. (P5)

Numerous participants suggested younger students were more experienced at SC use (P2, P6, P7, P11 and P14).

> *I think they're getting more used to it. It is happening more … I often ask has anyone used it before and there is usually quite a few have, but I do not know if it is … just one course here or there … (P14)*

Interestingly, P2 highlighted that students were excited by opportunities to actively participate in their learning, rather than the use of SC per se:

> *The students are way more tech savvy than we are… So for them that kind of electronic networking is just absolutely second nature now. So that's what I'm trying to piggyback on. [When I ask them] they're neither terribly enthusiastic nor terribly unenthusiastic, they're like: "oh-no, it's all right, it's cool." But it's… because it's part of something else that they like very, very much indeed, … is that my courses really encourage participation. But the online participation is only one dimension of that. (P2)*

Some teachers and their students appeared to be lagging behind what other groups within the study were achieving. It should be noted however that *all* of the participants in this study form a cohort of teachers who *are* using SC in their teaching, unlike many others in the institution who do not use these applications. These differences provided insights into the broader domain. It was not clear if the reason for limited use was because students lacked access to either computers or SC, or the exposure to SC in an academic setting, that made it difficult for teachers to introduce SC into their teaching. This is the limitation of using a third party account of an event and highlights the benefit that could be gained from a study including student input. This example from Public Governance (P3) suggested that as a result of these challenges, the scaffolding of student activity was important:

> *So the students had not been used to using Moodle… So it was very difficult because the students were resisting … my colleagues …everybody was resisting. Because I found that, if I just try to push them into a problem, they're not used to it, it's too much. But if I take them through by formulating questions and get their minds thinking, then they come up with all the stuff themselves, once I get the wheels turning. (P3)*

It is important though that teachers remain in touch with students' technological behaviour as the applications they use vary over time. At the time of this study, students were beginning to move away from Mxit to WhatsApp, and while many were using Facebook, fewer were using

Twitter. This was discussed in detail by P2 who reflected on his experience in a different region of South Africa to highlight that these fashions of SC use may also have local dynamics which impact what students use (P2), as well as when they use them (P4):

> *I've been very cautious about going to Facebook, because Facebook is so integrated into the informal social life of the students… that really gets them out of the institutional mindset, and into, "This is our space" … and that is also because that's where they are… and this year I was talking to them about going onto Twitter too, but for some reason Durban students are not on Twitter. It's weird because Jo'burg (Johannesburg) students are… (P2)*

> *Now with the masters class, they took to the discussion thread quite well… But I don't get involved in it unless I see that they are going the wrong direction. I just let it move and undertake its life just amongst them. … even though they use it, it is kind of in spurts. Our masters students attend the block release format, so they use this discussion only during those two weeks, which is not what I would want. (P4)*

8.2.2.4 Privacy concerns

P2 also raised privacy concerns related to requiring students to use SC as part of their learning experience. The power differentials between teachers and students are generally high and if a teacher insists a student has to use an open access platform for learning or assessment artifacts, the student could feel pressured to comply. Students may feel their freedom of choice is being undermined by the teacher's platform decisions.

> *… there's a problem of privacy. Many of them would have good reasons for not wanting to have people accessing their Facebook profiles, and I have certain reservations about that as well…so Moodle is the core thing that you have to be on, you have to be checking your emails that are coming from Moodle, and you need to be checking the site once in a while. Then Facebook is like…, where you guys can just [explore] … I actually got the students to set up the Facebook group, so I was totally out of it. (P2)*

While the Moodle site was thus specifically focused on as an instantiation of the module in a specific time (semester) and place (UKZN), the Facebook page operated as a connection point between various student groups and other academics who shared an interest in the topic.

8.2.2.5 Technological competence

Technological competence was a challenge for younger students who have had less exposure to devices or platforms, or who did not see the value in participation in academic forums e.g.

public governance, level 4 (P4), occupational therapy (P8 and P9), education (P14) and dentistry students (P13). For example:

> *The honours students, oh man, they were a harder nut to crack … they were ready to do the "service delivery protest" thing. … they were more like "We don't know what the heck you're talking about and we're really not interested". (P4)*

> *… different people in the class… were at different levels of … But amazingly if you had to talk to students about social networking … that would be fine; but tell them to go and formally download information and present it and it would become problematic. (P13)*

P13 raised an interesting point about how technological competence can vary dependent on the tasks expected of students. This highlighted why it may be better to find platforms with which students are familiar, or at least have similar functionalities to those with which they are familiar. It can be equally problematic to assume students are less competent, when they potentially have the means to solve their own problems:

> *I've just said "Look get your email on your phones, like just do it", …, and I very strongly suspect …they do it through informal networks. … But also they're much more savvy … their brains are inside their phones for hours and hours every day, they know how to do stuff. (P2)*

Older students experienced challenges with technology e.g. the postgraduate nursing class students whose average age was 46 years old (P10 and P11), and Public Governance students (P3).

> *It's so shocking, their computer literacy, and we know how health care and knowledge in health care just skyrockets. You can't be a health care professional and not know how to access information. (P10)*

But even if the older generation were SC proficient, P6 suggested their perception of its use was different:

> *To us, our generation … 'this is twitter and that is Facebook' … I have the sense of the medium I am using. When I look at my children and some of the students: If you had to ask them when they are talking about a conversation they had, … "Was that on Facebook, Twitter, WhatsApp?" I'm not even sure sometimes that they could tell you. I'm not even sure it matters and I'm not even sure it matters to them. But the point is; that seamless element [of communication] is different. (P6)*

This may mean that teachers need to approach the technology landscape differently for each module and offering.

8.2.2.6 Independent co-teaching colleagues' lack of use, or misappropriation, of social computing

Students take their cues from other academic teachers as well as from their own teacher. Student use may thus be negatively impacted by poor experiences in other courses, or negative input expressed by other academics. Such negative input will reduce their participation in SC activities as they may doubt the merit of SC use as part of their learning. This is discussed in more detail in the discussion of the negative reinforcement loop R10 (see 9.9.3, page 277).

8.2.3 The impact of social computing results on student motivation and participation (R4)

This mechanism was based on a student feeling that they could trust the teacher had their best interests at heart, and that the work the teacher suggested, would in fact be to their benefit. Students determined the alignment between their learning activities and how they would be assessed. If these were not aligned, students focused on the work which aligned with the assessment tasks. Students needed to see the positive evidence of their learning in this mode, before the positive feedback process was established:

> *In third year … once they see some kind of affirmation of the fact – and whether the affirmation is in terms of actual marks and test results, or whether it's in terms of them now feeling like they've understood something, or that they expressed some kind of an opinion and got some feedback from it … but as soon as that positive cycle kicks into action I think then it becomes almost like a preferred space to be and then it feeds on itself. (P6)*

8.3 Social computing empowers students

In addition to the direct impact the results have on students; for example, in improving their learning, it was also noted that both teacher and student commitment appeared to be strongly impacted by the sense of student empowerment that may occur as a result of the SC activity.

SC applications are designed to facilitate conversation and collaboration, to foster engagement and the sharing of ideas, materials and personal artifacts of learning. Teachers were explicit about choosing these tools because they supported these aspects of their teaching. Teachers reported that these technological affordances were realised in their classes. The following two sections discuss how this sense of empowerment fuels both student and teacher commitment to SC use.

8.3.1 Empowerment of students influences student motivation and participation (R4)

Empowerment of students is relative to their context: in some environments, where resources are readily available, the provision of basic materials will not be considered to be 'empowering' as it represents the norm. In a different environment, however, it can make a noticeable difference to students' learning if all lecture materials are available for download:

> *Students … like the fact that it is a resource. They are very appreciative of the fact that it is a resource, because they haven't got access to resources, So it's not necessarily a bad thing, because it provides in one space, all the resources that they are supposed to be having. It's all there, you know and even if they have missed something it's there. (P11)*

Students were motivated to become more participatory when they gained understanding of material, succeeded in assessments and felt better equipped to take charge of their own learning needs. There were thus a number of ways in which the student was empowered:

> *A number of them said "wow I found such great stuff for my clinical nursing". (P10)*

> *[They] became aware of the fact that what they wrote and how they wrote it created meaning for the audience. (P18)*

> *They then for their various tasks could go and do what they wanted and go into what space they wanted. Most stayed in the Facebook ecosystem and some went … back to the chat room… they move into the other space where they actually are learning and they're like "wow, actually… I'm enjoying this". (P5)*

> *As soon as something is released they'll go in and have a look at it, then they'll go away and they'll think about it, and then they'll come back and they'll do it … (P7)*

> *The other thing is that they can bring materials more easily to this space. So you can [allow] for individuals to follow a more unique path through the learning … find*

topics that interest them that are maybe tangential to our core content … that probably doesn't even get assessed in our course… to me that's fine … (P6)

As students were exposed to these opportunities it not only expanded their understanding of the lifelong learning possibilities which technological solutions can provide, but also began to spark an expectation of a different norm in HE teaching and learning.

8.3.2 Empowerment of students influences HE teacher commitment (R1)

Teachers who used SC often aimed to see students taking ownership of their learning; they encouraged them to find their voices and to contribute in the learning space. When teachers saw evidence of students feeling empowered by this teaching approach, it created positive feedback supporting continued use of SC in their teaching. Comments which illustrate this are presented in Table 12. Many of the teachers spoke of how empowered students felt by having greater access to their teachers (P7, P12 and P18), because they felt they had control over their learning (P10, P11, P16 and P17) and realised their opinions and knowledge could be shared (P3, P7, P11 and P16). Students appreciated their contributions being acknowledged by the teacher which increased teacher commitment to the use of SC (P2, P5, P6 and P15).

Table 12: Student empowerment influences teacher commitment

#	Quote: Student empowerment influences teacher commitment
P1	
P2	I always launch a discussion from a movie, … they really like … feeling that that their thoughts actually fit in, and that there is not such a gap between their ordinary thinking and their academic thinking
P3	And they found themselves, because the reason they were giving me such a hard time … was because of their lack of self-confidence, they' didn't think they could do it. … they were not used to it, it's a new thing for them.
P4	
P5	… it is a way of flattening the power structure … There is much, much more engagement in an online environment; People are happy to engage and put things out there and ask questions and even not so afraid of looking silly. Because it's a sort of mixture of social … and it's ok to mess around a bit.
P6	Is there evidence that the techniques that I am trying to do impact their learning positively? … If you can see it in an artefact then that almost is like a – I don't know …. A trace that shows that something positive did happen for them.
P7	They end up responding to each other a lot of times even before midway through the course; and yet you actually tell them to stop and move on to other activities, because they get so engaged with debates – They like the fact that we are available all the time for them…
P8	
P9	
P10	A number of them said 'wow I found such great stuff for my clinical nursing' you know, and I said 'exactly …This is why I sent you there. You know you can learn how to hotwire a car on YouTube. You can learn anything, so use it'.

P11	I do believe as Paulo Freire said that education is either transformative or is domesticating… if you treat your students as producers of knowledge, as people that are contributing to the learning process, and as equal partners in that learning conversation that takes place, that process will actually liberate them.
P12	Because I know I have had an SMS or email from them on the weekend…
P13	
P14	
P15	So that is another reason that pushed me, I said well can we have a system where we share the same PowerPoints; … because it makes sense: If you are writing an exam why should there be two different PowerPoint presentations that are going around?
P16	Dante's Inferno … is much more fun you know. We all know somebody who's in hell. … so we do listen to that one (version) but it does not follow closely to the original. So we find others. They also help me to look for other information on it and they are very happy to bring it in.
P17	It was more of an exposure thing, and having them at least try it, so that they are not scared of it, …. What other class would allow them to have a chance to test out these tools …
P18	Students who came from backgrounds where computers were not a sort of a norm, were very empowered by this kind of system. – (The e-journals were) very private, they really love that; they really appreciated that. They felt that connection with the teacher; they really did, it was quite a powerful thing.

8.4 Students report the results of social computing use by 'word-of-mouth'

Besides the direct observation of the results of student SC use, students sometimes reported on their experience. This 'word of mouth' (WoM) sharing of results represents the efficacy of the implementation of the use of SC in teaching as acknowledged from the perspective of the person sharing the story (Repenning, 2002, p. 117). When WoM is positive then the reinforcement loop works in a positive direction increasing commitment; whereas if WoM is negative then it creates a negative, downward spiral. This feedback may be directed to the teacher, which influences their sense of commitment to the activity or to academic managers who have an oversight responsibility for teaching.

8.4.1 Students report the results of social computing use to HE teachers (R1)

The impact of the results of SC use on teacher commitment has already been discussed (R1); however, those comments were primarily based on teachers' perceptions and observations of behaviour. This section deals explicitly with what students have **said** i.e. spoken or written, about the experience. Positive WoM feedback included:

> *… we asked them about Skype, Facebook, Moodle … they loved Skype. (P17)*

> *… teaching is about a face-to-face conversation …creation of a trusting, learning environment and … students do give me feedback … that I am reasonably successful in creating that. (P11)*

I had one student who wrote to me who said that he really enjoyed the information he was getting from this and he thanked me for making this available to them. Written wise I have not received any negative comments from students. (P15)

… and I remember one student, he's like… "It is just so neat, you know; to know that there are other ways to pick up information and we need to be very aware of what is happening (in the digital sphere)". (P17)

A chatroom is a bit chaotic you know, hundreds of people talking at the same time and they came out and were like, "wow it was nice". Yet going into those sort of things they might be "No, just give me the slides". (P5)

Many of the teachers commented on how they aimed to help students develop broader skills and the feedback sometimes indicated there were these additional, positive, repercussions of the teaching activity. This also enhanced teacher commitment to the use of SC, for example:

They had to write about what they were reading in the press and a lot of the students… don't read … and they have no idea what's going on …I've had students come and say "We now have conversations at the dinner table. My father is so excited because I am talking about these things and I know about them and I can have arguments with him." So this kind of thing was really encouraging. (P18)

Surveys of class feedback can also be particularly useful if the teacher is prepared to be vulnerable and ask for more detailed feedback, for example:

… "Is it really too much to expect to do so many social media tools? To expect a fair amount of interaction…?" But the students said "You know… you must just keep on with it" … and I'm like "Oh, ok". (P17)

The students wrote and the tutors wrote back; and in evaluations afterwards the students said it was one of the most difficult things because it took time. But it taught them a whole lot of things. (P18)

Not all feedback was positive, however, and negative feedback could be general or include comments about a specific activity or platform:

I set up the journal, which one of them used, for a short while, nobody else touched it. They said, "No, it wasn't useful"; I said "That's fine". (P1)

… because in one session for example there was a problem with the sound, and the students were actually getting quite angry…(P11)

> *I think it was the pedagogical approach of problem based learning, combined with the expectations that I had of them on Moodle. And at some point… they simply refused to do it… (P3)*

The extent to which negative feedback influenced teacher commitment was dependent on the amount of influence they gave to student feedback. While student feedback was recognised as an important element of responsive and reflective teaching practice, students may also prefer less challenging learning formats than those which are in their best interest as was also highlighted by P5.

8.4.2 Students report the results of social computing use to management

Students are able to speak to their teachers' line managers about the implementation of SC platforms in teaching and any comments made in this regard in formal classroom surveys are available for management's review.

At UKZN the prescribed procedure for student complaints would be to approach the teacher directly, and then the teacher's line manager, before escalating unresolved issues either to more senior academic managers or the Student Representative Council (SRC). In one instance, students objected strongly to the introduction of a new pedagogical approach, including SC. The following story, by P3, illustrates how fine a line teachers have to navigate when introducing new practices into their teaching. There is a delicate balance between challenging students to reach for bigger goals, and pushing them to a point they are either not able, or are unwilling, to consider engaging:

> *Well, I'm going to tell you this about the undergrads, you know they reported me to Person J [Academic Leader] and told her that if I don't cut down on the work load they are going to go on strike… they were putting up such a ruckus that the TAs (teaching assistants) were waiting for me … before I went to the lecture. And they were saying to me "… we can't let you go in here alone, we don't know what they are going to do to you". …But after a while they got over that … and excelled, …the honours students, oh man, they were a harder nut to crack. (P3)*

This event aptly illustrates how political, and contentious, teaching decisions could become. In this instance, the feedback to management was negative. A good academic manager will weigh student opinion against teacher input. It is however stressful for an academic to have to defend their teaching actions and to prove that their actions are in the best interests of students. This stress adds to the costs to the teacher of undertaking these alternative forms of teaching (see section 7.3.2.5).

8.5 Conclusion

Chapters 7 and 8 have effectively highlighted the closely entwined influences between the teacher and student when an innovative teaching practice, such as the implementation of SC in teaching, is introduced. Both the gains and the challenges showed these SC activities as events in which participants were personally highly invested. While the teaching and learning space can in some ways be seen as a very personal and intimate space between teachers and their students, due to HE being a public, and often publicly funded endeavour, it does not occur in isolation of the moderating influences of academic colleagues, processes and institutions. These influences, which extend beyond the relationship of teacher and student, are discussed in Chapter 9 and 10.

9 Processes influencing individual HE teacher use of social computing

> *Humans live in flesh-and-blood bodies, accumulate traces of experiences in their nervous systems, organize current encounters with the world as cognitions, emotions, and intentional actions …[but] turn out to be interacting repeatedly with others, renegotiating who they are, adjusting the boundaries they occupy, modifying their actions in rapid response to other people's reactions, selecting among and altering available scripts, improvising new forms of joint action, speaking sentences no one has ever uttered before, yet responding predictably to their locations within webs of social ties they themselves cannot map in detail. ...If social construction occurs, it happens socially, not in isolated recesses of individual minds. ...Hence the difficulty of reconciling individualistic images with interactive realities. (Tilly, 2005, pp. 59-60)*

9.1 Introduction

This chapter moves beyond the teacher and the student to consider the influence of academic colleagues and institutional structures and processes. The processes influencing the HE teacher's use of SC are discussed in order of firstly, positive reinforcement loops; secondly, negative feedback mechanisms or processes; and finally, the balancing loops which operate at the institutional level.

Positive reinforcement causal loops can be ordered in terms of the level at which they operate i.e. some operate at the level of the individual academic and others operate at the level of the institution or even national level. There were five processes which could be considered to operate at an individual level. These processes dealt with teaching partners, who used SC in their joint teaching of a module (R8); a mentorship process where one (or more) teachers were involved in mentoring one (or more) teachers (R9); reinforcement of an SC practice by discipline colleagues or professionals (R2); or other academics (R3); and the diffusion and reinforcement of a SC use by emulation by another HE teacher (R5). There was a funding reinforcement process which operated at the institutional, UKZN, level (R6) and another which operated at a national or potentially global level (R7).

Negative feedback processes were mentioned at the individual teacher (R1) and student (R4) levels. Specific situations of such negative feedbacks can switch the reinforcement cycle into a reversionary, or negative, spiral. Specific instances where this was noted are discussed in section 9.9. Finally, the institutional balancing, or normative pressure causal loops, are considered, which are intended to monitor and control individual academic effort in line with the goals of the institution.

9.2 R8 Partner (Mutual) Reinforcement process

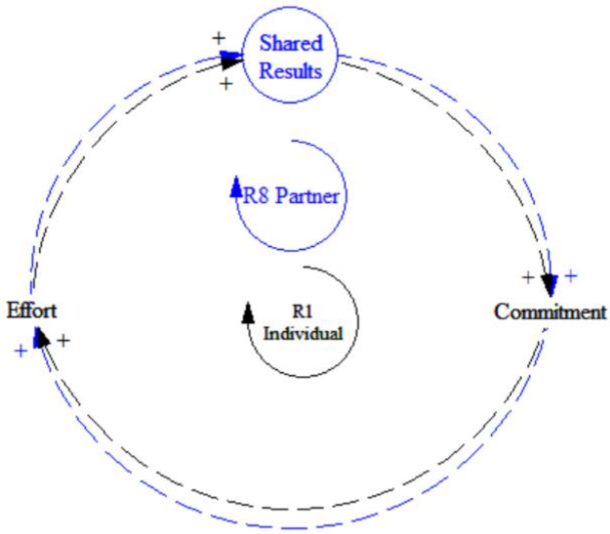

Figure 23: R8 Co-teaching Partnerships result in co-reinforcing loops

Analysis of Participant 5 and 6 interviews highlighted their working relationship as a co-teaching partnership. They had shared a number of modules and rather than teaching separate sections they often worked together on delivering content. The discussion of co-teaching partnerships is thus based on P5 and P6 experiences i.e. a single pair of participant cases. Their shared commitment to SC use, shared paradigmatic view of the content, and agreement on the pedagogical approach was highlighted by both:

> *So I try to get a level of buy-in … it does work when you sync with the person at some sort of academic, pedagogical, world view level – P6 came in and we synched. (P5)*
>
> *Now between (P5 and I) … it's almost like a shared ownership. (P6)*
>
> *… OK so it's not the same relationship. When I work with P6 we are working on the same course sharing the stuff, constructing and designing it together. We're planning; and we're just basically sharing assessments and stuff, but we're working on the delivery and everything together. (P5)*

This had a positive impact on their commitment to the use of SC and the effort they invested. This is not unusual (Bellis & Verganti, 2020). The literature and participant data stressed the amount of effort and time required to implement SC interactions. Partners are likely to commit more effort and resources to the intervention, because they know they have a colleague relying on them. The shared experiences created a knowledgeable sounding board for ideas and a rich resource for both. P5 recounted how a remembered, shared, chatroom experience ensured they did not continue with an inferior application plugin:

> *I did experiment with some plug-in chat thing [in Facebook] but my colleague (P6) and I have discovered … that you can end up in the wrong chat room… so that wouldn't work so well. So we went with a chat solution that we had used in previous years called… Chatterous. (P5)*

Over time, having a partner with whom you can work closely creates a trust-based relationship. Trust is a key construct in social capital theory and is known to facilitate a learning environment (Johnson, 2011). Such trust-based relationships come with potentially high rewards because of the associated, above-average levels of commitment, effort and resources which may be made available to the shared initiative (Krinsky & Mische, 2013). However, a trust relationship comes with a certain level of risk. Krinsky and Mische (2013, p. 17) clarified this: "Trust networks are composed of people connected through regular transactions, in which at least some of them put valued resources at the risk of others' poor performance". Zelizer and Tilly (2006) stressed four conditions necessary for a trust network: firstly, people must be connected by similar ties (directly or indirectly); secondly, a shared tie should allow a person to be able to call on another member for aid; thirdly, members should share a common, major long-term project (e.g. building a family); and finally, the collective project is placed at risk due to potential mistakes of individual members. Not all networks, or communities, can be classified as trust networks. While there may be some overlap the difference, according to Zelizer and Tilly (2006), is that other forms do not generally place the valued joint project at risk, based on the potential mistakes of a member of the same network. P5 and P6 illustrated how productive a trust-based relationship can be, even if the 'network' only consists of two members.

The discussion by Krinsky and Mische (2013) of Tilly's work stressed that because trust is central to social life it is also important in power related contexts. P5 and P6 belonged to the same discipline, but based on P5's earlier comments, it was clear that the same relationship did not exist between him and other co-teaching colleagues (see also section 9.9.3, R10).

Contrary to common sense views of moral reasoning, Tilly suggested that 'us-them' styled boundaries, even though they may include exclusive practices, may be important to identity and should not be seen as incompatible with equality or fairness. In academia there may be numerous dimensions along which academics can be characterised. Teachers may be divided on one dimension (e.g. pedagogical approach) while they share another (e.g. belong to the same discipline). This is an important aspect of understanding intra-community or intra-discipline dynamics. Intra-group differences were also noted in the discussion of the R2 colleague-based reinforcement loop, in relation to the experiences of P1 and P2 (section 9.4.2).

The partner-based impact of effort expended and results achieved were difficult to disaggregate. This pair-based dynamic only became evident during analysis and was thus not a focus during data generation. However, this pair spoke of extensive trials of different platforms and tools, more so than other participants. While this may be fuelled by personal interest and their discipline bias (Information Systems and Technology), it was clear their explorations had been broad-ranging. It is not unlikely that this may have been supported by the high levels of trust between the partners.

> *So I think that's been a learning experience so far of what works and doesn't work. What (P6 & I) thought would work didn't always work and what we thought wouldn't work sometimes surprises us. (P5)*

> *It wasn't just the fact that we were … wanting to be … out in the cloud, open - it's that we had spent sufficient time there that we knew [implied: it would be OK] … because we had gone out there and tested the waters, survived it, … (for) both of us … working in a beta-world, in a beta-space, gained traction. It was actually that the nature of computing had shifted such that you could work like that. (P6)*

P6 indicated they attempted high risk implementations because they knew that together they could recover from any potential negative repercussions, should this be necessary:

> *… having had experiences like 'Small Worlds' where we did the assessment one week and three weeks later the whole environment disappeared… (P6)*

In addition, P6 also explained how they had different approaches to technology. This explanation illustrated their individual differences (how they come across technologies, and how they think about applying them):

> *I don't go out and follow sites that are just about technology. … whereas I think P5 might be a bit different here … for me technology is always about being applied in a context… what also influences the technologies that I follow and try; is who I speak to, and what they also find. … P5 will say "Ahh I saw this let's try it". (P6)*

This particular configuration of two colleagues who achieved a result which stood out from the norm, is not uncommon in creative spaces. The literature on creative dyads is prolific in the popular press but has received less scholarly attention than other forms of collaboration such as teams or networks (Rouse, 2020). Rouse (2020) suggested that studying a co-creating pair may help simplify the observation, and theoretical untangling of mechanisms and processes influencing an activity. Such a pair can rely on complementary perspectives and abilities, as well as emotional support under stressful conditions creating a 'safe' environment (Bellis & Verganti, 2020). Creativity is seen to flourish in such environments where judgement is reduced and may be an important enabling factor. Larger creative groups have to cope with the tension between the advantage provided by having access to a diversity of ideas, and the challenge of managing the judgement and pressure to conform which the many may impose (Bellis & Verganti, 2020; Rouse, 2020). It appeared the personal relationship forms an important part of the process which allows creativity to flourish in pairs. It is also suggested that a personal relationship may precede co-creation or the co-creation may lead to the development of a personal relationship i.e. they are mutually reinforcing. Rouse (2020) highlighted that a co-creating pair is identifiable by the fact that tasks are not roles associated with a particular person; ideas are passed back and forth rather than being suggested by one, and always evaluated by the other. The characteristics of (a) trust in each other and a willingness to face risky options together; (b) a personal relationship identifiable by the understanding the colleagues have of each other's pedagogy and contributions; and (c) the shared responsibilities they accept for all aspects of the project, were identified in the partnership relationship between P5 and P6. Bellis and Verganti (2020, p. 20500727) suggested the benefits of the pair "far outweigh the limitations".

9.3 R9 Mentor Reinforcement process

An example of a two-person mentorship relationship became evident early in the analysis when interviews detailed how Participant 4 was mentored by Participant 3 (Public Governance). There was also a mentorship relationship between Participant 1 and

Participants 14 and 15 (Education). A more diffuse and complex mentorship relationship was evident between Participant 7 (Pharmacology) and other members of the Health Sciences. This was specifically mentioned by Participants 8 (Occupational Therapy) and 13 (Dentistry) but alluded to indirectly by Participants 10, 11 and 12 (Nursing). In this Health Sciences example, many-to-many mentorship was evident, as P11 (Nursing) also mentored teachers from other disciplines, such as P8 from Occupational Therapy. The individual participant results achieved through the mentorship processes have already been discussed; this discussion thus focuses on typifying the nature of these collegial relationships.

The relationships between Participant 1 and Participant 3, and their respective mentees, is first discussed. Thereafter the more complex relationship of mentorship within the Health Sciences is considered.

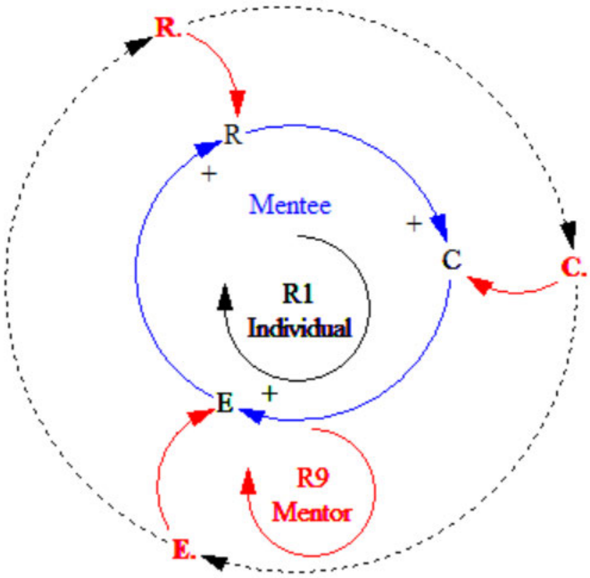

Figure 24: R9 Mentorship reinforcement loop

9.3.1 Typical mentorship: One-to-one relationship

The one-to-one pair-based mentorship experience is the most common form of mentorship with one colleague mentoring another closely associated colleague. The mentorship relationship between P1 and P14 (in Education) is discussed first, followed by the discussion of P3 and P4 (in Public Governance) and finally, the cascading effect of this form of mentorship.

9.3.1.1 Mentorship in Education

> *The … colleagues that I've helped set up courses; they set it up for full time students and feel that … it saved their teaching. (P1)*

Participant 1 and 14 both mentioned a specific trip which provided the space for them to discuss the use of Moodle and how it could improve teaching and MCQ testing:

> *Participant 14 and I … talked about it (Moodle, assessment, MCQs) …then we went on a workshop on how to ask higher order multiple choice. And she got quite excited … then I said to her, but you can do all of it in Moodle and it's immediately marked. You don't have to send it off and wait a week, and the student gets feedback. So …I think that's one of the things… but it was my push that made her go onto an electronic space… (P1)*

> *… how I got into it was through Participant 1, we actually went on a long trip together and spent a lot of time in the car talking. … A class that I had… was suddenly going to be over 100 … And I was really battling … How am I going to engage with students? And also how am I going to manage them? …So she spoke to me about Moodle … She said basically it is a matter of biting the bullet and struggling through learning how to use it and … getting over that obstacle, but it will make your life so much easier in the long term. So I sort of decided to do that. (P14)*

After P14 committed to the use of SC in teaching it was important for P1 to also be practically involved in assisting others with the effort required to implement SC. The 'effort' supplied by a mentor can include the sharing of knowledge and skills. P14 explained how P1 assisted her and another colleague by running a workshop:

> *… she (P1) was the one who ran a small workshop with me and one other colleague to teach us the basics to get started. … The very first year I used it, when I was still fresh from P1, I did set up a group discussion site … she showed me how to. (P14)*

P1 also mentored a contract lecturer and assisted with the effort required to implement and monitor SC use:

> *"So I will help you set up and help you do it." But he's never done it before and he's not one to run after computers. But he's loving what it can do for him. (P1)*

In this event, in addition to mentorship there was also episodic power being employed by P14 over the contract lecturer:

He's (contract lecturer) now teaching the module that follows her(P14) … (Implied: And she has now specified)" Now I've already trained (students in using) it, they must (be expected to) use it ". So he was forced into it and had never done it before; and I just showed him in half an hour how you upload text there. So you know, that became the starting point and I think that's where everyone starts: it's in the administration thing. (P1)

In this instance, P14 (mentored by P1) was now requiring other teachers to maintain the practice of SC use in teaching in modules for which she was responsible. P14 mentored this co-teacher into the use of SC as she felt he would not survive the running of the module without it. She thus used the episodic power available to her to achieve the required result by creating an obligatory passage point (OPP) for co-teachers, namely, the use of Moodle (Silva, 2007).

9.3.1.2 Mentorship in Public Governance

Participant 3 used an LMS and SC related tools in her postgraduate studies and teaching in the USA. When she arrived at UKZN, she assumed students should be taught in the same way. She was already committed to the use of these applications and was initially blind-sided when she thought they were not available:

When they told me there was … nothing like Blackboard… For the first time since I had been here that I just really felt helpless. … So those three things again: no Blackboard, no teaching assistant and classes of 140 students … I'm like "What have I done here, you know?" (P3)

She felt more comfortable once she realised that Moodle was available at UKZN and began to mentor other teachers.

Now I have influenced my academics, and several of them are incorporating elements … so it's becoming part of our organisational culture as a discipline. (P3)

As Academic Leader for the discipline, P3 had positional autonomy (Maton, 2005) which she could exercise in relation to her own teaching decisions, but she could also use episodic power. Episodic power is also referred to as "power over" or "causal power" (Silva, 2007, p. 177). Any teaching academic can however choose to resist the adoption of SC . Notice the emphasis on "my academics": This can be used to indicate a sense of community, but also carries a sense of authority over members. This power could be enforced through moments of translation, via an OPP for other actors (Silva, 2007). In this instance use of SC was however not enforced. P4 had previously been introduced to Moodle and SC:

> *Of course there have been lots of workshops and publicity about Moodle… It's one of those things you hear and they just pass by you. …It's out there … and if they want it… let them go ahead, I don't feel I'm ready for it yet. (P4)*

Her position changed when P4 recognised the potential benefit of the use of the technology and her motivation increased because P3 provided a supportive environment:

> *I thought "Let me try it". But … you need somebody close to demystify things… We probably resist … social computing; because you could … expose yourself in ways that could be very damaging. … So you need some safe space to actually learn the ropes … Participant 3 kind of did that for me. (P4)*

The effort required to develop SC use was noted by all participants. P3 reflected on the effort her USA mentor put into scaffolding her development:

> *I went to a lot of training for Blackboard. …, and the person who was the Head of Blackboard, … she really liked the fact of how interested I was. … I could be in the middle of doing something at home and be, "How do you do this, how you do that?" and I'll email her, and she would email me right back. (P3)*

This effort was now being paid forward in P3's mentorship of P4:

> *I knew she(P3) was there and if I had a problem I could turn to her. She took me through the ropes… (P4)*

Once mentored, and confident in their ability, a teacher will often share their knowledge. This can cause a cascading effect where the diffusion of the use of SC happens through combined processes of emulation and mentorship.

9.3.1.3 The process of mentorship causes a cascading effect of SC use in teaching

P14 and P15 can be considered peripheral participants of the Moodle community as their use focused more on large class administration e.g. communication with students, provision of resources and online MCQ-based tests. Confident of these skills, they then mentored colleagues. When faced with a new co-teacher on her module, P14 mentored him into the use of Moodle to establish consistency across modules and to ensure students maintained their

Moodle skills required in subsequent levels of study. Likewise, P15 explained how he had mentored colleagues, and how they have done the same:

> *… I have a full time contract staff (member) who … came and sat with me and I went through a kind of tutorial with her … And she was now encouraging my permanent members of staff … she even said that I have had a tutorial … and I am happy to teach all of you. So I think that there is a similar kind of thing happening now (mentorship and diffusion). (P15)*

These two teachers in Education, mentored by P1, thus themselves began to mentor discipline colleagues in the features they had mastered. This dynamic was important as it was not only those who were highly skilled in an application who were offering, or able, to mentor others. At each level of competency, it was possible for an individual teacher to assist another teacher in bootstrapping their skills to the next highest level. Mentorship may not be a simple, linear process but can also occur by one person mentoring a number of people, or one person may be mentored by multiple people. Both of these circumstances were observed between participants from the College of Health Sciences.

9.3.2 Complex mentorship: One-to-many and many-to-many relationships

9.3.2.1 Mentorship in Health Sciences: One-to-many

Participant 7 spoke specifically about an online module being used to help postgraduate students (including credentialing staff) with their research. This module indirectly also served to mentor the credentialing teachers in SC use:

> *There are some staff credentialing in both years …, some of them have [also] been talking to me about: "How do you do this online, how can I?" … They think about their own teaching and academic development. (P7)*

P7 also had a module designed to mimic a postgraduate experience, to allow teachers developing master's-level module templates to understand the experience of working in a SC space:

> *Now it's down to about twelve, fifteen module templates… four of them … went in [to Moodle] immediately because they knew the process … The others had to be nudged a little bit, and then as soon as they were nudged, they were fine … I think that's what engaged them, is to see the different sorts of things they were doing. (P7)*

This demanded even more effort from P7, as the facilitator, as she was having to challenge her colleagues, as well as explain her pedagogy. Through mentorship P7 motivated a large number of teaching academics into the use of SC in teaching, as explained by P8 and P13:

> *Well she (P7) is brilliant… What she did very cleverly, in the process of getting us to design our modules for this new master's, she made us into students. … So we had the experience of a student in using all these various types of technologies; which was very good for us… really exciting but I don't have enough background to use them very effectively at the moment. So I am very much 'developing'. (P8)*

> *She (P7) has a wealth of information … she really knows her work and she's got lots and lots of experience etc. (P13)*

Besides the effort P7 committed to helping colleagues, the development of the online module that she made participants work through required major effort to develop and monitor. It did, however, provide a vehicle which they could use to bootstrap their own development:

> *… If they experience it, there will be a deep memory [of a negative experience], they'll understand not to do this. And I think that,…taking them through the process of how to do stuff, how to think through stuff, it was interesting. (P7)*

The online master's programme included modules which were common across a number of specialisations. Teachers therefore shared responsibility for developing modules. This allowed for shared effort and mentorship within teams, which reduced the amount of effort required of any single participant:

> *We have done the module, we have done the template, we have done quite a lot of work. … So we were able to experiment and get stuff done there. Which was quite good. (P13)*

P7 reflected in detail on what it had been like being a mentor and taking responsibility for the online master's programme. Some of the results were only achieved due to the additional effort she expended; these outcomes further increased her workload due to knock-on effects:

> *So it's been a hard struggle to get here … I had three years when this was under accreditation, both at university and at HEQC level where I really had to fight the fight, and when I thought that I would have a quiet year of implementation and doing things I want …* (but) *it has become suddenly such a thing to do. I'm now using my time also to train other people, which was an unanticipated addition to this whole thing. … I feel the responsibility to do that, but it's been a LOT. (P7)*

9.3.2.2 Mentorship in Health Sciences: The reinforcing mechanism of many-to-many relationships

While P8 noted how P7's initiative facilitated her use of SC, she also recounted how she was encouraged and motivated by P11 (Nursing):

> *… the faculty research module was where we started Moodle, and Participant 11 … kind of got me into Moodle. (P8)*

She suggested this interaction with people played a major role in motivating her to use SC, specifically in terms of increasing her enthusiasm by providing a focused task to take the initiative forward:

> *…but if I read about it, I am going to be far less… enthusiastic than if somebody comes and says "Have you tried this, let me show you". And workshops … are good if you're going to take it straight out of the workshop and implement straight away. I think what made mine so meaningful was that we were busy with the module: I had to get certain information up on Moodle, and Participant 11 was there behind me pushing me. (P8)*

Due to institutional restructuring into colleges, P11 no longer resided in the same school as colleagues such as P8. However, within the School of Nursing and Public Health, there were three participants who worked closely together: P10, P11 and P12. P12 had a primary focus of supporting the video conferencing facilities and had chosen to help mentor other colleagues more broadly:

> *It is interesting to take somebody who initially was not keen on using Moodle … I know eventually she would have got there, but if she did not have that push she might not have. You know she might be still stumbling around… (P12)*

P11, now located within the School of Nursing, still had responsibilities at a college level. She co-taught on a compulsory module for Health Sciences undergraduates and provided the effort to implement the platform structure, in an attempt to scaffold SC use with a group of teachers . She spoke of the potential of using Facebook for a class of this nature, but the use of the institutionally supported platform seemed to be the better choice as she was not in charge of the offering:

> *I've got a 100, no 200, Health Science students for 'Research' … they're undergraduates. … They'd be the ideal group to do something on Facebook, but we*

don't. I'm a guest lecturer on that module… At least I got them all onto Moodle. (P11)

Mentorship appeared a highly productive process for diffusing the use of SC in teaching and may be configured on the basis of one-to-one; one-to-many; or many-to-many relationships, depending on the context and specific aims. A technology champion may help foster and support emulation (Cochrane et al., 2012; Matthews, 2008).

An individual teacher does not operate within a bubble and their discipline or professional colleagues were usually the main reference groups for academics. The feedback provided, and role of these colleagues (R2) and other academics (R3), in supporting or challenging SC use in teaching was thus important to consider.

9.4 R2 Discipline/ Professional Colleague Reinforcement process

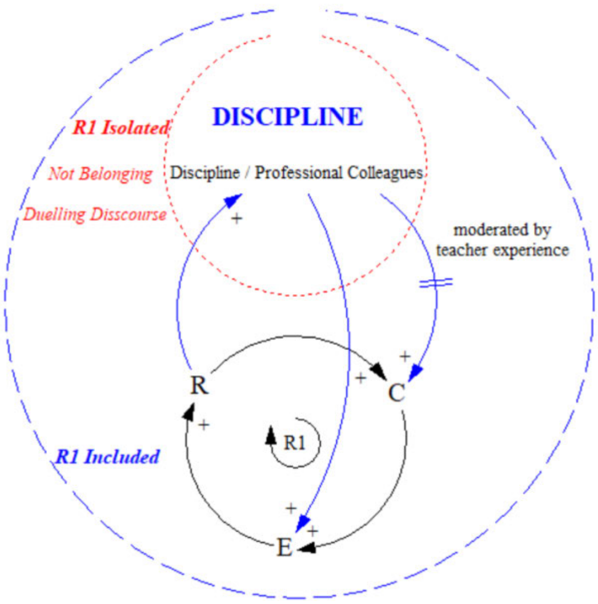

Figure 25: R2 Discipline/ Professional Colleagues reinforcement of R1 SC use

The results of the SC use can be observed and may be discussed by word of mouth (WoM), by discipline or professional colleagues. Their positive reaction increases as results improve and may then lead to an increase in the teacher's commitment to the activity, creating a virtuous reinforcement loop. This feedback loop consists of three basic mechanisms, namely:

the reaction of discipline colleagues to the results of SC use in teaching, the feedback from the discipline as it impacts the teacher's commitment to SC use, and the discipline's support of the teacher by providing assistance towards the effort required to teach using SC (Figure 25).

9.4.1 Observation of SC results by discipline colleagues

Little about the actual observation of the results by colleagues was noted in the transcripts. One example related to how a specific class of P11 worked with a colleague's (P10's) module:

> *You know Participant 10 is a qualitative research expert and the module that is online is qualitative research, … she just taught my 75 students and she told me that it went very, very well. (P11)*

This event reflected as positive feedback both for the teacher delivering the module (P10), as well as for the teacher whose class it was (P11). Both teachers felt the use of SC was advantageous and a useful tool for this particular cohort. This was likely to encourage further use.

9.4.2 Discipline colleagues' feedback to the teacher (R1)

Ideally, discipline feedback is a positive input, creates a sense of a shared experience, is supportive and positively reinforces behaviour. Input from colleagues may be constructive criticism that helps the teacher improve, for example:

> *I know I have a tendency to … I'm getting it from the grapevine, from academics… [Implied: Advice, such as…] "You know when there is change let's make the change [indicates gradually] … and sometimes I don't do it as incrementally as I could. (P3)*

Where discipline colleagues were supportive, in addition to a positive impact on commitment, offers for practical assistance had a positive impact on the teacher's available effort. This had a positive impact on the results, and the feedback loop as a whole:

> *… she has a lecturer from the Netherlands who is teaching … three sessions where we are going to link up with him through Skype. (P12)*

… there are quite a few faculty members who are using various tools, so that's kind of motivating and we can share each other's techniques and stuff… (P17)

So the first thing was that one had to invent HORDES of questions that were meaty enough … it became a team effort from us. It wasn't just out of my head, everybody participated. (P18)

Feedback may be perceived as negative if a feature is not used as intended:

… [going through list of people who've logged on] that's my new PhD student, that's a colleague [repeats colleague five time more], the students are not using it! … You see colleagues, colleagues, colleagues, colleagues. …But why do they go on there if they don't send their students on there? (P1)

This participant did not understand why colleagues who used the research site did not direct their postgraduate students there. She also felt professionally disappointed that her discipline colleagues discarded the curriculum changes she had made in a previous teaching cycle:

I'm trying to revamp the course, which is in itself tricky enough. It hasn't been touched in eight years really. Well, I changed it the last time I taught it, and they threw all of that out (mumbling) … (P1)

They were however exercising their academic freedom in taking a different approach to the content. Elsewhere, she suggested her teaching was characterised by a knowledge code approach i.e. an empirical, more natural sciences knowledge-making approach. She contrasted this with colleagues who had a knower code approach that placed greater stress on evaluation and interpretation (Howard & Maton, 2011). These differences in epistemology may be important to the way in which collegial interactions operate. Fundamental differences may create major schisms between colleagues.

9.4.3 Delays affecting the feedback from discipline colleagues

The impact of the discipline on teacher commitment may be moderated (or delayed) based on the teacher's experience. The teacher's experience of colleagues' previous input, or knowledge of their colleagues' position in relation to the use of SC in teaching, can influence how they react to input.

The issue that I had to face right at the beginning from the academics actually, is the fact that they didn't think that online teaching and learning could work. (P7)

… it was very difficult because the students were resisting … my colleagues …everybody was resisting … I don't want to hear that. And so then I just go down like dominoes, and knock down all these obstacles. (P3)

So I believe it's hard to switch across, even harder … for the 'lecturer'. … You lecture!! We are called lecturers. … I can't force them to do that… because he has his academic freedom and he doesn't want to use it. (P5)

It appeared teachers who used SC in their teaching exhibited a high level of tenacity or persistence, even in the face of opposition or scepticism from colleagues. The responses from these teachers included elements of positive deviance: when faced with the same challenges as their colleagues, they found alternate solutions, potentially outside the accepted norms, that lead to a positive result (Leavy, 2011).

The relationship between individual teachers and their discipline or professional colleagues may present in two different modalities: one in which the individual teacher feels included and part of the group (indicated by the boundary blue line in Figure 25) and the other where the teacher is isolated from colleagues (indicated by the boundary red line in Figure 25). This positioning can be contextualised as the person being either included within a community or isolated and excluded from it.

9.4.3.1 Feedback to teachers who feel included in the discipline

In general, those teachers who felt included within their reference group found the feedback supportive. This was noted a number of times, specifically where a discipline-based community of practice existed, for example, communities centred around P7 in pharmacology and P10 in nursing. Other examples were provided where colleagues spoke of cascading emulation of use of SC in teaching e.g. P3.

9.4.3.2 Feedback to teachers who feel isolated from the discipline

This investigation showed that teachers may find themselves isolated from colleagues. For those teachers who were isolated from the discipline, two modalities were noted: teachers may feel isolated from a group they wished to be part of; or may themselves choose to isolate themselves. In this study, one example of each modality was observed. Their situations only became evident because each chose to highlight their more distanced relationship from their discipline colleagues. Their emotional reaction to the situation was also discussed.

The experience of teachers who would prefer to be included in the discipline

P1 (in Education) felt isolated from colleagues she would like to work with. She suggested ways in which she thought they could collaborate and share resources online and yet there was little (or no) uptake. She was emotionally affected by this, wondering why they were not more participative and engaged. Even while she queried this, she suggested that they had a different paradigm, and while she didn't criticise it she clearly struggled to understand their perspective:

> *Sometimes the experience that I get when they talk to me is that they say they are too busy… My feeling is more that … it becomes a value judgment. Which is very tricky because if you follow Maton, a knower-code is … just different … just as good … and surely it is also because I'm sitting here in (one campus) and they all sitting in (another campus)? …I find it hard to talk about, without it being a finger pointing, which it isn't, because they have got a huge experience to draw on – whereas I have to come at it in a systematic way… It's that kind of conflict … That I'm trying to make explicit and they might sometimes think that either, as a hit on me: "Where do you find all the time?", but also, "Why are you writing all the stuff down. That's sort of obvious?" … (P1)*

P1 presented a duelling discourse which stood in opposition to the dominant discourse (Su, 2010; Young, 2006). The dominant discourse is created by those in power who operated from a knower-code, experience-based perspective, whereas P1 operated from a 'competing' knowledge-code. It was thus difficult for the groups to not only understand, but also appreciate the value of the 'other' position. The situation was exacerbated because these colleagues, from different campuses, were brought together during the institutional merger. They had previously operated as separate communities, whereas they were now placed together structurally. This challenged the identity, or identities, of this newly formed, merged discipline. This tension between colleagues experienced by the group was part of the 'storming' stage of team dynamics i.e. they were still trying to establish the 'new norm' of their identity, and relations as a merged discipline (Baker, 2011).

The experience of teachers who prefer to work in isolation from the discipline

P2 (in Psychology) who also felt isolated from his colleagues, was strongly motivated to make student learning meaningful and emancipatory, unlike his own "fantastically disappointing", "utterly worthless and depressing" educational experiences. He negotiated with academic management to teach all his courses as electives, teaching alone, and designed his own modules so that:

> *…the topics are significant. … They'd never been taught before, I mean they're courses I invented from nothing, they don't exist anywhere in the world…. So I just teach whatever I stumble across that I think is kind of interesting to me … and the students seem to then find it really interesting as well." (P2)*

This 'withdrawal' allowed him the level of academic freedom and autonomy he preferred (Vican et al., 2020). He did not feel an emotional need to work more closely with discipline colleagues or to be less isolated. Interestingly though, he did miss the collaborative aspects of sharing experiences with like-minded, innovative teachers:

> *And the environment that I'm working in, I sort of have to work out Moodle by myself. I mean there is no one that I can talk to and say: "Oh, like how do you do this?" or "What are you doing?", it's like nothing, absolutely nothing, by pure individual trial and error, of like: "OK, if I press this button, what happens?" (P2)*

His isolation was self-imposed and necessary as, without this arrangement:

> *I wouldn't even consider doing it, and then I may as well work like… in a bank then. (P2)*

9.4.3.3 Feedback to teachers: Different views of teaching and learning

There are other fundamental issues over which teachers may disagree. There can be disagreement over what constitutes an 'authentic learning experience, as explained below by P5. Over time students have come to expect an instructivist approach in university lecture rooms, but this is not the way we, as humans, learn naturally (e.g. learning to speak). Our natural, informal ways of learning, could be considered our most 'authentic' approach to learning. However, this was not what students have been schooled to expect, nor what many academics considered to be the appropriate mode for teaching. This can represent another arena for contention, where a dominant and duelling discourse were evident:

> *There is a distinction that we make between formal and informal learning. I think it's a bit constructed because I think learning happens all the time … To them[students] it's [authentic learning] sitting in a classroom… for me to upload all the slides, to stand there and lecture them straight off and to tell them these are the objectives and these are the likely exam questions that you are going to get. … but will they have learnt? No, because I would have just focused them on a few small things, they*

wouldn't have had to engage the topic … I believe if I push them enough, and I've seen this especially in Honours, they move into the other space where they actually are learning and they say "wow, actually… I'm enjoying this". …Yet going into those sort of things they might be like "no just give me the slides". And I think at the end of the day it is thinking about what's the best for them. (P5)

9.4.3.4 Feedback to teachers: Different views of an academic's primary function

If an academic is predominantly teaching or research focused, it may influence what they perceive as the dominant discourse about teaching in HE: P5 discussed how academics could argue that they were not primarily employed as teachers, whereas P8 made an argument for why her discipline had previously focused on teaching and training:

I do think that a lot of people that happen to be at university don't actually have an interest in education, they're interested in their field. So I'm an IT person, I'm an accountant, I'm a marketer and they are experts in their field but that's different to being a good educator. (P5)

Certainly in quite a few of the disciplines in Health Sciences, the development of [postgrad] courses and things have been quite slow as we came in very much as teachers and not researchers, because our main aim was to train and get as many of our professionals out there. (P8)

Both positions have merit and yet both positions are now considered to be dated. Academics are now expected to productively manage both teaching and research (North et al., 2011).

The main focus of the R2 causal loop has been to highlight the productive relationships which can develop between discipline or professional colleagues. It has also highlighted areas of potential contestation which could place colleagues in opposition to each other. This places at risk the potential benefits they could gain by collaborating with, or supporting, those colleagues who choose to use SC in their teaching.

9.4.4 Discipline colleagues' efforts assist the teacher (R1)

When colleagues are supportive of an initiative they may provide assistance which reduces the effort required by the teacher. Numerous examples were provided by the teachers:

There's a learning potential in using somebody else's [material]. … As a lecturer I would say: "Don't throw it out, I'll juggle it around" …so I might take the whole *course and flip it, but I'll still use some of that in it. But I have never had that happen, never …. (loud laughter). (P1)*

What happened with some of these students is that they have other modules that they are also doing online, that's truly helped because you are not trying to sell a new thing ... So with those students that was easy and I think it helped both of us [teachers]. (P10)

But at the same time, you know, there are quite a few faculty members who are using various tools, so that's kind of motivating and we can share each other's techniques and stuff… (P17)

But I mean they are excited. They are keen to do this [implied: create templates]. They have ideas, and if I can get a group together and have a knock-on effect that will be fun, and at least help my responsibilities if I can share them. (P7)

Once a number of teachers began to use SC in their teaching it was helpful if they developed guidelines around their shared practice so that effort was not wasted in duplicating activities, training etc.:

This is what I think should be in the guidelines so that other lecturers do that [as well], and then you have a shared thing, and I think you still have to set rules for the way that the session is going to be – which is very prescriptive – but I think you've got to do it. (P11)

…and we are going to be working with her (P10) ... because she teaches clinical nursing. So we are going to work with her to try and get a simulation up, because neither Participant 12 nor I can do that, because … I'm not a clinical nurse, I'm a mental health nurse. (P11)

These forms of interactions can begin to form a community of practice that was noticeable in interviews with P10, P11 and P12 in Nursing. Their use of SC in teaching had already stimulated activity from other colleagues:

[Listing people…] There is Participant 11, there is – across the passage – Person X [colleague] she is using it. Obviously you know Person S [colleague], she uses Moodle.. ... [continuing the list]. Then there's Participant 10 and Person Y [colleagues]. ...I am only aware of the one which she does with Participant 10 … Who else is there? Person Z [colleague], she has just come on board because we have got a programme running with the Seychelles students… (P12)

9.5 R3 'Other' Colleague Reinforcement process

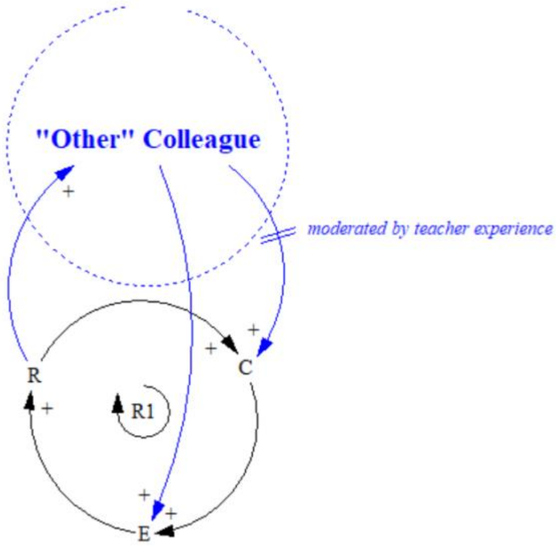

Figure 26: R3 Discipline/ Professional Colleagues' reinforcement of R1 SC use

There may be other academic colleagues who take note of the SC activities of an individual HE teacher who are not from the same (or related) discipline or profession. A similar basic process, or mechanisms (R3), may be in effect, as noted in the R2 loop. This includes, firstly, the observation of the results; secondly, the feedback from the academic to the teacher and the effect it may have on the teacher's level of commitment; thirdly, the potential moderation of this impact based on the experience of the teacher, and finally, the positive effect of another academic providing assistance and effort, to help the teacher; and thereby reducing their workload (Figure 26). Participant 7 experienced this positive reinforcement as participants from the College level (tier 1 within the institutional structure) became involved in the programme which was designed for School level participants (tier 2):

> *So now there's a keener approach to those sorts of things and it has gone up to College level – the fact that it has become suddenly such a thing to do, that I'm now using my time now also to train other people (P7)*

While this resulted in more work for her, it did increase her sense of commitment to the project. The increase in commitment may have been related to a feeling of camaraderie, being supported, and sharing an experience:

I like that. Even if it's not necessarily in a physical team but a networking context. (P13)

Well, the more things are being used, the more I do that. I mean I also need my motivation. ... we had another project, which had some external contacts ... and two or three of the external people got all excited, ...wow...you know? (P1)

In this study there was no evidence of colleagues outside the discipline or college contributing effort to the teachers' SC use and the teachers did not report their reactions to such input moderated by experience.

9.6 R5 Emulation/ Diffusion of SC use in teaching Reinforcement process

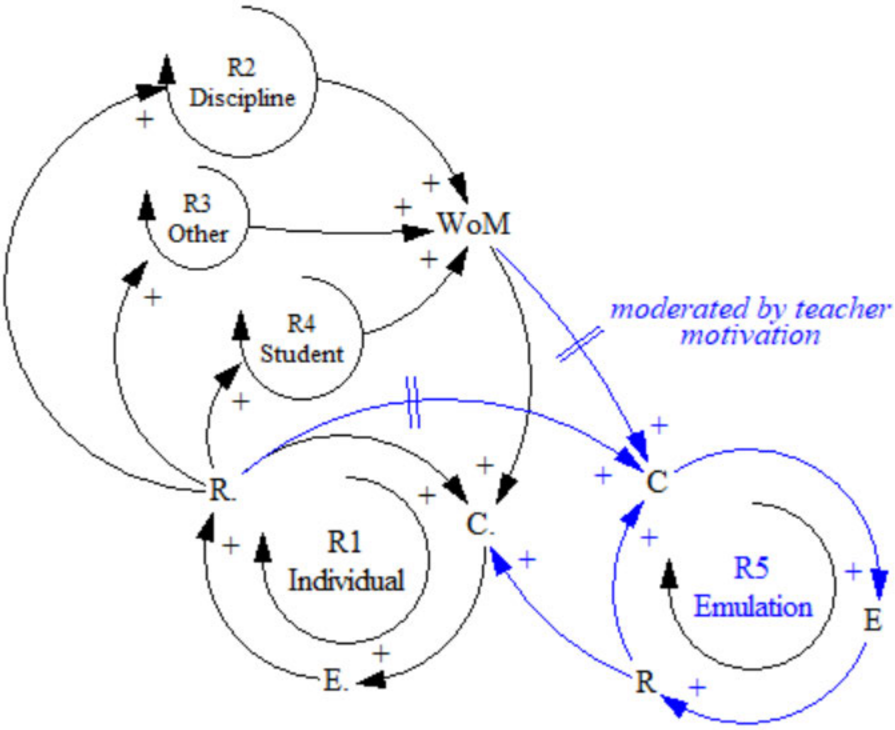

Figure 27: R5 Teacher emulation of SC use (R1)

An individual teacher who emulates the activity of a colleague using SC in their teaching could come from within the same discipline, profession or institution, but may not. An academic who had observed (as members of the communities represented by R2 or R3), or heard about the teaching intervention (via WoM) and who chose to emulate this practice was represented by R5 (Figure 27). While this reinforcement loop, in its most basic form, is the same as the diffusion process of Repenning (2002, p. 113 Figure 3), it also represents Tilly's emulation process (Krinsky & Mische, 2013). R5 represented a positive reinforcement loop, as the results of the diffusion of the practice served as a stimulus to the individual teacher to continue, or perhaps increase their commitment to the use of SC in their teaching.

The uptake of the practice may, however, be delayed, and the impact of WoM moderated, by the emulating teacher's level of motivation:

> *When I came here technology wasn't even on the chart… so nobody in this School, discipline or any faculty had any idea about it. … So when I first mooted that this is what I would want to do… you can imagine the consternation that caused. But you know it is amazing how it has changed in the last couple of years… more and more people are seeing the need. (P7)*

Participant 1 suggested that it was more complex to motivate an academic than the basic, and less successful 'carrot and stick' method UKZN management used to motivate academics:

> *… but I disagree with … the methods that they use …There are only carrot and stick…and preferably both at the same time; and that's not what academics are like. We don't like carrots and we don't like sticks, don't come here and tell me what I should do…you know. So what you do, is you strategically place some carrot where we walk past and you go, "Whooohoo look, I've found some carrot!" You don't hold it on a string in front and say "That's the way to go". It just doesn't work. So I think it works much better in terms of people getting excited about it and talking about it. (P1)*

Of note, was the fact that this diffusion process may only bear fruit much later, and the teacher may not even be aware that their practice had been emulated. P1 explained how her efforts to engage some of her discipline colleagues had been unsuccessful; she felt isolated from them as they were from a different campus and had a different paradigmatic approach to teaching (knower- rather than a knowledge-code worldview) (discussion under R2, section 9.4.3.2). P15 was based at the 'other' campus referred to by P1, and unbeknownst to her, he reported that her input had a delayed, but direct, impact on his teaching:

> *You know in 2010 I taught the understanding research module for the first time. And that is when … Participant 1, … set up this learning site for 'Understanding Research'. And I made very little use of it. … It was a very new thing for me having lectured here for ten years… [Lecturing had been] in the traditional [way]: You go to the class, you lecture … I did not see the seriousness of it then because we're dealing with 80 students, 90 students. It is during the course of last year when I realised that the undergraduate students where we have large numbers are battling and*

complaining … that I realised "Well listen that is the route to go…", so I had not even used it … Ja, I probably would have not known that; that [Moodle] is an option (P15)

And he then, subsequently, experienced the same inertia from his colleagues as P1 had complained of:

I am the one then, who pushed people like Person AH [colleague]… to get this thing done. In fact, right through the module Person AH [colleague] kept sending stuff to me and said "You put it on…" So, I also got the other modules on…but my colleagues did not make use of it. (P15)

He explained how the decision to use SC was influenced by a number of issues, and only if the imperative was great enough to overcome the hurdles would he consider making the necessary effort to change his way of teaching:

…it was not an active resistance … I think it was a normal human reaction to something new. … there was not a kind of compulsion to be using it. No need, with that small number of students and … I was completing my PhD at that time. So the emphasis then was on, 'OK I do not have time to learn something new now, let's get the PhD out, learn something new later on'. … I think it is a combination of various factors that pushed me into this. (P15)

The importance of personal motivation was thus critical to the diffusion of a teaching innovation. There were colleagues who were simply not interested, or motivated, to consider a different approach to their teaching:

Another problem that we have specifically in dentistry is that a lot of our work is … clinical skills, it's patient interaction … So that we cannot … substitute or even put online, … the way we can, is to … put some of our theory online … Some of us are really willing to try this out but others are saying "sorry but my face to face contact is sufficient and I'm quite happy with having to do it". So in a lot of ways it is also personal preferences. (P13)

Motivation arises either due to intrinsic or extrinsic rewards or because there is some form of social obligation (Backhouse, 2013). Instrumental motivation is the interplay between the individual reinforcement loop (R1) i.e. personal agency, and the WoM of the diffusion/ emulation loop (R5) (Repenning, 2002). Initially, when there is no track record of success, WoM will be negative and management may choose to counteract this is by applying normative (balancing) pressure to encourage participation. If the normative pressure, or the personal commitment of the teacher are not sufficient to counteract negative feedback mechanisms from R1 and R5, the motivation threshold will not be reached (Repenning, 2002). The motivation threshold can be defined as "the level of commitment at which the reinforcement and diffusion processes switch directions, moving the implementation effort from a reversionary state [*added: negative, downward spiral*] to a regenerative one [*added: positive, upward spiral]*" (Repenning, 2002, p. 119). Teacher motivation is thus the precursor to the commitment they will exhibit, the effort they are prepared to expend, and thus the results which can be achieved. It was suggested that reinforcement, diffusion and the normative pressure, and their positioning relative to the motivation threshold, would determine what action can be expected.

While the processes covered in sections 9.2 to 9.6 have further explored mechanisms operating at the individual level, support and reinforcement at a structural level is important to sustained achievement and success. These are discussed in the following two sections.

9.7 R6 Institutional (UKZN) Reinforcement process

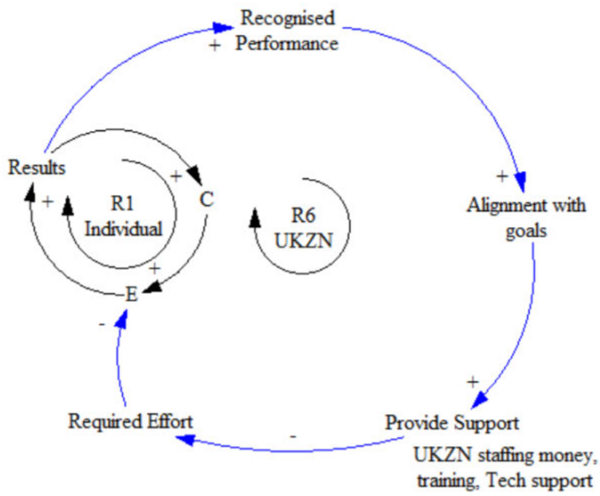

Figure 28: R6 Institutional support positively reinforces SC use (R1)

When there is institutional recognition of the positive results being achieved by a teacher this can result in additional opportunities to enhance the teaching innovation. As suggested by Figure 28, positive results are recognised as the appropriate outcome expected from an HE teacher. This brings the teacher's achievement into alignment with the institutional teaching innovation (TI) goals. Alignment with institutional goals can facilitate access to resources, or funding for resources; this can reduce the amount of individual effort required. As the amount of support increases, it reduces the required effort from the individual which ultimately means the individual has more 'effort-capacity' or available effort, to expend on the SC initiative, supporting the positive reinforcement loop (Griffith & Altinay, 2020).

Some of the resources required may be made available as a normal part of institutional operations e.g. technological training, support staff to assist in administration or teaching support of students, and technical support to help teachers, teaching assistants and students. It is possible that these resources are limited and not as readily available, and in insufficient quantity, to serve as enablers of SC use in teaching. All participants, with the exception of P5, stressed the need for supportive resources (Figure 29).

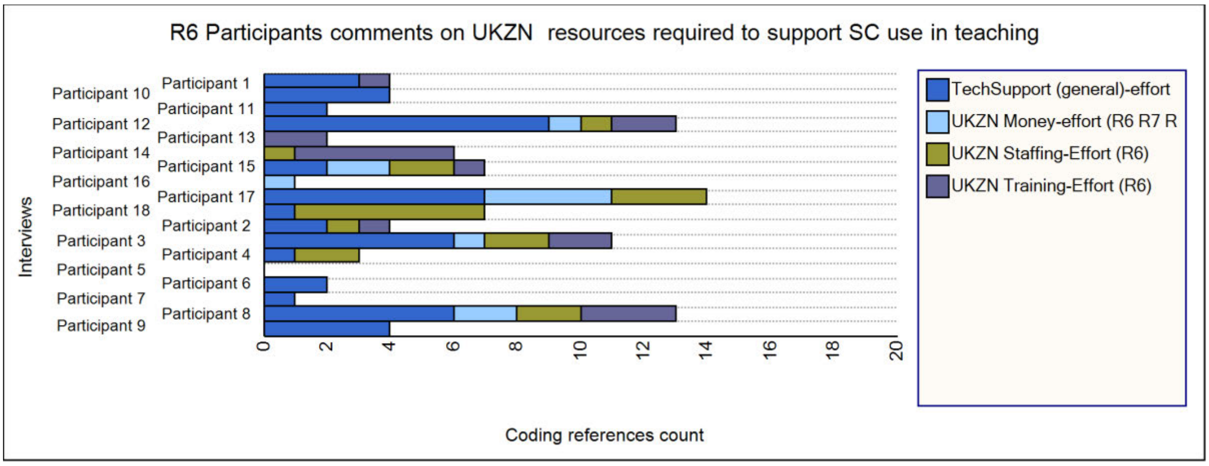

Figure 29: Institutional resource support required for SC use in teaching

The availability of appropriate technical support received the most attention i.e. roughly half of all comments on institutional resource support (14 of the 18 participants). Institutional support was coded in NVivo to identify technical support, money, staffing and training.

9.7.1 Technical support

UKZN technical support services were tasked with general computer technology services and institutional platform support. This did not include the mechanics of how to use specific features of a platform. Specific features and platforms may be supported by other institutional departments e.g. the library provided training on Endnote bibliographic software use. There was some support of specific learning platform features via the Academic support services division:

Person AI [Ed-Tech Colleague] … our education technology person … is quite helpful, in fact he has been instrumental in helping me to set up the Moodle site. (P15)

I realised that there was an IS&T school … so I went and talked to somebody there … … they finally told me there was this thing such as Moodle. (P3)

There may be issues requiring different departments to resolve teacher challenges. P8 spoke of a case where the use of computer tablets in rural areas to record case histories of patients presented a variety of challenges: the security of the device and insuring it against loss and damage, as well as arranging how wireless data access and control of software would be managed, were some of the issues mentioned:

… who is paying and how much airtime, security to stop the students from abusing it … So we have been spending nearly a year trying to sort this out. … they're not very quick with coming back to me … (P8)

Teachers appeared to be working at the 'bleeding edge' where institutional policies and mechanisms have not been determined and teachers requiring information were seen as challenging the departments' traditional modus operandi.

Students also required technical support. Student support fell primarily to module teachers and academic support staff, who trained students in the use of teaching platforms.

… in the beginning I use Participant 12 and say "Give them all the basics" … we do one orientation and it's actually not enough you need to go away, you need to play and you almost need to have like a second orientation. (P10)

… sometimes I just dread students, I am trying to …troubleshoot them … and I can hear they are on a screen which they should not be on … and I just say to them …just keep pressing return, return till you get to the screen that I am looking for. (P12)

… there are five sites … it's very disruptive 'cause … while you are teaching, somebody is trying to dial in and … it's very start and stop. … this is truly how it goes sometimes: "Madedeni, Madedeni, Madedeni can you answer the question?"… The minute that you start having slides up, you can't see the students very well … they're split on this little screen; you can't see if the students are confused …you know?(P11)

The technical issues may be site-specific and dependent on the interface with other institutions. The postgraduate nursing modules were one example, introduced in the quote above, and explained further below:

> *It is proper video conferencing, we use… ISDN lines, it is not web conferencing. … We use that because … we have been to government hospitals and ISDN at this moment in time is more reliable and government cannot afford bandwidth. The other thing is they dial us so the cost of the call is incurred by their end as opposed to us. It's real-time. (P12)*

There were also technical issues when collaborating with other teachers cross-institutionally, as platforms may not be able to operate seamlessly:

> *Most of them [colleagues in Sweden and the USA] are using Adobe Connect which is a problem for us. … It was just a complete nightmare we actually couldn't link up in the end, it was just horrible. There isn't really any other way unless our project with [the Swiss] shows that we can just use Facebook … they had great success [with that] in Nepal … (P10)*

In many instances teachers talked of doing something for a colleague to help them become operational more quickly. While this was helpful it may provide short term gains but reduce the diffusion of skills in the longer term. The result of this 'support' was that those who were competent continued to reinforce their knowledge and skills, while other teachers became more reliant on those with skills, rather than becoming empowered themselves:

> *I mean sometimes they come and ask me a question and … I'll say, "You know just leave it with me …". I know sometimes they should fix it themselves but sometimes just to keep the momentum going I would rather just … Give them … a smooth path. (P12)*

It may be difficult to determine if providing assistance is allowing the teacher to overcome an initial hurdle; or if it is creating a dependency which means the teacher is not able to sustain the initiative themselves. The following example presents such a case:

> *Look we've used the older platform, OLS, … now the university is using Moodle … So I said "OK, well, what do we need to do?" and he basically gave me the materials that he had used in OLS and that I was to put it into Moodle. (P17)*

It was not clear whether the senior colleague had the knowledge to migrate to the new platform or if he was dependent on technical support. In addition, it becomes debatable whether or not the teacher needs, or should be required, to have all necessary technical skills, or whether these should be supplied by the institution. There were also concerns that if educational technologists are given carte blanche to develop online courses based on academics' content, when they are not content specialists, this can 'deprofessionalise' the work performed by teaching academics (Ocak, 2011; Scott, 2013; Shelton, 2014).

9.7.2 Financial support

Teachers may choose to use open access online applications to avoid software costs. They may, however, need access to additional software features which have to be purchased independently of the institutionally provided tools:

> *… there are a lot of technologically related things that Moodle can do and that I need to purchase to make it work better. (P3)*

Internal UKZN funding calls for teaching and learning initiatives are advertised, awarded and monitored by the University Teaching and Learning Office (UTLO). Funding is available on a competitive grant basis. Support may also be provided through external grant funding (discussed in section 9.8). Funds can be used for a variety of purposes, including hiring staff (P17) and purchasing equipment (P8):

> *… in 2011 we applied for Teaching and Learning funding… so we can hire a tutor; a technical tutor who can guide students through… So we put together a little grant funding and just got R6000; enough to hire this guy, (P17)*

> *They're [computer tablets] actually from a teaching and learning research grant … if this proves to be successful then it could be much easier to motivate for each discipline who is participating to buy their own set. (P8)*

The amount of time and effort required to maintain an online environment for students was often underestimated. The relief teachers felt at having such support was noteworthy:

> *I think in the past, there were some students …not logged onto Moodle. … Whereas when we had the technical tutor, well they were signed up… People who couldn't get it? They knew that he was ready to assist, and they weren't coming to me trying to figure out how to get it to work. So that did somewhat put me at ease. (P17)*

But there was concern about what happens when budgets are cut:

… if they don't cut our tutorial funding. I was hoping to have a whole lot more [tutors and tutorial groups]. (P4)

9.7.3 Staffing support

The discussion has already suggested how tutor, postgraduate assistant or contract staff support is necessary to assist with the training of students and to assist with providing online student feedback. Contract appointments, while useful, are however not ideal as they are limited in duration. This means a lack of continuity in staff appointments with the concomitant overhead created by needing to continually train incoming staff. Permanent positions to support these initiatives were generally not available. Where these academic technical (or software) support staff were available, they were centrally located within 'Academic Computing', in the division of Information Technology Services (ITS). A limited number of these specialised staff were employed to support all academic applications such as Moodle, Endnote, NVivo and SPSS. This was an operational limitation when numerous teachers required support.

Disciplines with 'technical' posts available e.g. to assist with laboratory work, may be able to repurpose such positions to help address these challenges, but these opportunities were limited:

… and initially they were going to employ somebody on contract and they approached me … I said "Why go from a permanent to a contract (post)?" So they managed to release a post here. (P12)

There was also a sense of a disconnection between the demands being made of teaching staff and the staffing resources provided to achieve these aims:

… maybe you know, start using it [Moodle] more prominently in our teaching because the vice chancellor said … his job is to get the numbers [number of students registering at the institution]. He does not deal with space and things… Meaning that it is our problem… we have to sort it out… So you have 1400 students, three permanent members of staff, how do you deal with that? (P15)

It was possible there was a disconnection between the ideal situation the teacher was attempting to create and what was practically sustainable. P18 suggested students were happy to continue submitting journal entries even though they required concentrated effort, but the initiative had to be halted because the staff could not continue to comment on their entries:

> *We had about 120 students and … four or five tutors … it used to take me an entire day and a half to read and respond to the journals. …And over the years we had to cut that back it just became impossible… I mean interestingly it wasn't the students who had a problem with doing the writing so much… It was the management and the feedback from the tutors that I had to be careful to manage. (P18)*

9.7.4 Training support

The availability of training and the nature of training provided can improve the use of SC in teaching, but when misaligned with what teachers required it did not improve the situation:

> *I mean how did we get started on Moodle? Remember how they had that whole tour around and gave us all these shows and it was absolutely useless? (P1)*

There was a suggestion that a 'one size fits all' approach to training on learning tools and the use of SC was unlikely to succeed (Cochrane et al., 2012). Training workshops appeared to have value but only if embedded within a broader strategy of implementation and ongoing support (Chimbo & Tekere, 2014; Glenn, 2008):

> *OK there was a Moodle workshop that was advertised and I'm one of those excited people – those adventurous people 'there's something new let's try it.' …. [Then] we pick up the problems then we realise 'ok fine it can't work as yet let's look at how we can use some elements of it and build' and we worked from there. – I think it is a combination of both (formal training and informal assistance). (P13)*

> *.. but if I read about it, I am going to be far less for e.g., enthusiastic than if somebody comes and says "…have you tried this, let me show you"? Workshops … are good if you going to take it straight out of the workshop and implement straight away. (P8)*

The monetisation of support services, where 'users' have to pay for these services, may become self-defeating. Such strategies may trigger an austerity approach to managing a discipline. In such circumstances only the absolutely necessary is financed, and any attempt to do anything outside the minimum required by a dominant teaching discourse, will not be supported. Evidence of this behaviour was provided by P14:

I mean one of the things that I have been very disappointed about this year is that we used to have computer training here and you could go for a morning workshop and if you went it would cost you nothing … They have taken it all away. Now the only thing they are offering is something like R2000 a morning and it is based at [another campus]. (P14)

Some teachers found workshops unproductive and preferred a self-study approach:

… there was a computer course that was being run … I went the first day and I never went back again because I realised that I can sit in my office [implied: and learn]. (P15)

Well, first of all, with Moodle, I'm still teaching myself Moodle in a lot of ways, you know. (P3)

The discussion suggested that it was very difficult to use SC in teaching unless there were adequate resources. While UKZN had resources available, and a funding mechanism to assist teachers in this regard, these seemed to be inadequate to sustain broad-based initiatives. These resources were not guaranteed to be available on an ongoing basis. Where 'SC use in teaching' initiatives were thriving, it appeared to be because they had been able to release additional resources (such as re-purposing staffing posts), because they had accessed additional resources through personal sacrifice and effort, as well as through accessing additional funding.

9.8 R7 External grant funding reinforcement process

The reinforcement process supported by external grant funding consists of the same mechanisms as R6 (UKZN institutional reinforcement, see Figure 28). Funders' provision of support for SC in teaching depends on the alignment of the aims and results of the interventions with the goals of the funders. In most cases, external funders do not supply resources per se and prefer to fund a pre-approved budget for an initiative which is expected to include all resources which may be required. As teachers become more experienced at using SC in their teaching they also become more aware of the types of resources they require to improve the chances of a successful result. This experience allows for more realistic budgeting when applying for grant funding.

Two participants raised the issue of external grant funding. The question of external funding was not targeted during the interview process and only came to the fore during analysis.

> *…nursing … received … a grant. … From what I can gather … in line with the Millennium Development Goals, they decided to implement this advanced midwifery programme and the only way that they could think to reach students in the rural areas is to use video conferencing. So from that grant we paid to set up two video conferencing venues: one is completed, the other one is half completed…(P12)*

> *I have NRF (National Research Foundation) funding … last year because of the NRF funding I got everybody together…(P7)*

There are however also instances where resources may be provided by institutions or organisations with which the teachers have partnered:

> *I also get funding from the Italian government … that is why I have been able to sort of liaise with Public University 4, Italy. … the Italian government at the moment, …sent me 5000 Euros. … I pay for the tutors … I give bursaries to the students … [But…] I mean they can stop tomorrow; you see? They haven't to date; but they could stop tomorrow. (P16)*

Reinforcement loops R1 to R9 focused specifically on positive reinforcement processes, which support the use of SC in teaching. There were however mechanisms or processes which may be negative and reduce the commitment to use of SC in teaching. These are discussed in section 9.9.

9.9 Negative reinforcement mechanisms or processes

All the reinforcement loops already discussed (R1-R9) can become reversionary, or negative cycles if a mechanism results in a negative impact. However, there are also specific conditions under which the positive, virtuous loops can be undermined and which can cause a process to become a negative feedback loop.

9.9.1 R1 The benefit of accumulated effort for repeat offerings of a module is lost

If a teacher is asked to teach a module they have previously taught again, there are benefits to be gained from the previous effort expended. The effort expended and results achieved in the first offering, particularly if some success was experienced, serve as a platform for the subsequent offering. This means that the potential re-use of activities, or their modification, helps to reduce the setup costs. The challenge is that teacher efforts may not deliver this benefit if the module passes to another colleague to teach. The ‘new’ teacher may treat the module as a blank slate i.e. starting afresh and the repeated-use benefit of the effort spent will not be realised:

> *The sense of continuity – you have a course. You do a couple of things with it, you try a few things, … and there’s continuity in terms of the course, but also in terms of what students experience. Because now it moves to somebody else, and it becomes like a blank slate that gets begun again …(P1)*

This creates a potential ‘leaky pipeline’ where gains achieved in a specific teaching context are lost downstream because the overarching process of teaching workload allocation, is not managed optimally.

9.9.2 R4 Students’ prior, limited, experience of a platform creates a hurdle

The more students are exposed to SC use, specifically in their formal learning environment, the more familiar these tools become; the benefits of their use are realised, and the more students become engaged in their use. Students’ use of such tools can however also be negatively impacted by their prior experience of SC use in teaching. When SC platforms were used only to post content and notices, the students’ expectation of the platform was very low or even negative. In this situation, prior exposure was a negative influence:

> *I know that a lot of colleagues … use all of these tools … as a place for posting content. … And my one concern was that students would come to that space with pre-conceived ideas of what would be in that space. … I had no clear idea of how they would have experienced it. … But the odds were heavy on the side that it was going to be a place where material was posted and for notices and not on the side of a rich discussion, engaging space. (P6)*

Under these circumstances, if a teacher stressed how important the SC activities were to the learning experience, they may have been met with scepticism or even derision. Students need to be educated into the use of the tool, and experience the positive benefits, before they may be convinced that SC use is valuable for learning. Participant 5 chose to address the issue of different pedagogical approaches, and tried to mobilise students at the start of a module; so that they could become engaged and experience the benefits as soon as possible:

> *… to do that mind shift … they do have to track with me on that … I explained how the thing is going to work; so I actually gave them very simply the theory behind what we are doing … but I still believe it takes a while. (P5)*

9.9.3 R10 Independent co-teaching colleague negative reinforcement process

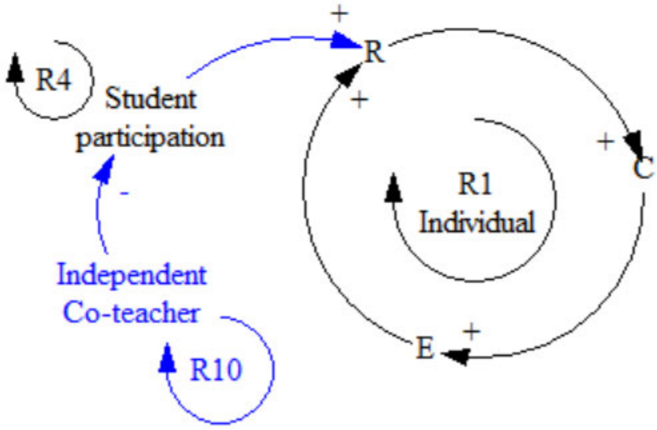

Figure 30: R10 Independent co-teacher negative reinforcement loop

In a co-teacher context, the approach to the use of SC exhibited by the co-teacher on the module can have a major impact on the results. An 'independent' co-teaching colleague with a neutral, disengaged or negative attitude towards SC can cause students to be sceptical about the benefits of SC activities being attempted by another teacher on the module. This impression can be created merely because the co-teacher does not use the platform in their teaching:

> *I shared the course with (them)… using Edmodo. So I said 'Here is Edmodo we are using it'. None of them did anything in Edmodo. (P5)*

> *… I'm going to have to run it [this module] again … It would be nice if for your half of it you could do the same, it is your choice – but I would like us to have eTuts …So I try to get a level of buy-in but as I said, it doesn't always work. (P5)*

Students read contextual cues and if the platform was not being used by the co-teacher, then it was likely that the co-teacher did not feel it could add value to the teaching process. This assumption may not be true for the co-teacher: P15 has already explained how other commitments (his PhD) and a small class size may influence a decision around SC use in teaching rather than a consideration of the efficacy of the application itself. Students were not however privy to these issues and thus, by Occam's razor, they may decide the SC interventions are not important to their learning, until this is somehow flagged differently for their attention.

Because HE teachers have specific responsibilities assigned according to their job descriptions, there will always be an institutional imperative for academics to achieve specific outcomes as determined by the institution. These serve as performance benchmarks against which an academic's results will be compared.

9.10 Normative or balancing loops (B1, B2 and B3)

UKZN teaching academics were expected to meet a number of benchmarks as part of their performance management. As in most HE institutions globally, at UKZN these included participation in a range of activities related to teaching and supervision of students (45% of time), research and academic publication (40%), module and institutional administration (5%), and ensuring local relevance of these initiatives through community engagement (10%) (Vithal, 2011).

The 'balancing' or normative pressure is a process intended to assist academics to perform according to institutional requirements. All balancing loops depicted operate according to the same basic mechanisms and are thus depicted on a single figure (Figure 31, page 279). Administrative and community engagement responsibilities are not included on this figure as they did not form a prominent part of the participant discussions relating to SC use in teaching. B1 relates to teaching workload (TWL) i.e. the total number of hours allocated to the teacher, to deliver specific modules or supervise students. This includes F2F teaching, supervision and any online activities. B2 relates to research activities which academics are expected to perform. The artefacts of research or creative endeavours are assigned specific productivity units (PU) with the academic lecturer expected to generate 60 PU per annum. B3 is of particular relevance to this study as it relates to teaching innovation (TI), i.e. innovations HE teachers implement to align their teaching with best practice in their disciplines internationally, thereby ensuring students receive the best possible experience during their studies. B3 will be discussed in more detail in section 9.10.5, but it should be noted that this 'teaching innovation' component receives little attention in the institutional narrative.

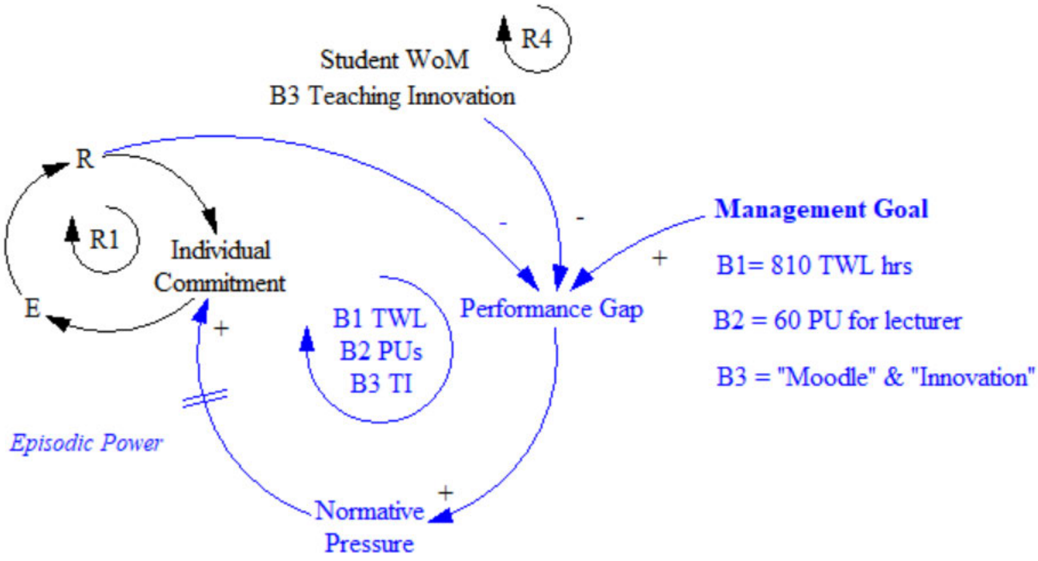

Figure 31: Three normative loops for teaching workload (B1), research productivity (B2) and teaching innovation (B3) operated at UKZN

9.10.1 Mechanisms which form the basic UKZN balancing loops

Repenning's (2002) process of normative pressure is based on the comparison of the individual's commitment to an innovation as compared to the goal determined by management. The performance gap between the performance of the individual and that expected by management forms the basis of the normative pressure. At UKZN performance is monitored via a performance management (PM) process. The process is outcomes-based i.e. based on the results of teachers' actions, rather than their commitment to such actions. As an individual's results for an academic requirement increases (i.e. teaching workload, research productivity or innovation in teaching), the performance gap between the individual's result and the performance goal required by management, reduces. If management chooses to increase (or decrease) the requirement goal, the performance gap is also affected, either increasing (or decreasing) accordingly.

Specifically, in the case of a teaching innovation (in this case use of SC), the feedback from students to management can play a role in the normative actions employed by management. Increasingly positive comments will result in the teacher being assessed as performing well, which will reduce the performance gap. However, student unhappiness with a teaching innovation e.g. if it requires more work on the part of the students, when reported to management (as in the case of P3) may result in management feeling the actions being implemented are not appropriate.

The assessment of the performance gap will lead to actions that further align the teacher's actions with that required by the institution: This is represented by normative pressure e.g. if students complain about a teacher's behaviour and management determines the teacher has strayed too far from what is expected, the performance gap will be seen to have increased i.e. the teacher's actions require major realignment. 'Management' in this figure represents the line management of the teacher. When an intervention is required it will be monitored, discussed and implemented by one of the line managers of the teacher i.e. the Academic Leader of the discipline, Dean/ Head of School or DVC/ Head of College. The greater the performance gap, the greater the normative pressure applied. Additional normative pressure is expected to increase the individual's commitment to the task. Limited results, or poor performance, is 'balanced' by normative pressure being exerted by management, which is anticipated to lead to greater effort and greater results.

9.10.2 Lack of normative pressure: administration and community engagement

Of specific note is the fact that there are no clear metrics prescribed to indicate the expected norm for administration or community engagement responsibilities, whereas specific metrics are assigned for both TWL and research. In the interviews with participants, no specific emphasis was placed on the impact of administrative responsibilities on SC use in teaching, other than if a participant felt this duty impacted their available time to invest in specific initiatives, for example:

I'm not teaching the Honours, because I'm serving as academic leader. (P3)

The importance of community engagement was noted as important to ensure relevance of the academic project, for example:

What will make it better? How can we go research and talk to people in our community and find out what will make them feel better or make the government perform better? What do the people in the community think performance indicators should be, how will the people know if they're satisfied? (P3)

But there was one instance where practical work within the community was mentioned by P8; and SC tools were mentioned as a means of improving the communication and feedback between patients, students and the teacher:

We [Occupational Therapy] have students that go out on a community practical. … They then do things like home visits, school visits etc. So you might have a lady who has had a stroke, who has been discharged from hospital, she has got speech problems, paralysis on the one side etc. And then a little group of students will go to her home. … [They] can actually do a video recording of her and send it back to me, the lecturer. I can look at it and advise [the students]. (P8)

However, teachers did not concern themselves with the fact that there were no metrics or comparative measurements related to administrative functions or community engagement. These aspects of academics' responsibilities were thus not modelled in the discussion of this project. The specific requirements related to teaching and research were discussed by participants, with the most emphasis on the TWL allocation model and its repercussions.

9.10.3 (B1) Normative pressure related to the UKZN Teaching Workload (TWL) framework

The purpose of developing a framework for teaching workloads at UKZN was to "provide objective quantifiable measures of the teaching related activities of individual academics that have application across the University" (Vithal, 2011, p. 2). The intention was to address the inequalities created by the use of a range of workload allocation mechanisms across the institution (Vithal, 2011). While the framework suggested that the constants used in calculations were negotiated, the reality suggested this was not the case in most instances. The senate-approved allocation of 45% of an academic's time to teaching, results in a teaching workload of 810 hours / academic/ year (Vithal, 2011, p. 4). This normative pressure on teaching time focuses on teaching as a F2F activity as UKZN is primarily a contact teaching institution. Few modules operate on a distance education basis (most notably postgraduate offerings) with SC-supported modules most commonly delivered in a blended learning format.

This study does not intend to debate the merits of a TWL framework at UKZN, or workload allocation models (WAM) in HE, in general. This is a global phenomenon which has gained traction as the HE sector has become commodified, and is beyond the scope of this study. More importantly the intention was to describe the norms for HE teachers at UKZN as well as to gauge participants' responses. It should be noted that this was not an area specifically interrogated and arose as part of the inductive coding of the transcripts. Two aspects with regard to the TWL coding (as summarised in Table 13) deserve noting: firstly, in general, participants focused more directly on the amount of time SC could save them in their teaching responsibilities, and/or how much time SC use in teaching required of them, rather than focusing on the TWL framework per se (P6, P7, P8, P10, P11, P12, P14, P15 and P17); and secondly, limited comments were made which directly linked to the TWL and its applicability or appropriateness (P1 and P11).

As already discussed, P1 felt the TWL was poorly conceptualised and conforming to the TWL assigned hours appeared to potentially be contrary to good teaching practice and to the detriment of both the students and the teachers. Her description was detailed and evocative as she expressed sentiments that most teachers can relate to and went to the heart of concerns raised in relation to WAM generally: the TWL was highly prescriptive and assigned global norms across the institution irrespective of the nature of the content or the pedagogy being implemented. She also suggested that the time pressures created by the TWL would cause SC to be used where it can reduce teacher time (effort) e.g. for administration, but is less likely to be used in ways that increase teacher time investment e.g. developing student engagement activities. The normative TWL process often assigned teachers F2F teaching or supervision responsibilities, which in practice consumed more of their working hours than the institution recognised. This placed teachers in the untenable position of either teaching to the hour-allocation for a module, which P1 suggested from her experience resulted in an inferior teaching (and learning) experience; or the teachers use more time to deliver the type of teaching experience they feel should be provided. If a teacher chose the latter, this would either be to the detriment of their other academic responsibilities, or at a cost to their personal time.

Table 13: Participant quotes on the teaching workload norms at UKZN

	Participant comments on teaching workload commitments
P1	Look, you and I know how totally absurd those norms are. …. Wow, I did that so quickly, 2 days and I planned an entire course. …And (the time) … allocated …was gone. … no time to prepare for each individual session, … adjust the plan, … no formative assessment … and then the amount of time set out for marking!
P2	
P3	
P4	
P5	
P6	… using social computing, engaging students in this way demands more of me in terms of time… I don't see (them) … as helping me spend less time on a course or somehow freeing up time.
P7	They like the fact that we are available all the time … they call me over the weekend
P8	… (we need technology) to free us a little bit … But again one needs the time (to use the tech) … I would love to be able to spend more time looking for and creating …
P9	
P10	Having said that all of these things are EXTREMELY labour intensive for the teaching. It would have been so much easier if I just sat and did my lecturing.
P11	I don't think the time allocation is adequate … the (video conferencing) technology is … driving the teaching to become lectures. – (Also) I don't think that learning stops at 5 o' clock… So I don't have issues (being available) … that's not normal for everybody
P12	People think it is extra work … I say, it's not extra work, it is actually an ideal opportunity for you to review your curriculum and change it and move with the times
P13	
P14	… I put a lot of readings up there, I put all my instructions up there … anything that is more interactive and also takes work away from me …e.g. that I do not have to do marking, like MCQ marking
P15	… once you get used it, it is not time consuming … most often you are uploading documents for students which you already have on your system. And it takes … a couple of minutes to upload
P16	
P17	The first year … the time frames were very short… so he drops me in and we just have to get It done like now, now, now. But now we have a lot more time, we have some planning, we've discussions now with ITS,… with Teaching and Learning…
P18	

9.10.4 (B2) Normative pressure related to UKZN Research Productivity Unit (PU) requirements

UKZN is committed to being a research led institution (UKZN, 2014), as stated on its webpage (https://www.ukzn.ac.za/about-ukzn/vision-and-mission/ , accessed on 2 January 2020):

> *A truly South African University of Choice that is academically excellent, innovative in research, entrepreneurial, and critically engaged with society.*

Research productivity is measured in productivity units (PU) at UKZN. This is a "weighted value of the AU [Author Unit, determined by Department of HE] allocated to different categories of UKZN accredited research outputs" (UKZN, 2014, p. 5). A researcher receives a payment into their research cost centre based on the number of PU generated in a calendar year, as well as the allocation from the DoHET. A lecturer is expected to produce 60 PUs p.a. The number of PU assigned to a specific research activity varies e.g. a journal article is 60 PU. Ratings range from 4 to 100 PU, dependent on the activity (UKZN, 2014, p. 22).

> *You're obligated to produce on both the research front and the teaching front. (P7)*

> *… this huge thing about publications. Publish or perish. We are just not getting the time to do it. (P8)*

The tension between the teaching and research commitments of academics was evident.

9.10.5 (B3) Normative pressure related to UKZN innovative teaching requirements

UKZN has as its main goal (Goal 1) "To achieve **excellence** in teaching and learning" (https://www.ukzn.ac.za/about-ukzn/vision-and-mission/ , accessed on 2 January 2020). The application of technology to enhance education is considered part of the teaching norm in HE and thus UKZN aims to foster the use of such teaching tools to deliver world-class teaching to its students. This is supported by the fact that it has established a dedicated University Teaching and Learning Office (UTLO):

> *The University of KwaZulu-Natal has positioned itself as the premier university of African scholarship and the primary responsibility assigned to the UKZN Teaching & Learning Office (UTLO) is to provide leadership in all areas of teaching and learning and institutional research to realise the University's vision, mission and strategic plan with regard to teaching and learning. In fulfilling its mandate, the UTLO seeks to collaborate with academics, researchers and students to create supportive, adaptable and innovative learning environments in which **outstanding teaching** at all levels is nurtured, recognized and rewarded. (http://utlo.ukzn.ac.za/Homepage.aspx , accessed on 2 January 2020)*

While not specifically listed amongst the responsibilities of academics, it was clear the university expects its HE teachers to innovate in their teaching. The institution awards Distinguished Teacher Awards in recognition of such endeavours and the description of the expectation of such awardees provides insight into how teaching innovation could be judged:

The Distinguished Teachers' Award requires candidates not only to be outstanding teachers demonstrating successful and effective learning outcomes, but to have made a sustained contribution to teaching and learning through: demonstrated contribution to ***the innovation and improvement of teaching and learning practices*** *within the candidate's discipline or School and in community engagement; demonstrated contribution to curriculum and/or materials development in the discipline; and/or demonstrated reflection on practice translated into the scholarship of teaching. (http://utlo.ukzn.ac.za/Excellence_Awards/Distinguished_Teachers_Award.aspx,accessed on 2 January 2020)*

Although no specific metric can be assigned to such 'teaching innovation' it was clear that this normative pressure was placed on UKZN teachers. While recognised in performance management and promotional guidelines, there was no clear indication of the benchmark for such activity. The institutional implementation of a LMS such as Moodle did, however, point to an intention to support blended learning practices and teachers were expected, as a minimum, to conform to international norms of teaching practices in their discipline. In addition, the call for innovation in teaching suggested the institution expected its teachers to be innovators in the areas of Scholarship of Teaching and Learning, publishing in journals dedicated to the research of teaching practices, in addition to publishing their discipline-specific research. This requirement of 'Teaching Innovation' (B3) is thus another balancing, or normative loop process impacting HE teachers.

9.11 Conclusion

Chapters 7, 8 and 9 have jointly described the structures, mechanisms and processes which can be considered to explain the dynamics which lead to, or influence the use of SC in teaching. These have, however, primarily been disaggregated to a process level and discussed independently. Chapter 10 will focus on re-aggregating these complex processes to present the institutional view of how these processes and the related structures weave together to form the lived realities of the HE teacher participants.

10 An institutional view of the mechanisms and processes influencing individual HE teacher's use of social computing

> *More importantly, however, is the quintessential reflective ability of human beings to fight back against their conditioning (not nullifying it for if nothing else it dictates language and topic), giving them the capacity to respond with originality to their present context (Specifically they do this either by taking advantage of inconsistencies within it and then generating new forms of syncretism and pluralism from it, or by exploring novel combinations of compatible elements within it and then advancing new types of systematization and specialization in the field of ideas.) (Archer, 1996, p. xxv)*

10.1 Introduction

The complexity of the processes, relationships and interactions which influence HE teacher use of SC in their teaching has been discussed in a disaggregated fashion in Chapters 7, 8 and 9. It is however important to the theoretical conceptualising of the phenomenon to attempt to aggregate these individual discussions in a holistic way; considering an institutional perspective of how these processes interact and play out in practice (Figure 32).

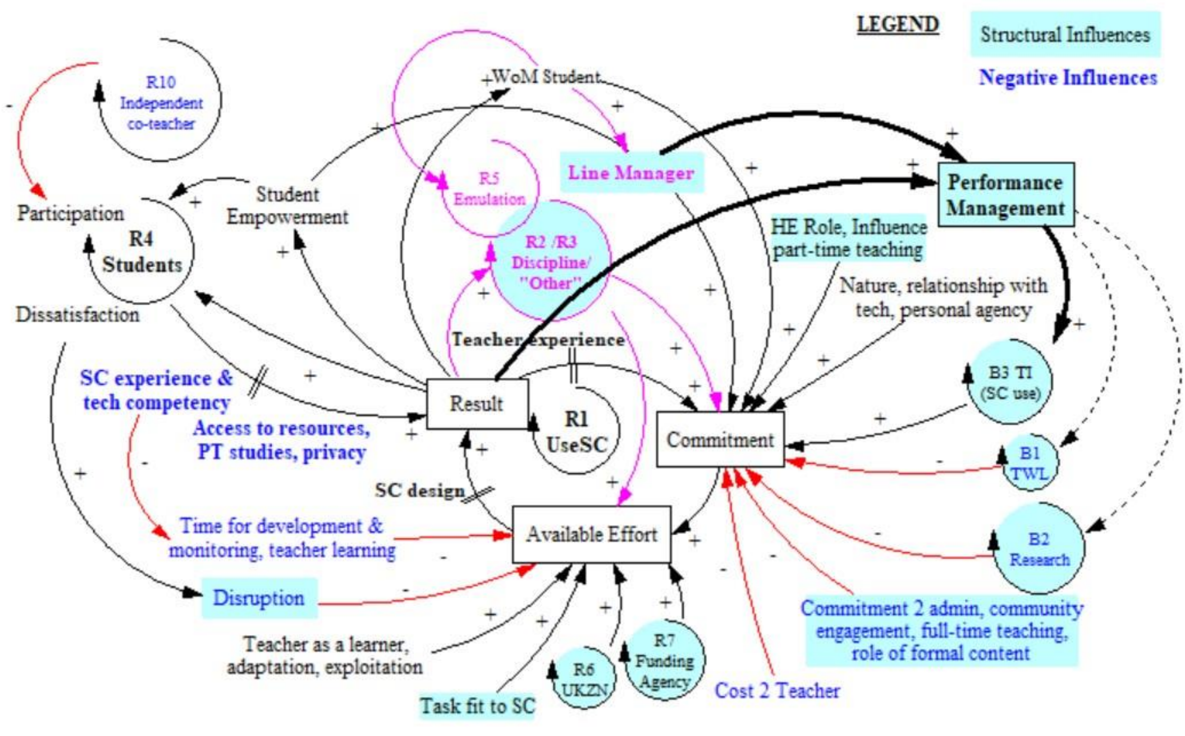

Figure 32: A summative representation of the structures, mechanisms, processes and people influencing HE teacher use of SC in their teaching

The centre of the figure is the R1, individual teacher use of SC loop consisting of the three key variables i.e. commitment, available effort and results. There are numerous factors that can influence teacher commitment either positively, or negatively shown in blue text on Figure 32. Structural influences can be both from within, and from outside, the institution (highlighted components in Figure 32). Influences may also result from the agency of actors, or influences can be the outcome of interactions between structure and agency. The following three sections discuss these influences on teacher commitment (10.2), available teacher effort (10.3) and teacher results (10.4).

10.2 Individual HE teacher COMMITMENT to social computing use

There are eleven arrowheads entering 'Commitment' on Figure 32, seven of which relate to positive inputs while four are negative impacts. The positive forces, or those which increased commitment to SC use are: the influence of the results of the SC use (R1); positive feedback from discipline, professional or other academic colleagues (R2/ R3); the student empowerment observed by the teacher (R4); positive word-of-mouth feedback from students(R4); structural influences such as the teacher's role in HE and teaching on a part-time programme (R1); individual characteristics such as the teacher's nature, their relationship with technology and how they exercise their personal agency (R1); and finally, the normative feedback experienced from a performance management process dealing with teaching innovation (TI). This normative pressure (at least initially) encouraged increased commitment to TI. Those inputs which were seen to reduce the commitment to SC use are: the normative pressure to increase commitment to F2F teaching and supervision (B1); the normative pressure to increase commitment to research (B2); the normative pressure to be engaged in administration and community engagement; the demands of full-time teaching; the role of the nature of the formal discipline content in the decision to use SC; and finally, the cost to the teacher in terms of work-life balance, stress and mental health in general.

It is necessary to consider any interactions which may occur among these negative forces in greater detail. Of specific importance at a structural level, are the processes which work to govern academic behaviour and productivity in general i.e. the balancing or normative loops, B1-B3. A more systemic analysis, however, revealed further mechanisms and interactions between these influences that are dealt with under five sub-sections, namely: Management's normative input to teaching innovation (TI) (B3) (10.2.1); research (B2) and TWL (F2F) (B3) normative pressures (10.2.2); the links between TI and research (10.2.3), and TI and TWL (10.2.4); and finally the multiple interactions between TI, the scholarship of teaching and learning (SoTL), TWL and specialist research (10.2.5). This section on teacher commitment ends with a discussion of the role of the delay impacting the result-commitment mechanism (10.2.6).

10.2.1 Teaching Innovation normative pressure from management (B3)

Line managers use the institutional norm to assess the performance of each teaching academic in terms of their F2F teaching and supervision (B1), research (B2) and teaching innovation (B3). The arrows linking 'results' and performance management (PM), and the line manager and performance management, are used to indicate the input into the normative loops (Figure 32). The result from SC teaching is illustrated as a positive input into 'performance management', as the teacher was likely to be performing to the norm (or above) if there was a positive SC result.[5] The management goal was a positive norm, against which the teaching result was compared.

Normative pressure encourages greater commitment to a goal until this is achieved (see B3, Figure 31, page 279). B3 assumes a performance gap is inversely proportional to the result i.e. as the result increases and approaches the norm, the gap between what is expected and what is achieved, will reduce. When the goal is reached the 'gap' becomes negative i.e. expectations are exceeded and normative pressure decreases. Repenning (2002) suggested this would cause a decrease in commitment to the innovation, available effort, and decrease in results. When the results fall below the goal, the influence of the loop switches into a regenerative mode i.e. pressure is increased in order to increase commitment, effort and results. While this is the theoretical expectation, there was no evidence there was a reduction of 'pressure' to perform in the area of teaching innovation at UKZN. The reasons for this may be twofold: firstly, there was no clear management goal for TI so the concept of

[5] 'Performance management' as a final assessment is reflected in Figure 32, rather than the 'performance gap' detailed in the normative loops.

‘pressure’ may actually have been absent, and secondly, the concept of ‘innovation’ has embedded within it, the concept of an ever moving goal post. An ‘innovation’ is measured in relation to whatever is accepted as the norm. A person who has innovated in their teaching may find the activity becomes the norm and must re-innovate: P5 alludes to this in his interview:

> *… we’ll have Moodle, so what do they do? Upload some slides, put up a couple of notices. 15 years ago I would have said to you maybe that’s e-learning [implied: an innovation]. Now we look at it and… [shaking head] it’s not actually e-learning. (P5)*

As there were no clear metrics for TI, a TI requirement was not enforced. UKZN management appeared content with the status quo where individual teachers innovate, gain recognition, obtain grant funding or produce scholarship of teaching and learning that benefits the university profile. The analysis has already shown how a teacher’s nature, their relationship with technology, their perception of the role of HE in society, and how they exercise their personal agency, may operate to increase their commitment to use of SC and innovating in teaching more generally. The pressure to perform in this area is thus attributable to the individual themselves: bar an extremely negative teaching experience, these personally motivating factors suggest the innovative HE teacher is likely to continue innovating. In this regard the innovative teachers may be their own worst enemy, as they continue to choose to perform in an area of academia which may not be to their overall professional, and personal, benefit when compared to other areas where performance metrics are clearly specified.

An interesting feature of the normative pressure from UKZN management is the way in which teaching and learning innovation is managed at a strategic level. UKZN is fundamentally committed to providing excellent education. The first goal of the university is “To achieve excellence in teaching and learning” (https://www.ukzn.ac.za/about-ukzn/vision-and-mission/). This goal is also enshrined within the Transformation Charter of the institution (https://www.ukzn.ac.za/wp-content/mediaFiles/media-releases/ukzn-transformation-charter.pdf). Excellence in teaching is difficult to define. However, the fifth of the UKZN goals can meaningfully be used to understand what UKZN intends by this statement; it reads as follows: “The goals of the university are… 5. *Institution of Choice for Learners*: To establish the University as an institution of choice that values students in all their diversity and has a student-centred ethos, providing students with curricula, teachers, infrastructure and support services designed around their needs and producing well-educated, competent, sought-after graduates". With the pervasive influence of technology in HE this suggests that teaching should include two key foci: the positioning of the learner as an active participant in their learning and the inclusion of technology to facilitate teaching and learning in HE. One could thus expect that the university would be eager to track the implementation gap between the desired level of 'excellence' (or innovation, e.g. use of SC) and the teaching and learning being experienced by students. Figure 33 presents an example of the desired cycle of pedagogical review (B4) to improve teaching in order to achieve 'excellence'. This goal has not been enforceable because a suitable metric has not been determined.

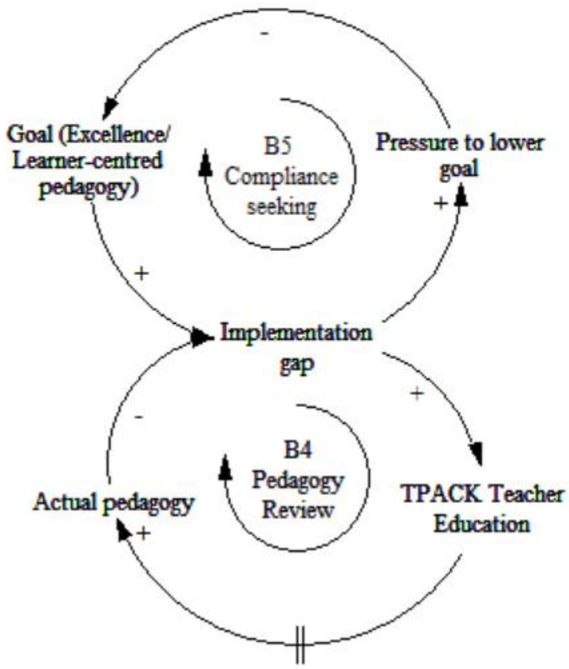

Figure 33: Drifting goals – From pedagogical review to LMS compliance

More importantly, many teachers did not see any need for curriculum reform, and cannot agree on a single, unified international learner-centred pedagogical norm for their discipline. If this could be determined, then the difference between this desired position of 'excellence' and the 'implementation gap' could be determined. The larger the perceived implementation gap, the increased need for TPACK teacher education. The more the teacher increased their understanding of this view of their discipline's content knowledge, appropriate pedagogy and use of technology, the more the learner could become appropriately engaged by means of this revised pedagogy. As the level of excellence in T&L increases, the implementation gap is expected to decrease. This however assumes that the existing pedagogy requires revision and that teacher education related to pedagogy and use of SC will result in increased implementation. These assumptions may not hold true. Training may have little impact if the teacher is risk averse and suspects the challenges related to SC use have not been overcome (Mueller et al., 2008).

This process (i.e. B4) only represents a small proportion of teachers at UKZN at the time of data production. More generally, as the implementation gap increased, so too did the pressure to revisit the original goal, as a goal that is difficult to specify is open to challenge. People who did not see the need for a review argued that the goal should be revised in the light of numerous demands being made of teachers. As this pressure increased, the goal was revisited to a goal that more teachers could meet (B5) . It is not uncommon for a goal to be revisited and modified to a lesser, more easily achievable, goal under pressure from participants. Because the goal had been lowered, the current implementation appeared more successful i.e. the implementation gap between current practice and the revised goal was smaller. This archetype is referred to as the 'drifting goals' archetype. In real terms the implementation gap between the current implementation and the original goal had not changed. If B5 resulted in a lowered goal, it could increase the likelihood of a repeat of B5 i.e. a cycle driven to lower the goal until it reached a goal with which participants were willing to comply. The opportunity still exists to implement a process of corrective action (such as review, education and training) which, over time i.e. with a delay in results, can result in improvement and a reduction in the implementation gap (B4). In the case of T&L at UKZN, the goal of achieving 'excellence' drifted to a goal that required all modules to have a presence on the designated LMS (Moodle) (B5). Compliance with this resulted in a false sense of achievement. The strategic goal of excellence in T&L had not been achieved and yet teachers were able to claim they were fully compliant with what was expected of them. In reality this modified goal did not speak to teaching at all, as it required a basic module site, within Moodle. It should however be remembered that even this lesser goal has great value for students. Once a module has a Moodle presence it is easier for teachers to use the notification features and file/ folder features to provide students with resources. This improves the convenience and ease of access to information for all students.

10.2.2 Research and teaching workload normative pressures from management (B2 & B1)

Research productivity and TWL responsibilities are highly specified and as a result, are not only strictly monitored, but have ‘hard’, measurable, requirements which academic teachers need to meet. The B2 and B3 balancing loops should be seen as individually focusing on the specified area of responsibility; thus for B2 the ‘commitment’ under consideration was the commitment to the research goal. While these processes were each concerned with one area of responsibility, the academic teachers were expected to balance their many commitments. Thus a competitive scenario arises; where commitment to one or two areas of academic activity, of necessity, means a reduction in others (Seaton & Schwier, 2014):

> *Well, in terms of what I want to be, I’d like to do more teaching, ‘cause I enjoy it. In terms of where I’m pushed to be, it’s more research. (P1)*

In Figure 32 the commitment to research, and an assigned TWL thus had a limiting influence on TI (indicated by a negative polarity). Seaton and Schwier (2014) highlighted issues also raised by participants such as a lack of time, the importance of research in promotion and that TI gives way in the face of other pressures. With the increase in student numbers and budget constraints, HE teachers in Africa find commitments to conventional teaching and research reduces time available to devote to TI (Czerniewicz & Carr, 2011; Lwoga, 2012; Onwuagboke & Singh, 2016; Wolhuter, 2014).

10.2.3 Teaching innovation and research normative pressures from management (B3 & B2)

Anecdotally, the tension between teaching and research commitments was often discussed by academics. However, participants’ commented on the potential for a virtuous (regenerative) feedback loop between innovative teaching and their need to produce research outputs. P17, a young teaching academic, explained this best by describing three aspects: firstly, her recent recognition of TI as an area of scholarship; secondly, her experience of the tension between TI and research in her specialisation (PhD); and thirdly, the existence of a body of literature related to the Scholarship of Teaching and Learning (SoTL) in her field, but which appeared to be sparse in the SA context:

I would have never thought I would write a paper about using social media tools for teaching and learning. … This is a bonus, … although it is a big distraction from trying to get my PhD done. … Do other people have other cases out there? That's why I'm going through all the literature. Maybe I'm looking at the wrong journals, but I just can't find where they are all hiding or if this is actually an original case from South Africa? (P17)

How this interaction between TI and publication of the related scholarship can be managed as an intentional process, was discussed by P7. She suggested that forethought was required to ensure the requirements for good scholarship were met, through the design of the TI and use of SC:

I have done a conference presentation … about how we've actually managed to get some research out of it. So we do a pre- and post-[test] with the students… It is also because of the fact that you have to find these kind of spaces within you teaching, because you're obligated to produce on both the research front and the teaching front. (P7)

10.2.3.1 The role of boundary crossing behaviour

A systemic approach suggests boundary related behaviours and artifacts were important to a fuller understanding of SC use in teaching. Boundary crossing behaviour between different communities was a common thread discussed by the study participants. This result was inductively determined during NVivo coding and is an interesting area for further research. There are three forms of 'boundary crossing' mechanisms noted: firstly, a few participants had a multidisciplinary world view which either led to, or developed as a result of, their experience of numerous academic fields. They exhibited a more catholic approach to mechanisms and processes compared to their discipline colleagues:

I have a BCom major in Accounts and Information Systems. … an MBA. … I was … at medical school … doing graphic design in audio visual … (P12)

… emerging ideas of poverty, … whether ICTs have any element to it? … [there are] not very many Economists actually looking at this field. (P17)

I do come out of Law, I taught at various community colleges … some universities, … (P3, in Public Governance)

The second form of boundary crossing is where relationships are based on a research interest and then morph into collaborations around teaching:

> *… this year I had … researchers from other parts of the world. … visit me … I am going to a colleague of mine in the States… We are actually going to get her students and my students to do a case together online. (P10)*

> *Public University 4, Italy … we are doing an international conference … we are trying to introduce things; I would like to have an exchange of students with them. (P16)*

> *… we've done several Facebook e-discussions based on poverty and education … [as] the curator of the poverty hub for the UN Academic Impact. … the UN Youth Report 2011, … a book launch for the UN … that opened Person AN [senior colleague] up to this idea of maybe we can try it for Teaching and Learning. (P17)*

In a study by Kinchin et al. (2008, p. 92), participants suggested that "research and teaching (be) integrated so that they inform one another":

> *… with my Swedish researcher it started with … clinical research … then we started talking about the use of technology … And that's where it started to spill into education. … For me it's always been the two go together: I am a teacher and a researcher. Why am I researching? I'm researching to improve the clinical area and improve things for my profession and I do that in a number of ways: I either act on what's happening in the clinical area or I act on my students that I am teaching. (P10)*

The third form of boundary crossing thus illustrates how innovations in teaching and learning, can result in research:

> *… this whole Moodle thing,… I have got involved with research with Participant 10, (and) with Participant 11. Participant 10 is also on the M- learning [research team] …(P12)*

> *… I mean, research in teaching and learning?! … I never even thought that there was research in teaching and learning. (P17)*

> *The other issues that struck me … That one has got a lot of stuff (teaching records, materials etc)… Then it becomes somebody else's research … (P18)*

These quotes provide evidence of interrelated, and harmonised, teaching and research activity. This appears to contradict the dominant HE discourse which frames these as opposing responsibilities. This would then suggest that the negative impact of the research balancing loop (B2), on TI commitment (B3), was incorrect (as indicated in Figure 32). In reality, a teacher may feel trapped between having to choose between innovating in their teaching (B3) and doing specialist research in their field (B2); in which case, the two commitments were in tension (as depicted in Figure 32). At UKZN, the recognition of research productivity did not consider the academic field in which the research occurred. Thus, while research productivity in one's academic field may be a necessity for recognition and advancement in one's chosen field, the research productivity measures for research at UKZN were only based on productivity units. A teacher who thus chose to publish the results of their TI, and advances the Scholarship of Teaching and Learning (SoTL) in their discipline (Boyer, 1990), would be considered to be research active, as required. In this situation the TI and the research requirements of the institution can create a positive, virtuous feedback loop as illustrated below (Figure 34). The orange linking arrows between the commitment of one loop (e.g. R1 TI) and the results of the other (e.g. R1 Research (PU)), illustrate how boundary crossing operates between the two areas of responsibility. Teaching innovation results can produce valuable data for research, and the research outputs generated from the research can increase commitment to teaching innovation.

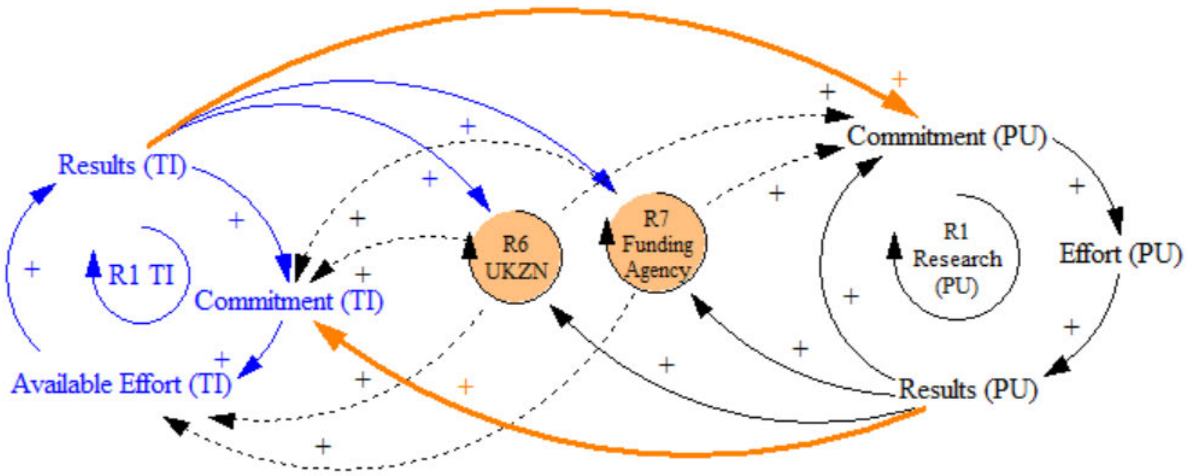

Figure 34: Positive feedback loop between teaching innovation (use of SC) and research productivity

Figure 34 shows how the results from SC use in teaching may result in funding from internal (R6) or external sources (R7). This will increase commitment to the TI and provide resources to address the effort required to develop the SC activity. The potential for funding based on the research products produced as part of the teacher's SoTL can both motivate and potentially fund future TI and future research.

There was, however, an additional boundary crossing activity which may reinforce the positive relationship between TI and research. As illustrated in Figure 35, an academic who is an active researcher, will generate either internal or external funding through their specialist research. Through the UKZN process of automatic funding as guaranteed through the DoHE (via the PU system), the specialist field researcher is guaranteed funding which is paid into a research account. This account is available to fund further research activities or to innovate in teaching. Should this occur, then a mechanism is activated which links an academic's specialist area of research to TI: the research funds can be used to access the resources necessary to facilitate the development and running of the SC activity. This will lower the motivation threshold so that the teacher is able to commit to the TI and provide support to teacher effort.

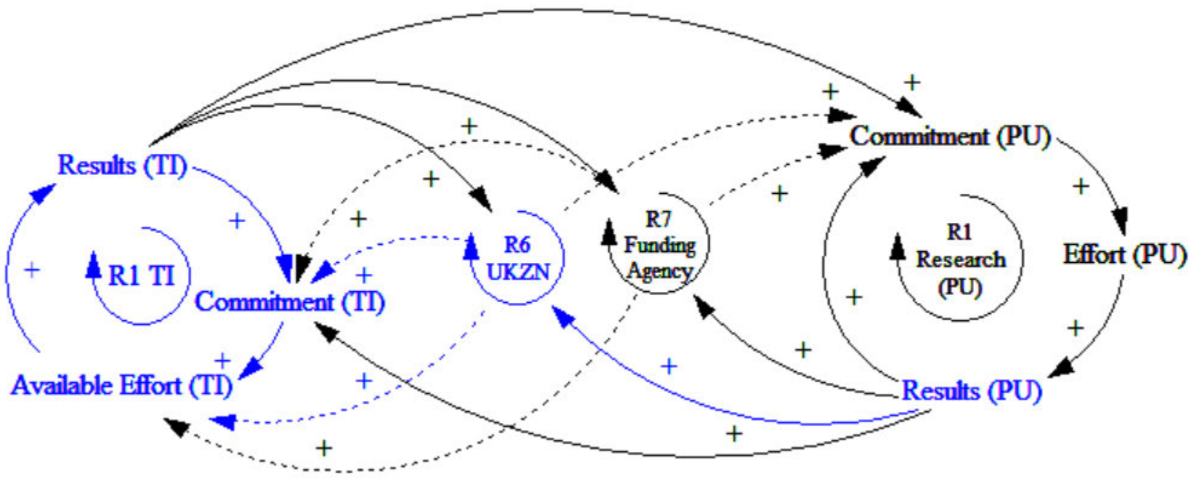

Figure 35: Funding from specialist research can be deployed to support teaching innovation (use of SC)

The positive reinforcement loop between teaching innovation and research (including both SoTL and specialist research) can thus be activated from both the teaching and research processes. Although these regenerative relationships were present, a tension may still exist at an individual level between the teacher's TI and specialist research i.e. a teacher will face the challenge of dual demands on their commitment and effort.

10.2.4 Teaching innovation and teaching workload normative pressures from management (B3 & B1)

The more teachers commit to F2F teaching and supervision responsibilities, the less they can commit to teaching innovatively online. This view of the situation was, however, oversimplified, as the modules in which the teacher innovated by using SC, still formed part of their TWL. It was thus necessary to disaggregate the concept of the TWL into its component parts. The TWL is an artificial structure developed to manage HE teaching. An individual UKZN teacher has two responsibilities, namely: to teach undergraduate and postgraduate modules; and to supervise master's or PhD research students.

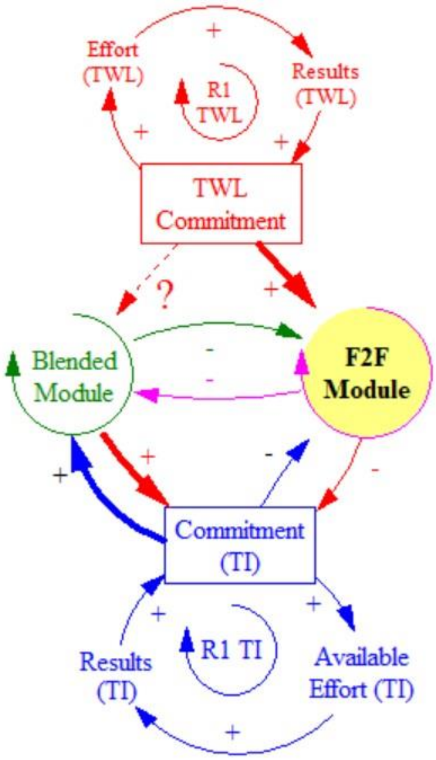

Figure 36: TI relationship to TWL module commitments

The expectation at UKZN was that teaching and supervision would occur in a F2F mode, with the process highlighted in yellow (Figure 36). The relationship between 'TWL commitment' and the 'F2F module' was positive i.e. an increase in TWL would result in an increase in F2F module teaching. There was no general rule to determine the proportion of a TWL that was comprised of blended learning i.e. includes SC use. The nature of this association was determined by each teacher and was thus modelled as ‘unknown’ (indicated as ‘?’).

A module in which the teacher chooses to use SC will form a positive feedback process of TI (SC use): commitment to TI will increases the commitment to the blended learning module; and results achieved in this blended module will positively fuel a commitment to teaching innovation and SC use. This is not the case for a conventional F2F module. A pure F2F module potentially reduces the commitment to SC use because it consumes teacher time and energy. A F2F teaching workload can limit SC use and the development of a blended module because F2F teaching is a teacher’s primary responsibility. The F2F teaching was expected to take precedence over any attempt to innovate the content, or delivery, of a module.

It should also be noted that commitment to a blended module or teaching innovation may reduce the sense of commitment to a F2F module because the teacher has less available time and energy. This may be dependent on the interplay between the teacher’s perspective of the module, the nature of the content and how SC use is conceptualised by the teacher. An illustrative case of how individual teachers may manage this differently was provided by P5 and P6. They worked in partnership in their use of SC on shared modules, but had different approaches to the other modules they were required to teach. P5 preferred to take control of a module and established the online platform to encourage a co-teaching colleague to also use the platform. If the co-teaching colleague chose not to use the online platform, he would leave them to teach independently in their own style. He found a way to include SC use in all of his modules:

> *I’ve been doing this [Database module] forever … So I need to make it interesting for myself, … [a colleague in IS&T] runs the same course as I do, on another campus. … [both lecturing the full course, not sharing delivery]… I tend to design how we are going to approach it .…. He is not helping me in anyway. As you know … you can choose; you can have unlinked courses. I’m doing my own thing [implied: and he is doing his own thing] … The other option is that you link together, and you can link as close as you like. (P5)*

P6 used an LMS but did not always require SC to be established, did not take control of setting up the online space and chose not to use SC in a specific second-year module because she had not worked out how it could be used effectively:

> *…between P5 and I, … it's almost like a shared ownership but when P5 is engaging with somebody else … P5 chooses to take the module. I don't; and I'm not sure why … It's not …that I don't feel like I could assert that dynamic in my own section…. I think the 2nd year is a particularly interesting one because it's the nature of the content, … (it) requires a chunk of investment of time from me, … So it's almost like I'm defaulting, I do a lot of very interactive things in the classroom but not using social computing. … The content there challenges my use of social computing more … [and] you have to be judicious that you are not trying to force technology on all content where maybe it doesn't fit. (P6)*

The specific approach a teacher employs when approaching their TWL will result in a personal set of dynamics which will define the mechanism linking their F2F and blended teaching modules. This study was not able to explore these aspects in detail, but this suggests it may be possible to create a typology of processes which can explain teachers' approach to F2F-, blended- and online-teaching modules. This thus presents as an area for future study.

10.2.5 Interactions between TI, SoTL, TWL and specialist research

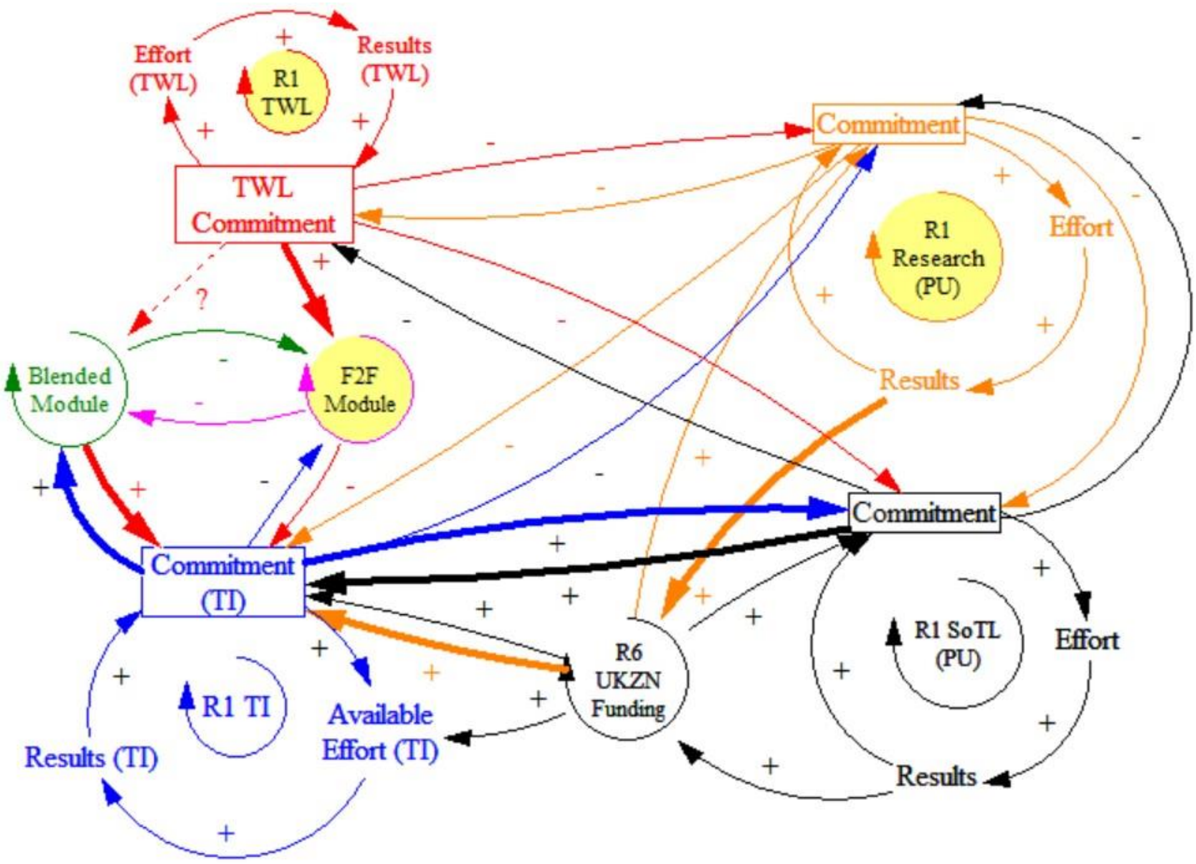

Figure 37: Relationships between TWL, TI, specialist research and SoTL

The mechanisms which operate between the four processes of TWL, TI, Research and SoTL need to be considered together, to gain an accurate perspective of how these interact (Figure 37).

Each of the areas in which the teacher was expected to be productive was represented by a reinforcement loop. TWL and research were recognised as the two main areas of academic responsibility, reinforced by the fact that there were performance metrics clearly specified for both (highlighted in yellow). Normally, the variety of commitments would be in competition for the teachers' attention. There was competition between the TWL and specialist area research; specialist area research and SoTL; and F2F teaching and TI (use of SC). However, the blended teaching, TI and SoTL were all positively reinforcing. In addition, three of the four areas of responsibility were linked via the UKZN funding mechanisms. Funding can be via (a) SoTL research-generated PUs; (b) specialist UTLO funding of TI; or (c) specialist research, that is used to support SC use in teaching (see Figure 35). Prior to the corona virus pandemic (2020), any online component provided, was at the discretion of the teacher. The only area of responsibility not able to access special funding, was F2F teaching. The assumption was that the university would appropriately resource F2F teaching from its main budget, as this was the primary mode of instruction at UKZN and a core institutional function. In times of financial stress, core budget items, such as those supporting T&L, may be leveraged to cover shortfalls. This can mean a reduction in provision of teaching support resources. Academics are expected to do more with less: greater student numbers result in higher teaching workloads with fewer assistants and reduced opportunities to develop activities to deepen and extend learning.

In such instances, it is often suggested that technology can reduce teacher workload, but this has limited traction in the literature and in the results from this study. Technology aids T&L efficiency by improving access to information, resources and platforms for collaboration with peers and others. Participants emphasised that feedback between student and teacher can only be replaced to a very limited degree e.g. with pre-set feedback responses for MCQs. In general, personalised qualitative feedback needs to be provided by a teacher or assistant (F2F or online), especially when a variety of artefacts are used for assessment when leveraging the affordances of the technology. A competitive tension thus remains unresolved between the commitment to a teaching innovation (e.g. use of SC as a teaching innovation on a blended module) and the commitment to F2F teaching.

The commitment and effort required to produce good F2F teaching was not recompensed or recognised in any of the structural mechanisms presented. While the focus of this study was on SC use and thus teachers were not specifically questioned on their F2F teaching, it needs to be recognised that good F2F teaching is also demanding especially with large classes. Outside those areas of efficiency where an online platform can be of assistance, the constraints faced by F2F teachers were not being addressed at a structural level. These issues have been raised by participants in two specific contexts, namely: firstly, the time pressures teachers experienced as 'imposed' by the formulaic approach to quantifying teacher effort (TWL), and secondly, the reduction in teaching support resources that appear to be due to financial constraints. It has already been shown that the use of SC and online resources are not the silver bullet to solve these problems. This study has shown that SC use in HE teaching at UKZN has been performed at the expense of the individual teacher; either by their use of personal research funds, or at personal cost to their health and mental well-being. Both F2F and online teaching are thus highlighted as requiring a review in terms of the mechanisms and processes required to ensure their continuation and ability to thrive.

While these higher level, structural institutional norms highlight the conflicts between competing commitments, it is also central to the understanding of the phenomenon to consider any delays in mechanisms impacting teacher commitment. A 'delay' can slow down, pause or halt the mechanism with which it is associated. Delays may thus represent situations which require attention to help ease the operation of the system. They may represent opportunities to implement interventions to improve the operation of a particular process within the system.

10.2.6 A 'delay' in negative feedback

'Teacher experience', shown as a 'delay' in the mechanism linking results to commitment (R1). in fact, operates across all input mechanisms which influence commitment i.e. from results (R1), academics (R2 & R3) and students (R4). While delays were often seen as negative influences, in this particular case, this was a positive influence. It appears teacher experience acts in sympathy with the continuation of the commitment to SC use. Where feedback is positive, especially if overly positive, a teacher may be sceptical of the reason for the response, but it will either have no impact on the level of commitment or increase it to some degree. Positive feedback is thus a mechanism which reinforces SC use.

However, if the feedback is negative; this will often not reduce commitment to the initiative as one would normally expect. The impact of the feedback mechanism is moderated (or delayed) by teacher experience. A teacher will evaluate feedback in relation to the teacher's knowledge of that individual's context and their motivation. In the case of student feedback, a teacher has to assess how valid and genuine the concerns are which have been raised. They will consider that students have a unique view of the teaching space and peer experiences; but also that they may be trying to optimise their movement through the system rather than optimise their learning experience. Students cannot be expected to know what teaching is in their own best interest as they are not experts in the discipline. Comments by other academics may be strongly influenced by their own academic biases: What they see as the 'norm' in terms of teaching practice, specific pedagogical approaches, appropriate discipline content etc. An astute teacher will thus weigh feedback against the 'norm' they associate with the commentator. They may consider the opinion to be that of 'the other', a representative of a duelling discourse which by its nature would be critical of SC use in teaching. The opinion from such a source would be given little credence by the teacher. Based on this attitude these participant teachers' may be considered positively deviant as their behaviour is voluntary, somewhat outside the norm, and the results of their actions are positive or 'honourable' (Spreitzer & Sonenshein, 2004). Pascale et al. (2010, p. 3) suggested positive deviance creates the context for finding solutions to systemic challenges:

> *Positive deviance(PD)? An awkward, oxymoronic term. The concept is simple: look for outliers who succeed against all odds. ... founded on the premise that at least one person in a community, working with the same resources as everyone else, has already licked the problem that confounds others. ... In most cases this person does not know he or she is doing anything unusual. ... From the PD perspective, individual difference is regarded as a community resource. Community engagement is essential to discovering noteworthy variants in their midst and adapting their practices and strategies."*

Although this mechanism reflected as a 'delay', it is actually a positive mechanism in terms of reinforcing ongoing SC use and productive results.

10.3 Individual HE teacher AVAILABLE EFFORT to implement social computing use

The available effort to expend on SC use in teaching was positively impacted by the teachers' commitment, and funding and resources made available by UKZN and external agencies (see Figure 38). If a specific task was a good fit for the affordances provided by the technology selected, this also made development easier. If the teachers saw themselves as lifelong learners, were adept at adapting both the tools they used and how they operated in their academic context, and exploited the opportunities presented, the task of using SC in their teaching was made easier.

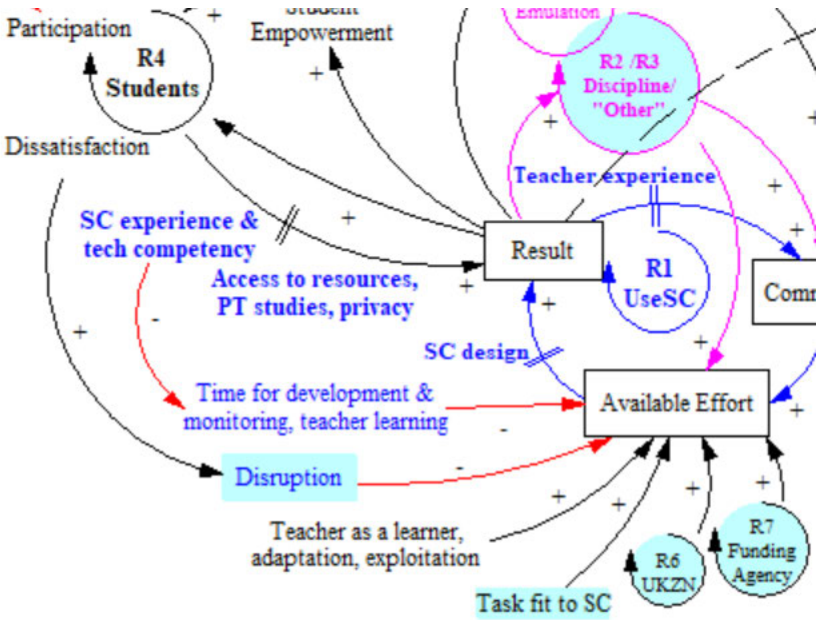

Figure 38: An extract from Figure 32: Mechanisms and processes influencing HE teachers' Available Effort for the use of SC in teaching

The time teachers need to learn about the technology and develop the necessary skills for implementation can cause a delay in developing the SC tools for teaching (10.3.1). Student challenges can also increase the additional effort required of the teacher which reduces the 'available effort' to pursue other teaching implementations. Students' lack of SC experience and lack of technological competency resulted in an increase in the amount of time required for developing and monitoring online interactions (10.3.2). The disruptions caused by students are part of the larger socio-economic-political landscape not only of the institution but also of the greater SA HE sector which is highly politicised. While the potential of additional internal and external grant funding can secure resources to help in implementation, this is a competitive process which may have a slight, and subtle bias towards previous recipients (10.3.3).

10.3.1 The challenge of creating online (social computing) interactions

Assistance from colleagues within the discipline, the institution or from outside, in the form of independent assistance, mentorship or partnership, is a major resource to supplement the effort required to implement SC use. This forms a positive reinforcement loop as discussed in Chapter 9.

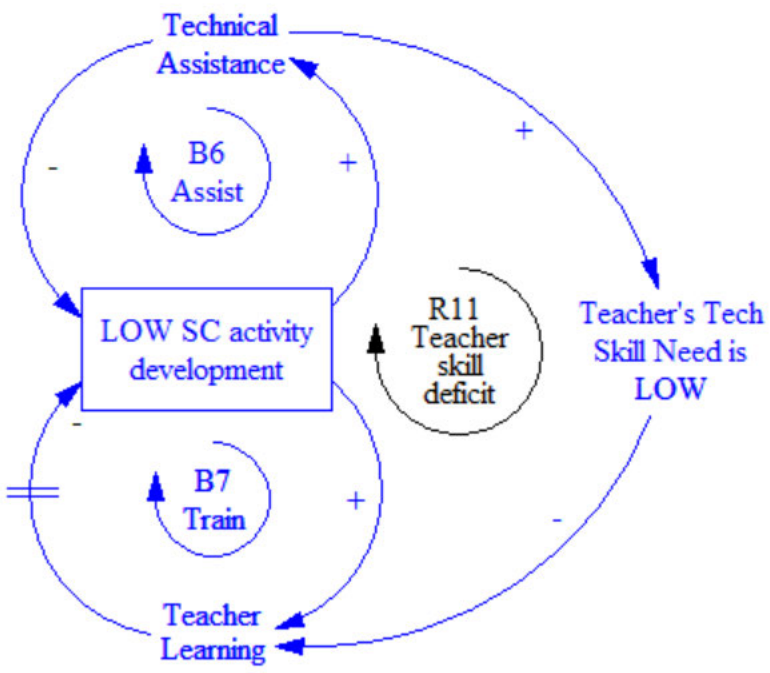

Figure 39: Shifting the Burden – Training (B7) and supplying technical support (B6) to support teachers in developing SC activities

There is however a potential negative impact of either technical support or assistance from a colleague (B6 Assist, Figure 39): while the ‘assistance’ may assist the teacher in developing the SC activity in the short-term; this could become disempowering in the long-term in that it removes the need for the teacher to become skilled and thus creates a dependency on continued support. If the teacher never learns to use SC without the help of another, their skillset remains static. The person providing the technical assistance becomes more experienced, without ever transferring the skill to the individual teacher they are helping. This support could come from a colleague or from a technical person contracted to assist. While this appears a negative outcome in the long-term, it raises the question: Does the teacher need to become a technology expert? An initiative in New Zealand (Lawrence & Lentle-Keenan, 2013) showed that online programmes can be successful with technical support and the use of educational technology design experts. The challenge was that teachers felt they were unable to maintain control of their content. They needed to have courses prepared well in advance, with no opportunity to adjust content along the way, which is the norm, and thus the experience was disempowering.

Providing training is expected to, after some delay, result in the development of SC activities. The training and time to gain experience reduces the available time of teachers who already feel highly time-pressured. However, these abilities will be reinforced and potentially result in increased SC use (B7). Finding a balance between facilitating training (B7), which does not free up the teacher's time but does empower them with skills, and providing assistance (B6) which frees up their time but is disempowering in terms of the development of their skills (R11), is a challenge (Figure 39). It should be noted that unless teachers perceive all related challenges to SC use to have been solved, additional training may still not result in the development of SC activities (Mueller et al., 2008).

10.3.2 The challenge of monitoring, assessing and interacting with students

It was initially thought that a move to online teaching and SC would reduce the time a teacher needs to spend on teaching, but recent research has shown this is not the case. Students require interaction with, and feedback from, their teachers to maintain a sense of presence within the T&L space, to improve their understanding and to gauge their performance. Demands on teacher time occur because the move to online learning requires the creation, monitoring and assessment of online activities and interaction among students, and between students and their teachers.

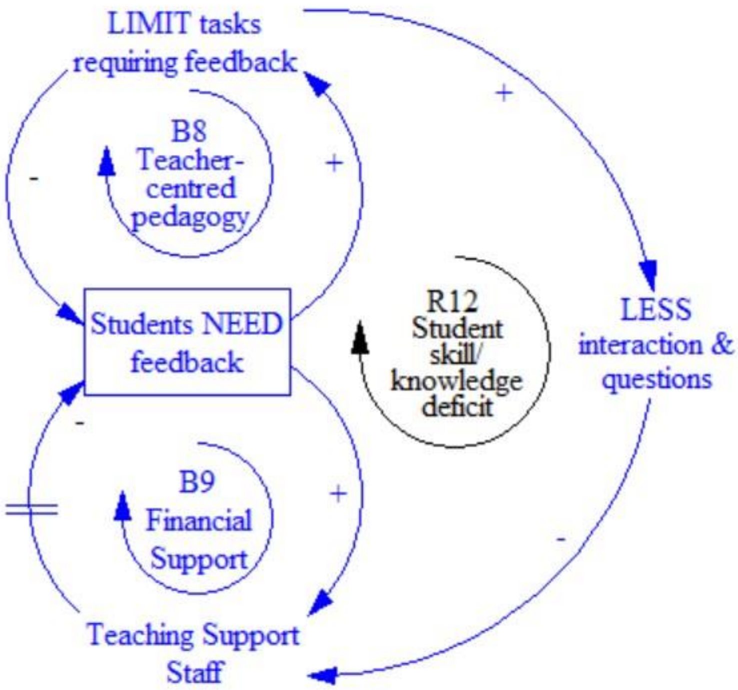

Figure 40: Shifting the Burden – Create a teacher-centred pedagogy (B8) or provide financial support (B7) to respond to student requests for feedback

A productive solution to this challenge would be to invest financial resources in employing academic support staff who can assist the teacher (B9 in Figure 40). However, during times of austerity, the more common management solution is to suggest that the activities can be adjusted to be less intensive in terms of the time commitment required (B8). This is another example of 'shifting the burden' system archetype. Rather than addressing the problem by looking for a solution to the fundamental problem, management suggests a symptomatic solution. In this case there are two side effects, neither of which is considered desirable. The first impact is that a teacher-centred pedagogy develops which optimises the experience for the teacher. This includes reducing time allocated for discussions, feedback, assessments and interactions, that require teacher engagement i.e. activities are automated as far as possible (B8). This decision will reduce the students' need for feedback but will also reduce their level of critical engagement with the content. The unexpected side-effect of shifting the burden to the teacher, either in terms of requiring a greater input in time and effort or a shift in their pedagogical approach, is that students are less able to demonstrate the skills and knowledge expected in their field (R12). This can have long-term impacts on the employability of students, accreditation of degrees and the university reputation.

A HE institution is expected to provide mechanisms for students to interact with their peers and teachers as part of their learning process. Increasingly, commodification has resulted in the suggestion to move teaching online as a cost-saving measure, as it could reduce the required number of teachers. The discussion above (Figure 40) illustrates that this is a red herring: online teaching still requires appropriate academic staff resources. These may be different to, but not necessarily fewer than, the resources required for F2F teaching. The long-term challenge for F2F institutions is not how they will manage online aspects of blended programmes. The challenge is rather how they plan to leverage their physical infrastructure and the social structures provided by an on-campus experience to differentiate their offerings in a way which is financially feasible and sustainable.

10.3.3 The potential bias in supplemental funding structures

The supplemental resources that can be accessed via grant funding was a major benefit to a teacher. Both UKZN UTLO funding and external grant funding is provided on a competitive basis. This was seen as a fair process because it is based on the academic merit of the proposal. There could however be a subtle bias within the process which is illustrated by the 'success to the successful' system archetype (Figure 41).

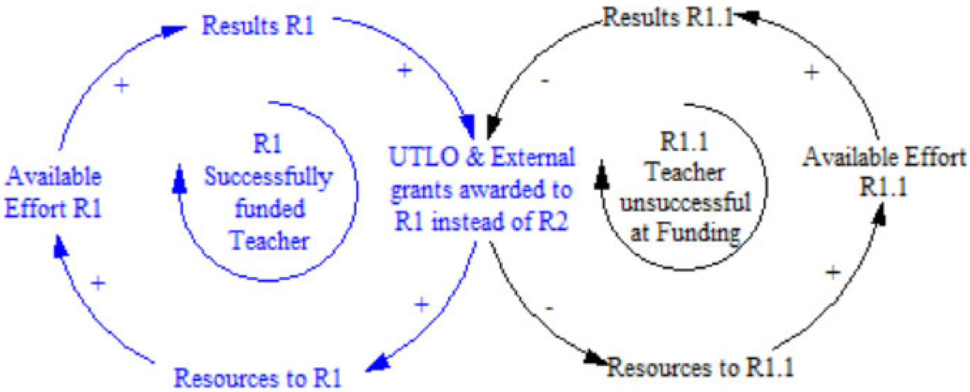

Figure 41: Competitive funding results in a 'success to the successful' archetype

If a teacher has a winning proposal (R1) they obtain the resources needed to increase their available effort to implement SC in their teaching, which produces positive results. Because the funding process is competitive, there is likely to be a teacher(s) who is unsuccessful in their application (R1.1). This R1.1 candidate, without the benefit of resources that the funding can provide, has finite available effort for implementation, which may not provide a desirable result. When results are not forthcoming, it may limit the R1.1 teacher's ability to develop a future competitive proposal, if competing against experienced candidates such as R1. The R1.1 reinforcement loop may thus serve to reinforce the R1 (or similar candidate) teacher's likelihood of succeeding in a subsequent funding cycle.

An overview of the institutional influences on teacher commitment and effort, as discussed, is important. It is however the results achieved which ultimately determine the nature of the reinforcement loop of teacher use of SC.

10.4 Individual HE teacher RESULTS gained through SC use

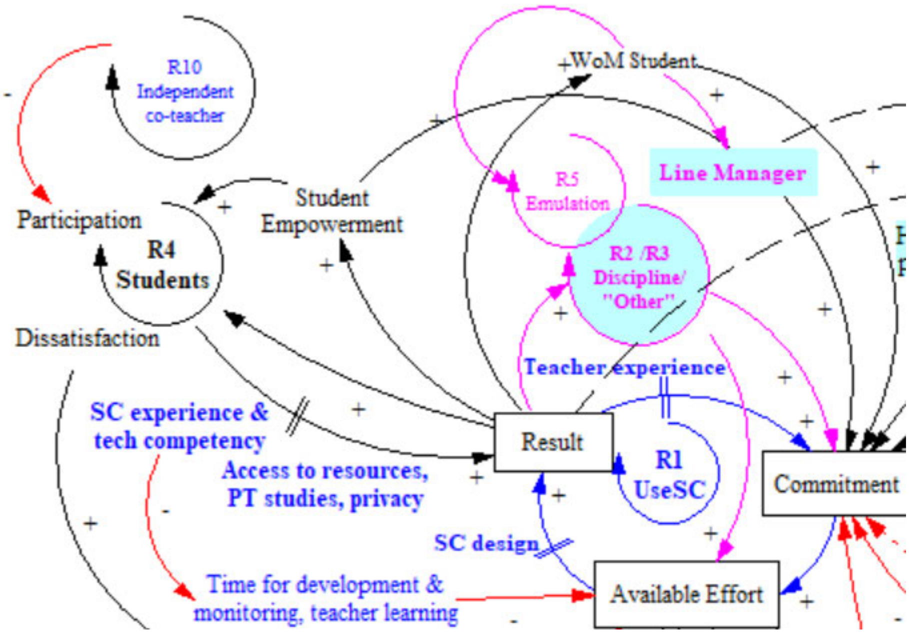

Figure 42: An extract of Figure 32: Mechanisms and processes influencing HE teachers' results from the use of SC in teaching

The results of the SC intervention are important as they serve as the flywheel for the system: positive results motivate students to participate in future endeavours; empower students as they help them to take charge of their learning and share their artefacts; result in word of mouth discussions of the activities; positively influence academic colleagues within the discipline and outside; are noticed by academic line managers and considered as part of performance management. Many of these outcomes are positively motivating for the teacher who is thereby encouraged to use SC even more in teaching.

There were two main inputs into the results: the Available Effort of the teacher and the Participation of the Student. A delay between the effort expended by the teacher and the result achieved may be due to poor SC design. If the activity is ineffectively designed, difficult to use, or otherwise represents a poor online task, it will hamper the successful completion of the learning activity and thus the anticipated results will not be achieved. This aspect of the phenomenon has already been covered in the discussion relating to the provision of technical support vs teacher training (10.3.1 and Figure 39). Similarly, a number of delays can influence student participation, causing the results to be less successful (or not achieved). These delays to student engagement could include SC experience, technology competence, access to resources, lack of time and access due to studying part-time and fear of a lack of privacy (see section 8.2.2).

10.5 Conclusion

Chapter 10 has highlighted the institutional level interactions related to individual teacher SC use. It should be noted that processes at an institutional level may be represented by the interaction of numerous reinforcement and normative loops which have previously been discussed as individual processes. In some instances the detailing of institutional processes has revealed interactions which correspond to recognisable system archetypes (Kim & Lannon, 1997).

Chapter 11 focuses on sythesising the teacher's insights on what SC tools they use, how they use them and why they choose to use them (as discussed in Chapter 6) as well as the structures and generative mechanisms that provide insight into the drivers of SC use (as discussed in Chapters 7 to 10). These drivers, described at a personal and institutional structural levels, can be employed as potential devices to interrogate the phenomenon in other contexts.

11 Synthesis of HE teachers’ use of SC: How they report use and the underlying structures and mechanisms influencing their use

> *… we are the makers of meaning, and we can move into that period with a theory that puts us and our sign-making at the centre – not free to do as we would wish, but not as the victims of forces beyond our control either. That is the point and the task of theory. (Kress, 2003, p. 176)*

11.1 Introduction

This synthesis chapter presents a theoretical framing that integrates the explanation of SC use in HE teaching as presented by the participants, and an explanatory system process-based model that integrates the role of all actors, structures and power that is grounded in the participant experience and knowledge they have shared. It thus forms the culmination of the analysis and synthesises the detailed insights within a coherent, overarching framework. UKZN, as the context of the study, represents a case of intrinsic interest, as it had undergone significant structural changes within the previous decade. The premise is that if teachers chose to use SC in their teaching during a time of significant institutional disruption, then the study of their practice could provide noteworthy insights. The research questions focused on what forms of SC were used, how these were used, and why they say they were used in their teaching. The critical realist (CR) representation of reality allows for both longitudinal structural influences and the agency of participants. In addition, as the under-labourer of the study, it suggests there may be subtle interactions at work that link to other participants and structural elements that individual teachers may not explicitly recognise. Chapters 6, 7, 8, 9 and 10 focused on a detailed discussion of the data obtained from the 18 participants’ interview transcripts. Chapter 6 focused on how the HE teachers reported their use of SC in their teaching. Chapters 7 through 10 focused on untangling the structures, mechanisms and processes which manifested as events, or stories, told by the HE teachers’ about their use of SC in their teaching. In the analytical discussion in Chapters 7 through 10, the writing explored the phenomenon from the ‘inside-out’ i.e. starting with the teacher and moving outwards to encompass forces and role players that influenced their SC use in teaching, in expanding circles. The theoretical lenses used in the data production and analytical phases, as well as those used in this theorising phase of the study, provide theoretical scaffolding to the chapter.

The discussion in this chapter follows the same order as the analytical process, beginning with the answer to the first three research questions i.e. the what, how and why of SC use in teaching, and culminating with a discussion that explores the deductions which can be made about the structures, mechanisms and processes influencing SC use in teaching. As a final analytical step it is necessary to draw these spheres of interaction together, into a single, representative domain in which the position of the individual teacher can be located.

11.2 The HE teachers' context: UKZN as a case study

The context in which a teacher teaches is an important consideration. The teachers have explained how they experienced the organisational culture and context of UKZN. On a global scale HE is facing greater demands for access resulting in the massification of HE. In addition, the NPM has resulted in a transactional, commodified approach to HE, dominated by the economic bottom line. UKZN teachers suggested that the backdrop to all teaching is a teacher's personal, largely instructivist learning experience, which is similar to that experienced by incoming students. Student expectations do shift over the course of their HE studies but teachers find it important to focus on 'small wins' which help in shifting student expectations as well as the perspective of colleagues. It is beneficial to explain the change in pedagogy and its implications for the learning experience to students, to activate their interest, and motivation to participate.

The introduction of an LMS such as Moodle, which has the potential to be used for SC activities, can also be misappropriated and seen to support an instructivist approach. When students demanded access to content, and it was provided on Moodle as a default without supporting activities, it was perceived as signalling a rote learning culture. This was reinforced if assessment focused on the recall of content rather than higher order questions. The shifting of the teaching and learning culture, or morphogenesis, introduces pedagogies that enhance the teaching (and learning) process, as explored in detail in Chapters 7 to 10.

11.3 Theorising the data production phase: Teachers' insights into their social computing use

Events are influenced longitudinally through time by social and structural mechanisms and processes which underpin societal interactions. While CR formed a foundational element of the study, additional theoretical framings were used to produce data from participants. Initially, establishing a framing for teaching with SC required a means of (a) including the personal aspects of the teacher which forms their identity (specifically as associated with teaching) as well as their location within a discipline or subject-specific community; and (b) bringing their teaching, discipline content, and use of technology, into a pedagogically driven dialogue. This framing, used for data production, thus invoked a community of practice (Wenger), discipline-oriented view of the teacher's academic life, while including a TPACK framing to focus specifically on the act of teaching using SC. Based on the educational technology literature, the constructs these theories presented seemed appropriate for data production.

The theoretical framing of the data production phase of the study provided insight into the first three research questions (RQ), namely:

RQ1: What social computing do HE teachers use in their teaching?

RQ2: How do HE teachers use social computing in their teaching?

RQ3: Why do HE teachers use social computing in their teaching?

The results of the analysis are discussed in the following two sub-sections.

11.3.1 RQ 1 & RQ2: What, and how, social computing is used in HE teaching?

The participants mainly used the institutionally provided LMS platform, Moodle. Skype, Facebook and YouTube were also popular. Numerous other SC applications were mentioned by individual participants but these did not have broad-based uptake.

Participants used SC for both full-time and part-time teaching as well as undergraduate and postgraduate modules. UKZN is a contact university and undergraduate teaching is predominantly full-time while postgraduate studies are often undertaken on a part-time, distance education basis. Use appears to follow the hierarchical models mentioned by numerous authors. Initial use is transmissive with easy-to-use features that are popular and focus on providing resources and notices. The next features engaged had a high intention to use, were common with participants, and represented transmissive and ritualised communication such as discussion spaces and Q&A. Applications and features were used singly or combined and the result depended on how they were used. Transformational use depends on the teacher's intention, design of the space, and engagement levels of the students, rather than what is being used. SC applications allow for conversational features, collaboration and curation of student knowledge. These experiences can transform the teaching and learning process, and the resultant student learning. The contexts that nurture such transformational experiences are difficult to create and Schoonenboom (2014) noted that LMSs in general are not good at facilitating such experiences, although this does not prevent them being used in innovative interactions.

11.3.2 RQ 3: Why social computing is used in HE teaching

At an individual level HE teachers' use was influenced by personal, academic, institutional and national factors. The majority of participants had a personal interest in making teaching interesting and engaging for students and themselves. These participants had reached a motivation threshold where, despite the challenges, they continued with SC use in teaching because they saw the benefits as greater than the costs. The personal and professional risk to teachers as a result of the time they expended on SC based teaching is important to acknowledge. A teacher who prioritises use of SC activities may spend less time on other academic functions such as producing research publications, which can be to their professional detriment. They also report high levels of stress and difficulties with work-life balance. These negative impacts can serve as push-factors resulting in HE teachers seeking opportunities in the private sector that are more supportive of innovation, and provide solutions designed to suit the needs of the individual teacher.

Participants spoke of two primary motivators for SC use: the first was a focus on improving students' learning by employing a conversational, collaborative and social constructivist pedagogy, and the second was to improve the teacher's efficiency when sharing resources, communicating with students, and assessing students using quizzes. The former was the more prevalent amongst participants. The latter i.e. initial use of technology for efficiency and administrative functions, may represent peripheral participation that could foster an inbound learning trajectory into an educational technology teaching community. The influence of academic discipline on SC use may vary depending on the nature of knowledge in the discipline and the beliefs of discipline members. The role of students and their use of technology, and SC in particular, also played a significant role. Operational challenges included access to resources for both teachers and students that may be linked to the availability of funding or support of colleagues.

This study has shown that SC occurs as small scale initiatives at UKZN. In the Health Sciences, the community of practice nature of their professions, and decisions to work across discipline boundaries, have played a role in how SC was used in their teaching. In general, participants stressed the importance of support provided by local and international colleagues as well as internal and external funding that support these SC initiatives.

11.4 Theorising the analytical phase: Structures, mechanisms and processes influencing social computing use in HE teaching

In the analytical phase the theoretical constructs provided by Community of Practice and TPACK could assist in providing the component nodes for coding and analysis. They lacked theoretical constructs, however, to represent the interactions and relationships between component parts of the UKZN context. The key theoretical focus of the study was to determine the generative mechanisms and processes that may help explain why teachers use SC in their teaching in the way that they do. CR presents the theorising devices of ‘self-aware agents’ and structures, that “enable /constrain action and are themselves reproduced and transformed in the process” (Mingers, 2004, p. 13). Events, and our experiences or observations of a sub-set of these events, are transitive, and are underpinned by enduring structures (social and cultural) and mechanisms. The criticism that CR does not adequately accommodate the complexity and openness of systems (De Vaujany, 2008; Mearman, 2006) requires that a clear system boundary be determined. The realisation that a broader range of elements of the university system would need to be represented in theorising long term and short term interactions introduced the idea of employing a systems theory approach. In addition, initial production and transcription of the data suggested that SC use in HE teaching was not the norm but rather featured more regularly as an innovative or exploratory use. Analytically the use of Repenning's Implementation of Innovation simulation model provides the necessary nodes and relationships to form an understanding of the commitment-effort-result cycle of innovation (Repenning, 2002). This framing, together with systems archetypes used broadly as explanatory devices, allows for a detailed explanation.

11.4.1 A holistic perspective of causal loops and system archetypes in the UKZN social computing teaching space

Chapters 7 through 10 have scaffolded a view of the SC, innovative teaching space that is grounded in participant interview data. Analysis profiled mechanisms consisting of interactions between objects, that then form the building blocks of processes which have primarily been represented as causal loops. Reinforcing causal loops (R) can either be positively reinforcing i.e. regenerative or virtuous or negatively reinforcing i.e. reversionary or vicious. Normative, or balancing loops (B), provide a process whereby normative managerial requirements are brought into dialogue with reinforcement processes. All processes need to be placed within a unified representation of a teaching space, or institutional system, so that a holistic picture of teaching with SC at UKZN, can be presented. Such a unified perspective will however include two riders: firstly, when the teachers discuss SC they may have meant a general, innovative practice using technologies that are not geared towards sharing or collaboration and thus would not strictly meet the 'social computing' criterion; secondly, while SC is being theorised as an actor in its own right, participants may not have spoken of it as an object with its own agency and thus any conclusions drawn in this regard have the potential to be researcher-biased.

At an institutional level the causal loops of the teaching space may become interconnected and result in specific patterns of interaction between the processes that can be identified as overarching drivers of the system (Chapter 10). These relationships exist in a delicate and nuanced tension with each other which is difficult to represent holistically. In particular, an institutional perspective must balance the tipping effect that relatively small behaviours may have on the greater system, while generalising the context sufficiently to provide a useful overview for explanation, discussion and research. The objective of Figure 43 is to present such a mid-level, partially abstracted summative view of the results of this study. A very detailed discussion of the small-scale and personal variations of these processes, as experienced by participants, has already been detailed. However, it is useful to highlight with broad brush strokes the elements that are noteworthy for this case and potentially in other HE institutions.

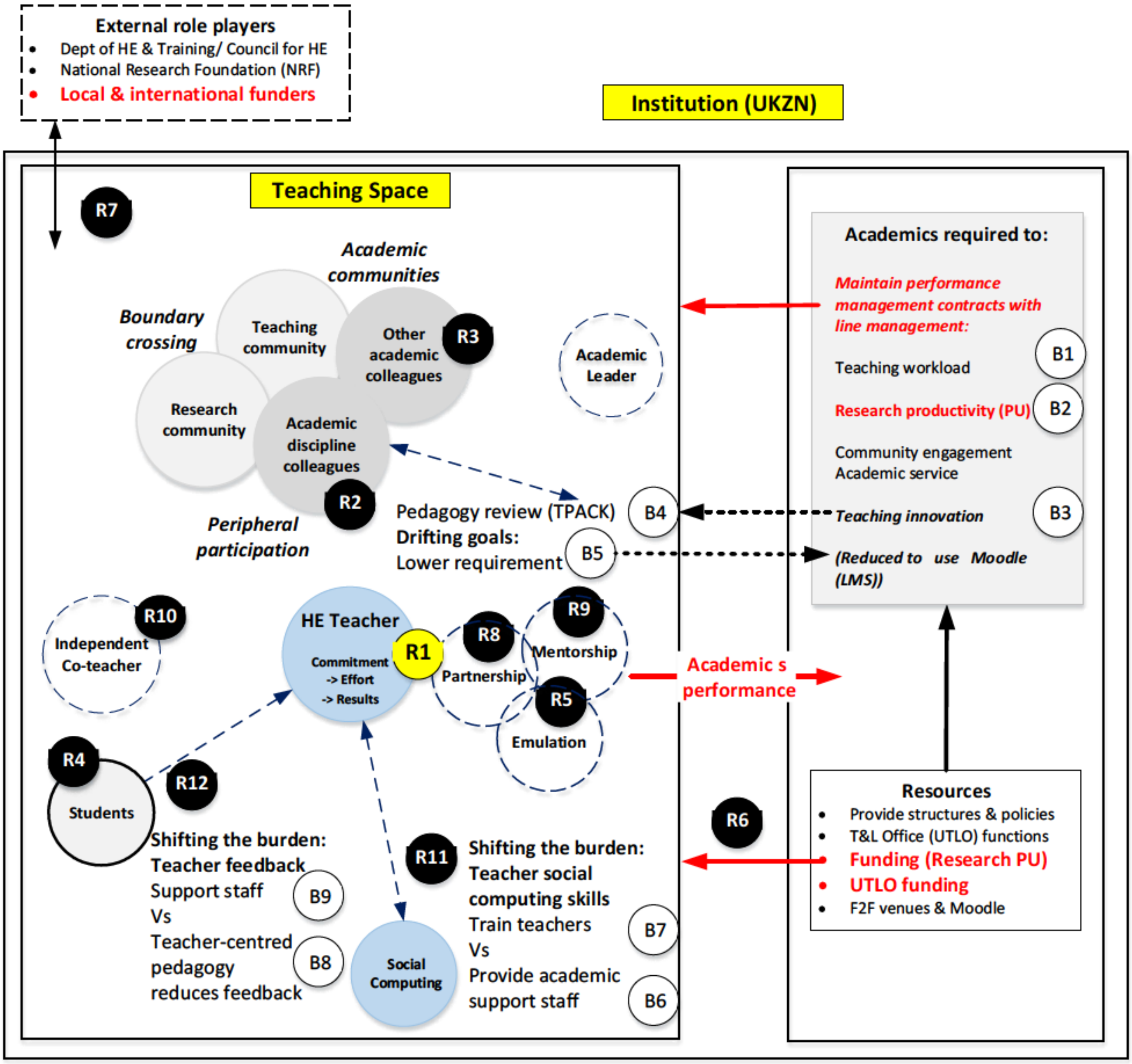

Figure 43: UKZN reinforcing and balancing system processes and their consequences

The HE teacher who is committed to innovative teaching, such as SC use, experiences a continual cycle of commitment, leading to effort, to produce the desired results (R1). However, the results achieved were not dependent only on the teacher’s effort but also on the engagement of students in the process of ‘learning’ and the efficacy of the teaching and learning process (R4). The major challenge facing HE teachers was the available time to meet all commitments. Two aspects of social computing innovation face the teacher: the first is that of learning the necessary skills (R11) and the second is having sufficient time to provide the ongoing formative feedback to students that is required if a social constructivist (or social constructionist) pedagogy is employed (R12). In each case there were two competing solutions: a long term solution can be employed e.g. train teachers (B7) and provide additional teaching support staff to assist with feedback to students (B9). Alternatively, a short term solution of employing someone else to develop the SC task appears to solve the problem but in reality disempowers the teacher by limiting their control over the material and medium (B6). Likewise, if a teacher uses a more teacher-centric pedagogy it will be more instructivist and require less feedback, but potentially also limits students’ development of critical thinking skills (B8).

A teaching innovation can be expected to spread organically dependent on the success of the innovation and the role players and dynamics which exist within the system. As illustrated, the diffusion of SC use may occur through emulation (R5), partnerships (R8) or mentorship (R9). It is also possible that the success of the use of SC can be negatively impacted by an independent, co-teaching teacher who does not participate in use of SC and may create a negative student perception of such applications (R10). Peripheral participation by HE colleagues suggests that the potential exists for teachers to gradually engage with such applications. In such cases, the use of SC may depend on the other processes operating in the teaching domain.

Paradoxically, while academics may work in private, and independently from others, an academic life is one which requires socialisation within defined communities. An academic is part of, and is influenced by, discipline colleagues and professionals (R2), academics and professionals from other disciplines (R3) and communities of teaching practice and research (Figure 43). These are not discrete groups with separate members. Evidence exists of boundary crossing behaviour and artifacts along all of these dimensions: academic discipline, teaching and research. An academic leader is a discipline colleague who is the head of a discipline, the line manager for an academic, and hence the person with whom a performance contract is negotiated. These interactions, enclosed within a box shape, can perhaps be seen as ‘internal’ i.e. occurring amongst those within the teaching space. Figure 43 includes relationships which cross the teaching space boundary and interact with teaching resources provided by the institutional system; and specify the academics’ responsibilities within the UKZN system. In addition, the UKZN teaching system is open to external input from external role players.

A UKZN academic is expected to operate within prescribed institutional requirements and balance a range of demands (B1, B2 and B3). Relationships based on community engagement and academic service were not highlighted by participants although they represented two additional areas of academic performance. It is suggested this is because outputs in these areas are not specifically monitored by management and have no clear performance metrics. Funding mechanisms are identified as critical to teaching innovation success because they allow teachers to purchase additional assistance, resources etc. that assist in the “available-time” challenge. This support may be through conventional channels, or through specific relationships between teaching innovation and excellence; specialist internal, competitive teaching grants (R6); and similar external grants (R7). At UKZN, research performance provides *guaranteed funding* based on research productivity in a specialist field or in SoTL (PU). A productive relationships can thus be formed between research, SoTL and teaching innovation (TI) to access such benefits. However, there appears to be *no guaranteed financial* avenue for teachers to promote their conventional teaching onto a pathway of innovation and SC use. The only avenues available are via a competitive grant process that is not guaranteed, or if institutional management recognises the need for such innovation as a standard financial responsibility of the institution. Should teachers wish to embark on such a trajectory they either have to ensure they have created, or secured, funds of their own or accept the personal cost to mental health and work-life balance that the additional time demands will require. The teaching versus specialist research “conflict” in HE that is oft quoted as the ‘publish or perish’ dilemma, remains as the individual academic’s challenge to resolve. Because research is directly funded it is seen to take precedence over teaching and an attempt to promote teaching innovation, including blended learning components (B4) caused academics to "push back" against this requirement, until a much lower requirement (use of an LMS) was introduced (B5). This falls short of the "excellence in teaching and learning" – goal of the UKZN strategic plan.

This study has shown that a potentially productive relationship between different academic responsibilities can be established by individual academics at UKZN by means of the research PU funding process. However, a strategic approach, at the institutional level, for resolving academics' responsibilities in ways that allow them to perform at optimal levels in all categories, is not evident. Figure 43 summarises the institutional teaching space by moving from the individual level to the level of generative processes and structural elements. To create a theoretical framing which can be employed in different contexts it is necessary, in addition to this explanatory abstraction; to provide a critical framing, dealing with power differentials at the system level.

11.5 Synthesis: Abstracting a general framework of social computing in HE teaching

The positioning of 'social computing' and the representations of power dynamics within the system are of importance in this final stage as the location and flow of power within a system is a key consideration in CR. CR presents a clear perspective of structures (social and cultural) as well as the agency of individuals: " The distinctive nature of the TMSA (*Transformational Model of Social Activity*) is how it pictures the coming together of human agency and social structure, specifically that they are recursively organised and that the reproduction and transformation of social structure is a generally unintended consequence of human action" (Faulkner & Runde, 2013, p. 804). The initial analysis has not provided theoretical insight into the location and use of power within the system. This suggests that a third iteration of theoretical framing is necessary to present the findings of the study.

The relationships between objects are thus theorised as important to the specific outcomes which are produced, both in the short- and long-term. While this provides a clear approach for theorising actors, agency and structures, it does not comfortably position a digital object such as 'social computing' in a way that is meaningful for this study.

11.5.1 *Theorising objects: Social computing*

CR has been criticised for seeing digital media as intransitive objects that are separate from us and remain unchanged by our knowledge of them (De Vaujany, 2008). This is particularly challenging when SC has been defined as occurring "at the intersection of computer networks and social networks" (Musser et al., 2003, p. 1). This implies a point of contact and a transfer between, and potentially modification of, both parties involved in the connection. Researchers represent computer or digital 'objects' in a variety of ways. It is thus necessary to clarify how SC is positioned theoretically in this study. A 'technological object' can refer to a diverse range of computer-related items which may be material or non-material. Tangible, material computing-related objects include e.g. a smartphone, or computer server; whereas intangible, non-material digital entities include databases, operating systems, computer programmes etc. The former have properties such as dimensions, mass and location whereas the latter do not (Faulkner & Runde, 2013). The similarity between human and technological actors is that they can be identified as having an 'identity' by virtue of the social position they occupy. A person may have multiple identities based on their roles. These roles are governed by "relatively stable complexes of rules" which relate to the practices, rights and responsibilities of members (Faulkner & Runde, 2013, p. 808). Faulkner and Runde stated, as a footnote to this discussion, that "identities may also be acquired by virtue of individuals' membership in particular social groups as well as their own personal characteristics, attitudes and attributes". These aspects, footnoted in their discussion, are central to our understanding of the use of SC in HE teaching because much of the behaviour of teachers is driven by community membership and personal characteristics, beliefs and values; in addition to the roles they fill.

Faulkner and Runde suggested people's interactions with technological objects are conditioned by a relatively stable sets of rules. Forms of SC are however more dynamic than conventional applications as they are (a) also able to be deployed in ways not conceptualised when originally created; and (b) gain specific characteristics based on their use by a variety of people or groups. The characteristics or influences of SC platforms are a function of the digital content created, shared and curated via these platforms. Embedded within such platforms are algorithmic behaviours which use the content and the behaviour of the users (actors) as a foundation to push or pull content to individual actors (Burr et al., 2018).

Archer (1996) and Kempton (2019) indicated that changes in relationships and interactions can have a broader impact on parts of the system, or the system as a whole. The embedded logic, and ways in which SC is used, form the basis for causal episodic powers that can influence the behaviours of numerous actors and result in emergent and transformational activity (Kempton, 2019). Kempton (2019, p. 6) described this as relational emergence: "When an assemblage has properties and powers that only exist because of the composition and interactions of its parts (its mechanisms), it is termed as emergence. This means that the whole that is created by the composition of entities is something more than its individual parts. … an assemblage is naturally becoming, stable, and changing in a temporal sense of the word". Archer (1996) process of morphogenesis refers to "the complex interchanges that produce change in a System's given form, structure or state ('morphostasis' is the reverse), the end-product being termed 'Elaboration'. Of course action is ceaseless and essential to both the stable continuation or the further elaboration of the system" (Archer, 1996,xxiv). Archer provided a hint to the analytical work required when she suggested that "effort will have to be devoted … to the derivation of morphogenetic sequences culminating in Cultural Elaboration as well as to their counterparts, the negative feedback loops resulting in morphostasis or cultural reproduction – the two, of course, often operating simultaneously in different parts of the cultural domain" (Archer, 1996,xxvi).

This view of the ebb and flow of power supports the narrative that technology is not a neutral force as it impacts, and is impacted upon, by practice (Greenhow & Gleason, 2014). SC design criteria make specific assumptions about the world and objects within it. They may thus also privilege specific interests and tend to certain causal powers and not others (Kempton, 2019). Many technological objects conform to a product-oriented view where technology provides specific affordances to their users that remain constant throughout their use. Technological objects (including the non-material) however differ from human actors in two respects, namely: firstly, they do not have their own 'practices' in the way human actors do; and, secondly, they do not have rights and responsibilities based on the positions they occupy (Faulkner & Runde, 2013). We can thus envisage a space where both technological objects and human actors can be represented in a similar fashion but with some minor differences. While TMSA and Archer's social realism have different origins they share similar, complementary views of 'morphogenesis'.

An alternative framing of technological objects is the sociomaterial perspective which sees the use of a technology and the technology itself as "entangled" (Parmiggiani & Mikalsen, 2013) and suggests that they can only be fully understood if we understand their relations to each other (Kempton, 2019). The idea of "sociomaterial constitutive entanglement" is highlighted along with the role of networks of relations between human and non-human actors. Parmiggiani and Mikalsen's metanarrative presented numerous views of how 'sociomaterial' is used, but stressed there was little explanation of how untangling these aspects can be approached. Many of the studies refer to the Actor Network Theory (ANT) of Latour (1997) as providing foundational concepts, including the fact that a subject and an object in a network should be viewed in the same way. They also highlighted the importance of research design and methodological choices as this can impact "the way the researcher is able to account for the performativity of an object of study as a sociomaterial assemblage in its unfolding" (Parmiggiani & Mikalsen, 2013, p. 96). Education has an interest in understanding technology use based on how it is positioned in relation to teacher- and student-actor practices. However, these processes are equally of increasing interest to researchers in Information Systems (IS). Affordance Theory (Gibson, 1986; Norman, 1999) is used to explore the affordances offered to individuals, groups or organisations by specific technologies (Pozzi et al., 2014; Volkoff & Strong, 2017). Conceptual understanding of this 'entanglement' of the actor and associated technologies is thus receiving multidisciplinary attention.

Objects and their relationships may be imbued with power based on their individual positions (in terms of their identity, roles and relationships). The way in which Web2.0 and SC objects are conceptualised suggests that it is necessary to explain the nature of the relationship (or entanglement) by finding dimensions along which they can potentially be disentangled. In addition, multiple trajectories or a variety of outcomes are possible from an interaction. The study of a system should thus assist in determining if there are recognisable assemblages which provide the potential for specific outcomes, or preclude the occurrence of specific outcomes.

11.5.2 Theorising power

Power is linked to connections, interactions and relationships (Charron et al., 2006; Musser et al., 2003; Silva, 2007). Technology is often implemented as a top-down process where vendors convince management that a specific need exists that the technology can meet (Hsu et al., 2013). This movement of education platform developers into the institutional space is not a neutral trend but rather represents the leveraging of “platform capitalism” (Srnicek, 2017). “‘Platform capitalism’ describes the business model and market form of the worldwide web since the appearance of digital platforms…[as they represent] the dominant spaces of capital accumulation on the Internet” (Williamson, 2021, p. 55). Through this process companies are able to control the production of data within the platforms and thereby gain a form of monopoly, and economic and political power over the social structures in these spaces. Initially, companies such as Pearson, promoted the use of their educational platforms to gain market share in HE which could later be further leveraged (Williamson, 2021).

This imposition of choices causes resentment amongst actors specifically when the technology does not meet real needs. SC allows teachers to take control of the use of technology to change the balance of power in the classroom via a bottom-up process (Jump, 2011). This may threaten teachers who fear loss of control in the classroom (Backhouse, 2013; Kinchin, 2012), while other teachers may actively seek the empowerment it represents (Selwyn & Grant, 2009). An instructional discourse, dealing with the knowledge, skills and disposition of the discipline is embedded within a regulative discourse which specifies the relations, identities and behaviour in the learning space (Wheelahan, 2007). These discourses that teachers (re)produce and within which they operate, represent specific interests and thus represent sources and mechanisms of power and privilege.

In academia the personal agency of an academic, their academic freedom or academic autonomy, has long been recognised. Henkel (2007) suggested that the idea of academic autonomy has largely been undermined as society holds institutions to account.

> *The governance of knowledge and knowledge-based institutions is shared and often contested between the state, the market and academic institutions. Boundaries are permeable and movable, and progress in the advancement and dissemination of knowledge is substantially dependent upon their being crossed. Institutional and individual academic autonomy is not given under these circumstances, so much as continually to be striven for and won. It is, therefore, conditional but, unlike the conditional autonomy depicted by Neave (1988), it is not something over which academics and their institutions have no control. (Henkel, 2007, p. 98)*

Academic freedom is not unconditional nor is it guaranteed. The HE academic space is globally involved in a struggle around legitimacy, relevance and value. New public management (NPM) sets the goals for HE institutions, while allowing them the 'freedom' to determine how these are achieved. While this can stimulate creative solutions it does not detract from the fact that these goals are predetermined with little to no room for negotiation (Marginson, 2008). While this 'imposition' is keenly felt, this is not a purely hegemonic, one-dimensional power space. More appropriately, this is a space of contestation, negotiation and shifting power dynamics. From this perspective 'resistance' and 'domination' are equally important as modes of power (Few, 2002). Individuals seek to form power alliances with those with whom they feel they share characteristics. The interactions in the system thus involve multiple actors operating in an arena where a complex web of power exists, rather than a "purely binary exchange of forces" (Few, 2002, p. 34).

The 'circuits' of power metaphor seems appropriate to represent the HE teaching system and has previously been applied in the context of economic transactions (Zelizer, 2011), computer-based information systems (Silva, 2007) and the politics of business-environment relationships (Orsatto & Clegg, 1999). Three key circuits of power are evident, namely: episodic power where one individual influences another individual to do something they would otherwise not do; social integration which is linked to roles and positions in an organisation that provides legitimacy and access to resources for an actor; and finally, systemic integration which focuses on mechanisms and processes which favour specific interests and provide techniques to discipline members if necessary (Silva, 2007).

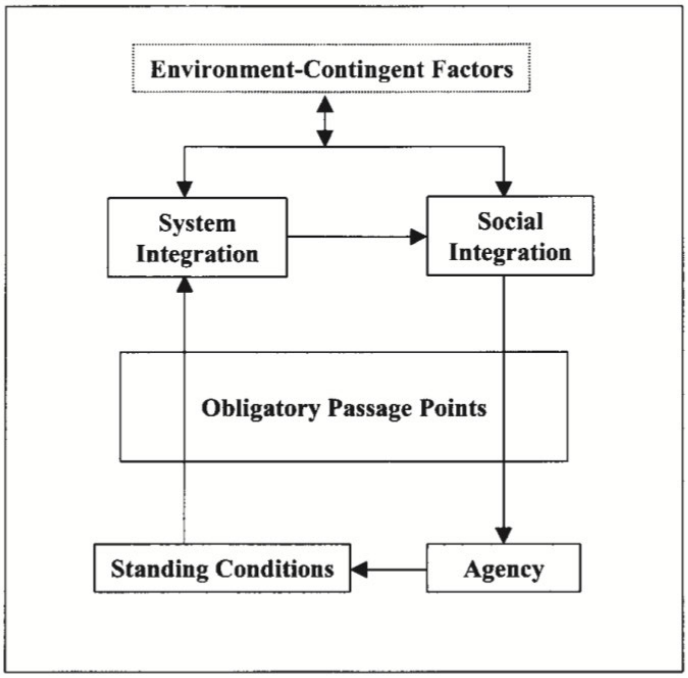

Figure 44: Circuits of power (as observed in a political ecology context)
(Orsatto & Clegg, 1999, p. 268 Figure 1)

Social integration has embedded within it Maton (2005) ideas of positional autonomy, while systemic integration appears to include relational autonomy which operates at the institutional or perhaps national level. Figure 44 provides the main components expected in a circuit of power at the system level, namely: environment-contingent factors that may influence (and be influenced by) both system integration and social integration; agency, standing conditions and the obligatory passage points (OPP) that represent the influence of social integration on agency and the way in which standing conditions influence system integration.

Circuits of power have boundaries which separate members and non-members. Within the circuit there is a common understanding of meanings, moral values, and the process of account keeping based on a common currency (Zelizer, 2011). At a system level there may be numerous groupings who have aligned with each other on some basis of 'belonging' and thus a system may include many communities. Overall, the circuits of power framing can be employed at various levels of scale with the main focus of this study looking at how the system elements impact the individual actor. The power dynamics within a system exist in a constant state of tension, to a lesser or greater degree; where the shifts in power are likely to be related to inequality in access to resources (Tilly, 1998) and are regulated by powerful agents (Silva, 2007).

11.5.3 Circuits of power in HE teaching

Analytically, the focus of this study has been on the individual HE teacher as the unit of analysis. When theorising this case study, UKZN was regarded as the boundary of the system. Figure 45 presents a generalised circuit of HE teaching power, as modelled after Orsatto and Clegg (1999). External, environmental factors may impact the processes of both system integration and social integration. These external factors may include regulations and the influence of government, interest groups and private agencies. The processes may also be impacted by consumer demand for HE teaching and the presence of competitors in the HE teaching sector. Not specifically mentioned by Orsatto and Clegg (1999) is the important role that change or disruption may play in the environment.

System integration is achieved through the use of technology, tools and skills that control both the physical and social space. It is recognised that parts of the system operate interdependently. Changes or innovations at the system integration level will ripple into the arena of social integration in ways which can empower or disempower existing social relations. This may simultaneously advantage some actors while disadvantaging others. In the arena of social integration 'ground rules' or rules of engagement prevail: firstly, relationships, rituals and techniques form part of the identity of participants; secondly, the purpose of engagement is to facilitate the creation of meaningful artifacts and techniques; and finally, it is assumed that a shared understanding of what constitutes 'HE teaching' is understood, accepted, and thus to some degree, imposed on all actors in the social space. This highlights the underlying power and authority embedded in the structures and actors, as a pre-existing condition for engagement.

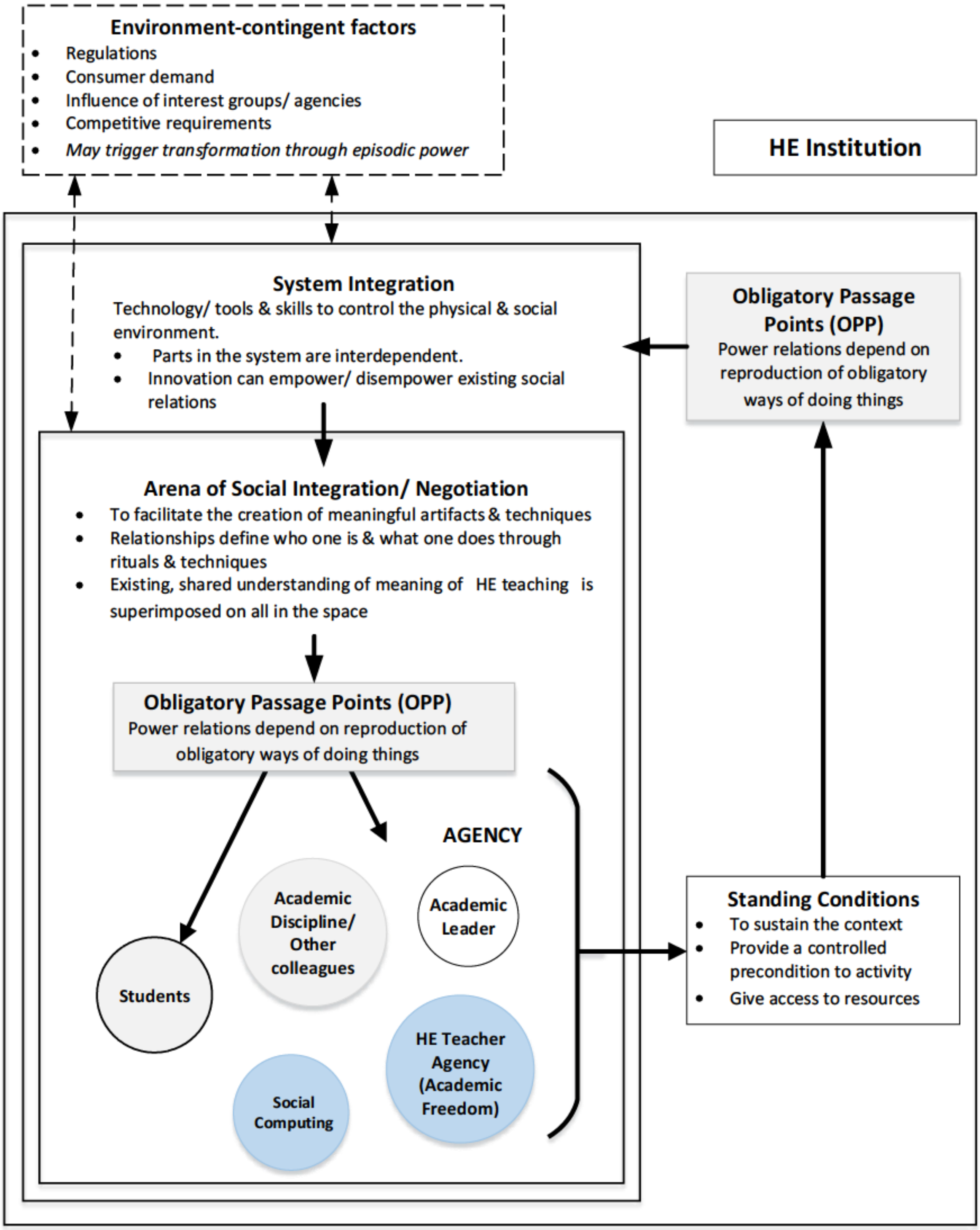

Figure 45: Circuits of HE Teaching Power – Theoretical concepts for this case study

It is recognised that actors are required to navigate obligatory passage points (OPPs) or prescribed ways of doing things. These OPPs are mechanisms by which the status quo is maintained (morphostasis). Social integration is a process which ebbs and flows: actors operate within a potentially contested space where interactions, and the power employed, exist in an ongoing arena of negotiation. It may at times appear ‘calm’ when ‘compliant’ behaviour is the norm, but can equally be ‘contested’ as disruption occurs when challenges, change or innovation tests the boundaries of prescribed behaviour. An “arena of negotiation” (Few, 2002) provides an appropriate representation. It resonates with images of contests within a contested space (arena) and yet requires a resolution of tension (negotiation) if the system is to continue to operate. Actor agency may be comparatively greater, or lesser, than that of other actors in the space and is not constant, nor is it binary (‘power’ vs ‘no power’). Power exists as a tension (or harmony) between actors, which shifts and can be granted to others or forcibly taken. For HE teaching academics, the agency they have is traditionally referred to as their academic freedom.

The standing conditions which apply to the UKZN HE system are those which sustain the context, give access to resources and provide the precondition to any activity. To some degree, the standing conditions, while a part of the system, are seen to exist outside the direct sphere which influences the teacher. More directly, the teacher experiences the standing conditions as represented by OPPs, which influence those operating under their authority. The OPPs operate at two levels: the first represents the obligatory patterns of behaviour imposed on the system as a whole at a strategic, managerial level (Standing Conditions influence the OPPs which impact System Integration); while the second represents the behavioural expectations of the actors within the teaching space. The standing conditions provide a set of OPPs which govern how the process of system integration will operate, but over time are themselves influenced by the agency of actors. This circuit of power suggests there are two key points where the existing system can be impacted to change: through external environmental forces, or internally through the agency of individual, or groups of actors. A potential third point of disruption could be the standing conditions; if an internal decision is taken to alter these standing conditions that is not impacted by the external environment but is management driven, this could change the circuit of power.

11.5.4 Circuits of power in UKZN teaching

The circuits of power in HE teaching (Figure 45) can be further specified to represent the UKZN teaching context (Figure 46). In South Africa, the HE landscape (i.e. Environment-

Contingent Factors) is controlled by the DHET, whose "mission is to develop capable, well-educated and skilled citizens who are able to compete in a sustainable, diversified and knowledge-intensive international economy, which meets the development goals of the country" (DHET, 2021). Independent statutory HE quality control is provided by the Council on HE (CHE) whose mission is to "lead and manage quality assurance; research and monitor trends and development; initiate critical discourse on contemporary higher education issues; and provide advice to the Minister on strategy and policy" (CHE, 2021)

A South African "open learning policy framework for post-school education and training" is being developed which aims "to increase access to education and training opportunities for all and to construct quality learning environments which take account of learners' context and use the most appropriate and cost-effective methods and technologies" (Nzimande, 2017, p. 1) (see 3.5.8 for further details). This national discussion document on open learning stresses that implementation will allow "operational and ongoing costs (may/to) be kept low", and the "initial costs of establishing the necessary … infrastructure (will be high), in addition to the heavy cost of course and materials development" (Nzimande, 2017, pp. 8, 43). It is not clear if this signals an intention to employ fewer HE teachers to service increasing student numbers (lower operational costs), and if the guideline sees T&L resource development as a once-off cost, an intermittent cost i.e. an initial and then revisionary expense, or an ongoing cost (Nzimande, 2017). These budget assumptions require clarification in the light of the findings of this study that shows the need for an ongoing investment in securing HE teacher time to secure a meaningful, technology-enabled, T&L experience.

The HE environment is also shaped by funders such as the National Research Foundation (NRF, 2021), and others on a local and international level. This space is also shaped by private and online institutions, as well as educational software platform vendors.

UKZN provides the framework in which HE teaching occurs at the institution. Standing conditions include policies and structures which support T&L as well as those which govern academics' broader responsibilities such as research, community engagement and university service. The University Teaching and Learning Office (UTLO) is tasked with delivering on the T&L goals as presented in the university's strategy (UKZN, 2021). The institution provides overarching funding to support provision of physical teaching spaces as well as online support via Moodle.

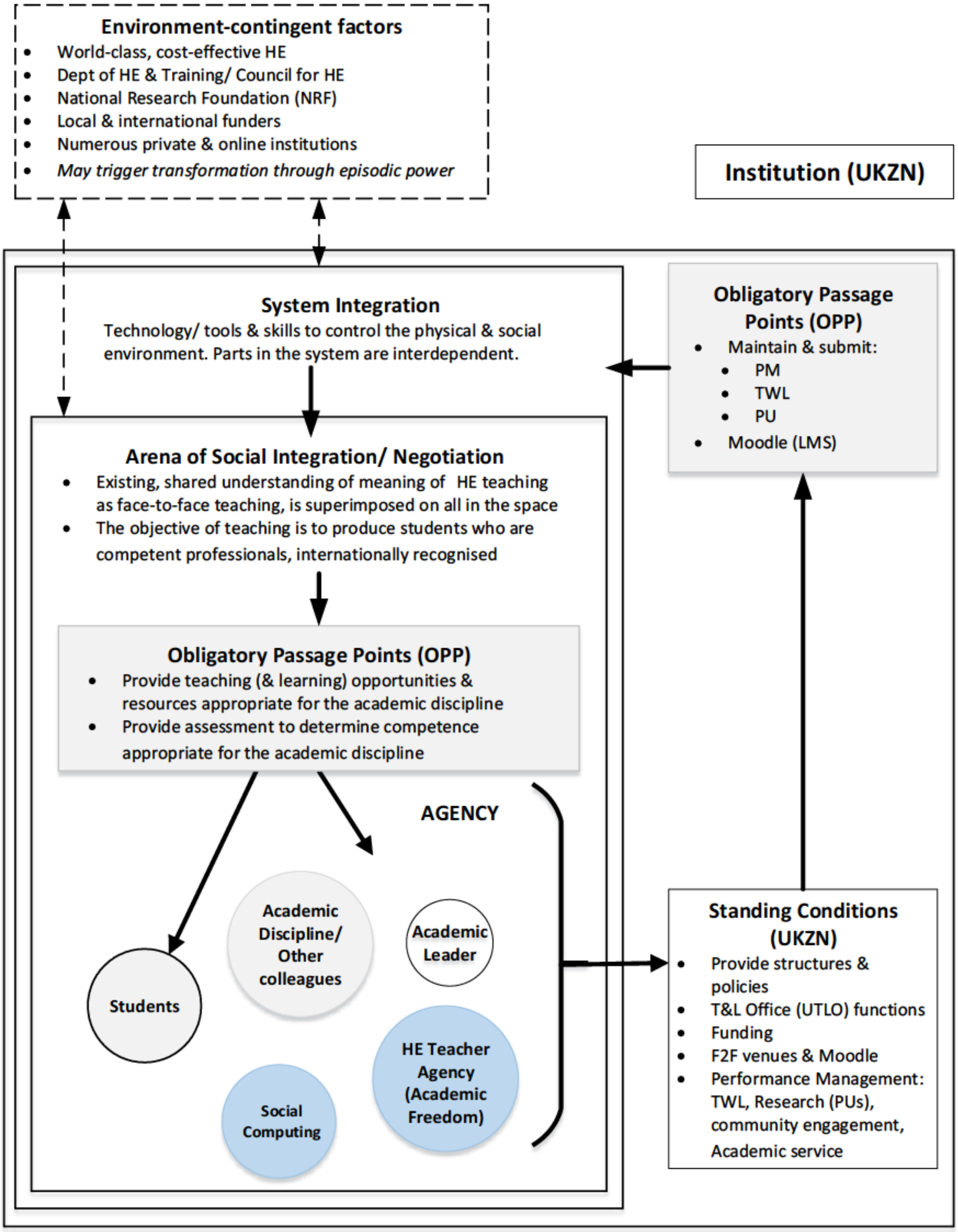

Figure 46: Circuits of HE Teaching Power – UKZN details

Additional funding to support targeted SoTL is funded through UTLO. Teaching is governed via a workload allocation framework (WAM), referred to as the 'teaching workload' (TWL). A performance management (PM) framework is used to assess academics. This PM system incorporates the four main areas of academic activity namely: teaching (TWL), research (PUs), community engagement and academic service. These form the OPPs which are required to achieve system integration. Teachers are required to complete performance management contracts and complete an assessment process. This involves the following: complete their TWL and meet all expectations related to teaching and supervision; perform on research commitments, and record PU-related research outputs. A teacher is also required to create a Moodle presence for all modules they teach.

The arena of social integration where players meet to achieve T&L has the primary objective (OPPs) to produce students who are competitive on an international stage. This requires that appropriate T&L opportunities, resources and assessments be used to determine competence and progression. Teachers, students, members of academic disciplines and other academic colleagues operate within this social space. At UKZN, contact, or F2F teaching, is the norm. Social computing applications, as non-material objects, have an equal positioning within the space as the human actors. Each of these players thus have agency, are interdependent and may be empowered, empower or disempower other players in the space.

11.5.5 Articulating agency within HE teaching circuits of power

In order to understand the system as a whole, it is not sufficient to only provide the macro level conceptions of power in the teaching landscape. It is also necessary to again return to the individual level and to locate the actors in their context. Their power, as individuals (objects) and SC platforms (non-material objects), require theoretical representation to ensure a detailed actor-oriented model of power in the UKZN, HE teaching system.

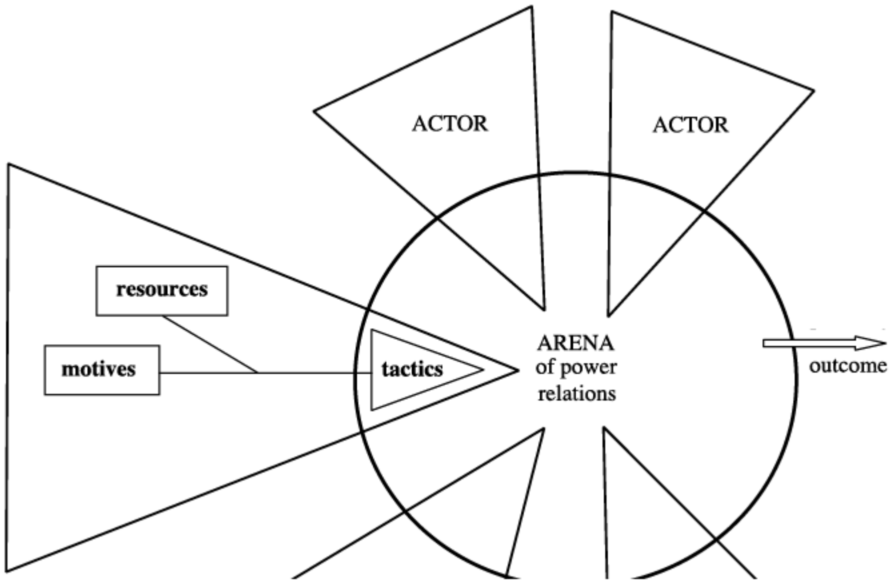

Figure 47: Motives, resources and tactics used by actors in an arena of power relations to attempt to influence an outcome (Few, 2002, p. 34 Figure 2)

Few (2002) suggested power is instantiated via the motives, resources and tactics of the actors (Figure 47). The motives of an actor are influenced by their sense of self or identity. Resources may include their personal knowledge, skills and social network as well as structural elements which they are able to leverage. Tactics are the strategies used to gain advantage in the social space (Few, 2002).

A summative framework should thus include motives (M), resources (R) and tactics (T) for actors, as well as processes that represent the relationships and interactions between role players. Figure 48 does not attempt to detail the MRT for the 'Environment-contingent factors' as this study is not concerned with their agency, but only the points of interaction with the HE teaching system. Other actors and structural components are detailed but only as they have been shown to relate to the HE teaching of the participants. There are three components of the framework which are detailed, namely: standing conditions, the arena of social integration and the actors within the teaching space i.e. the HE teacher, academic colleagues (from within the teacher's discipline and outside of it), social computing applications, students and the academic leader.

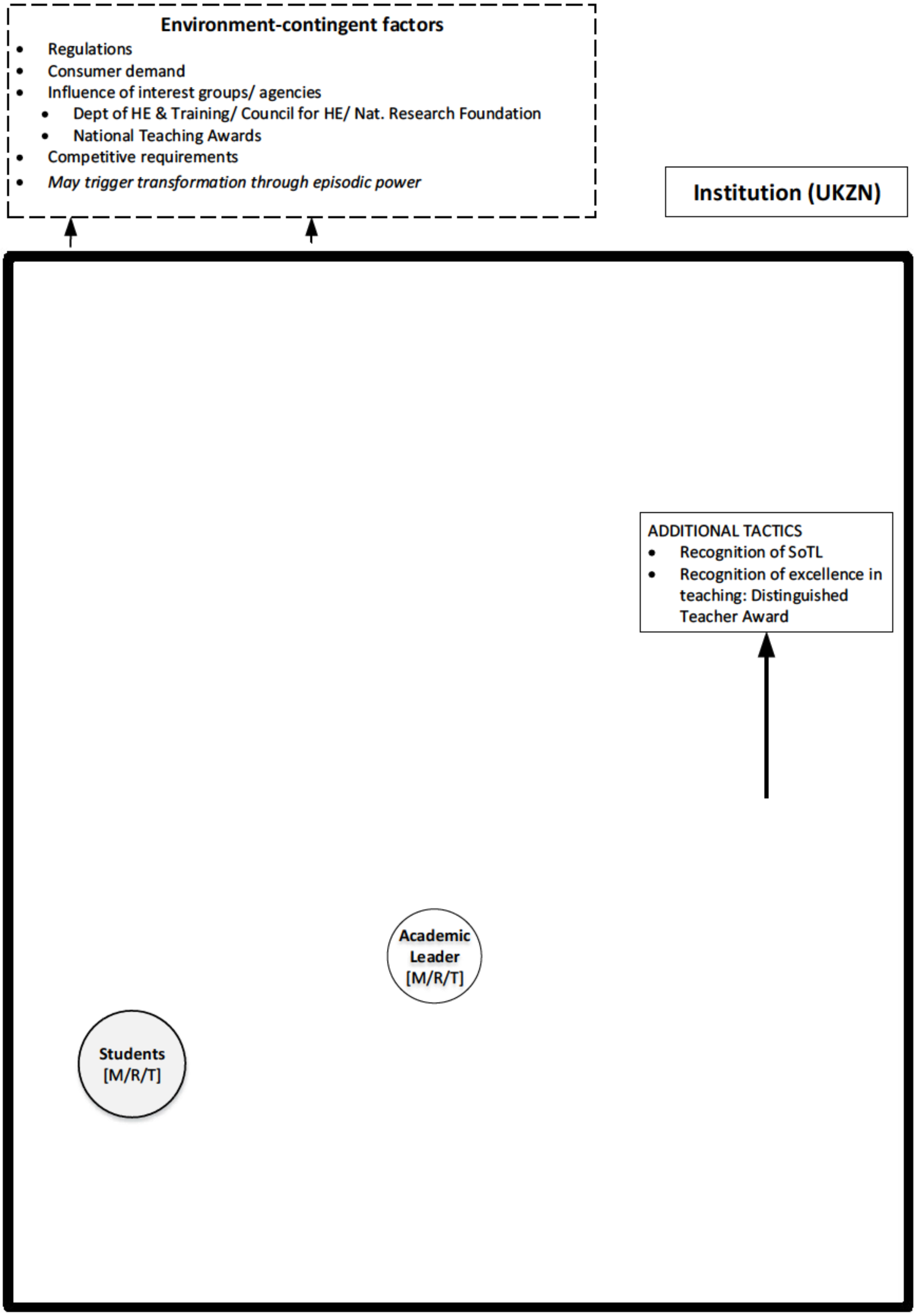

Figure 48: Circuits of HE Teaching Power – An arena of motives, resources, tactics and processes

‘Standing conditions’ represent the various levels of operational, tactical and strategic operations of the HE institution. The motive is to ensure the continued survival of the institution, which it achieves by providing all necessary resources at a structural, social and individual level. The system-based “circuit of power” (Orsatto & Clegg, 1999), and the actor interactions in the “arena of negotiation” (Few, 2002) can be linked to form a conceptual framework via the ‘OPPs’ that represent ‘tactics’ used to achieve the system objectives. As an example, the standing conditions provide the context for activity through the *tactic* of imposing specific behavioural requirements, via the *obligatory passage points.* Additional tactics such as recognising SoTL and distinguished teaching are also employed. The motive of the arena of social integration is to facilitate the creation and integration of appropriate artifacts and techniques of HE teaching by leveraging the available social resources i.e. the identity, relationships, rituals and techniques of the actors in the space. Similar to the ‘standing conditions’, the tactic used to achieve social integration is to create specific OPPs to control actor behaviour in order to reproduce the required norm. Each of the actors are assumed to have their own motives, resources and tactics which they employ in the teaching space.

While not specifically illustrated in the Orsatto and Clegg (1999) model, the actor behaviour forms the foundation of mechanisms and processes which reflect the interactions and relationships between components of the system. Specific processes can be identified that operate between actors within the social space, while others operate across the boundary with the institutional representatives of the standing conditions (detailed in Figure 43). These processes are represented diagrammatically within the framework because they are an important explanatory device for showing how individual tactics and behaviour interact in a transactional space to produce outcomes at a larger scale. It should be noted that the bi-directional arrows between the HE institution and the external environment also represent shared processes. The impact of these external factors are, however, limited and relatively simple in nature; and as they are not a focus of the study they are represented more simply.

11.6 The circuit of HE teaching power as an explanation for the UKZN case study

To gain a holistic picture it is necessary to determine the motives, resources and tactics employed by key objects in the teaching space.

11.6.1 UKZN institutional and national environmental-influences at UKZN

Although each of the stakeholders, structures and processes in the system have specific motives, resources and tactics, some are reasonably stable, at least in the short term. These details, as they appear within the literature and participant comments, have already been described to some extent. Role players in the arena of social integration in particular, require detailed consideration. In a number of instances, it is difficult to untangle the motivations of one actor from those of another; specifically if they have shared goals. In addition, what serves as motivation for one actor, may result from a tactic employed by another. The insights presented regarding other objects may be biased as they are based on HE teacher comments e.g. the HE teachers' comments *about* students may be different from students' own comments. This meta-analysis thus also suggests an opportunity for further research, where all actors in a specific teaching arena are polled for their perspective, rather than relying on teacher comments.

11.6.2 HE teacher motives, resources and tactics

HE teachers can be motivated by personal characteristics such as an inquisitive nature that is easily bored, a passion for their discipline or a passion for teaching. Table 14 also highlights how their sense of responsibility towards students played a role in their decision-making as they strived to provide students with the necessary 21st century skills, provided opportunities for them to become active participants in their learning, empowered them to be active societal participants, and knowledge creators and curators. While teachers were seldom inspired by the mere existence of a technology, they may be motivated by the opportunities technology presents. At the social integration level of the system, teachers' decisions may also be motivated by the tactics and actions of other actors such as students (Table 18), colleagues (Table 19), and the demands of the institution (see Figure 48). Available resources at the discipline and institutional level can also serve as motivators.

Table 14: HE teacher motives for using social computing in teaching

	HE teacher MOTIVES
1.	Driven by personal (identity) characteristics
	e.g. inquisitive, easily bored, passion for discipline and/ or teaching
2.	Influenced by environment contingent factors that determine role of HE institutions i.t.o. teaching
	• Role of HE in teaching 21st century technology skills
	• Role of HE in teaching critical thinking skills and producing socially-aware students
3.	Desire to empower students and meet their learning needs
	• Use pedagogies that require active and social participation; creation and curation of artifacts
	• Provide 'meaningful' (authentic) student tasks that are socially and professionally relevant
	• Encourage students to develop a 'voice' including developing mother-tongue terminology and capture indigenous knowledge
4.	Capitalise on technological opportunities/ affordances
	• Potential provided by appropriate technology can support component aspects of a teacher's pedagogy (discussion, creation etc)
	• Provides a structural frame for a course and provides a supportive resource for all role players
	• An institutional LMS can stimulate teacher engagement
	• Provides real world multimedia content and simulation potentials.
5.	Stimulated by student tactics
6.	Stimulated by discipline/ colleague resources and tactics
7.	Stimulated by institutional resources and tactics

Part of the teachers' decision to use social computing was based on available resources (Table 15). These may be personal resources based on their traits and abilities, their relationship with technology, and their perceived academic freedom. Alternatively, these may be physical resources e.g. assistants, volunteered time or shared knowledge that originate from colleagues or other stakeholders. The final resource, important to the success of a SC task, was the participation of students.

Table 15: HE teachers resources that support use of social computing in teaching

	HE teacher RESOURCES
1.	Personal traits/ abilities
	• Level of commitment and effort
	• Level of risk tolerance i.e. more risk averse teachers will avoid experimentation
	• A growth mindset towards learning and gaining new skills. May include self-study or workshop-based training
	• Teacher is interested in innovative pedagogies and chooses to experiment/ innovate (regardless of extrinsic forces)
	• Has a multi-/interdisciplinary paradigmatic positioning (via education, experience, or association). Actively chooses boundary crossing engagement
2.	Computer literacy and interest in technology
	• Interest in technology and a basic technology skillset. Does not require a teacher to be a technophile, as long as teacher is not technophobic
	• Level of comfort with use of technology may have demographic dimensions e.g. gender, age, race in particular contexts

	• Being a technology expert is not a predictor of use as the primary motivator is an interest in pedagogy
	• Employ prior experience of learning or teaching online
3.	Perceived level of academic freedom (available, discretionary allocation of time)
	• Ability to create a flexible work schedule enhances available time to expend on innovation
	• Use of technology may reduce administrative time spent on mundane tasks e.g. copying documents & posting notices
4.	Engaged students
	Provide greater opportunities for innovation, enhance possibility of iterative improvement of tasks and provide meaningful feedback
5.	Collegial support
	• Mentor, supportive co-teacher, learning community who provide input, assistance and/ or resources
	• Colleague/ line manager supports motivation for additional resources
	• Potential for sharing content or modules across disciplines acts as a resource
6.	Resources as provided by other stakeholders

There were numerous tactics HE teachers used to facilitate the use of SC in their teaching. The term 'tactic' is used to represent a variety of strategies; from the way a person could position themselves in terms of personal attitude and behaviour, to include relational mechanisms and processes that operate at the social and system levels. Table 16 presents a summary of the teacher tactics from a personal perspective (personal positioning) as well as from a discipline or academic community perspective (collegial interaction). The tactics employed when choosing and deploying technology, and partnering with students, are listed. The majority of the tactics deal with the interactions and relationships with professional, academic colleagues. There were general tactics when dealing with colleagues, tactics that dealt with community and boundary crossing and specific interactional strategies. Two features included in the table are of special note: the first is that opportunity hoarding was not reported in the study and manipulation could not be conclusively identified as the data only provided participants' points of view; the second is that teachers were resistant to the TWL formula when it was perceived as being contrary to the time allocation required for best practice teaching.

Table 16: HE teachers tactics used to support use of social computing in teaching

	HE teacher TACTICS
1.	Personal positioning
	• Choose to deviate from conventional teaching practices (positive deviance) (Pascale et al., 2010; Spreitzer & Sonenshein, 2004)
	• Engage in peripheral participation

	• Focus on a beta-mindset (satisficing rather than 'perfect' choice of technology). Engage in reflective practice and iterations of improvement. The process is viewed as a journey rather than a destination (lifelong learning)	
	• Teachers develop trust networks as a basis for co-teaching with technology	
	• Teachers adjust teaching strategy dependent on each modules' specific context rather than having a single strategy	
	• **Adaptation:** adapt existing resources to serve broader needs. Reduces transaction costs (Tilly)(Krinsky & Mische, 2013)	
	• **Exploitation:** exploit existing resources e.g. use an existing space to host different groups. Addresses potential inequalities e.g. access to resources (Tilly)(Krinsky & Mische, 2013)	
	• **Withdrawal**: A self-protection strategy. To choose to work in isolation from other colleagues to limit confrontation (Few, 2002; Vican et al., 2020)	
	• **Leave:** If intellectual creativity is stifled, personal costs of innovation become high and resources are not forthcoming, a teacher may choose to leave the institution for better opportunities elsewhere (Griffith & Altinay, 2020; Vican et al., 2020)	
	• A teacher in a management/ leadership position may use positional autonomy to reinforce their own practices, and influence others to do the same	
	• Teaching innovation (TI) is designed to meet the requirements for SoTL research	
	• SoTL and discipline-based research stimulates, and provides resources, to support teaching innovation (TI)	
	• A teacher may develop a self-destructive strategy which is effective/ advantageous for teaching but detrimental to the individual i.t.o other academic responsibilities/ advancement, work-life balance and mental health	
3.	Use technology deliberately	
	• Technology choice is based on teacher intent. Used in parts of a module or across whole modules. Consider experimental tasks of limited scope as a starting point	
	• Focus on specific apps and tasks to stimulate participation	
	• "Go where the students are" i.e. use the apps students prefer for authentic experiences	
	• Design pedagogical tasks using apps with appropriate affordances. There may be tasks where technology is not an appropriate solution	
	• Technology can be deployed in limiting and detrimental ways if teachers are forced into its use i.e. teacher practice can limit student options	
	• Technology can empower teachers to circumvent bureaucratic control	
	• Where appropriate: Develop standard practices and guidelines to support reuse of materials, or use across boundaries.	
	• Arrange administrative and technical support	
4.	Partner with students	
	• Explain the pedagogical approach to students to ease their transition into a new approach	
	• Use social computing to vision-cast for students to increase their participation (especially video/ YouTube)	
5.	Collegial interaction	
	Enrolment: Various forms of collegial interaction can be seen to involve reframing the discourse to appeal to individual interests and rechannelling individual behaviour (Few, 2002)	
	(a) General tactics	
		Develop a supportive, regulative discourse around online teaching. One-on-one conversations may be most productive e.g. on a shared trip
		Encourage collegial participation
		Provide opportunities for collegial participation. • Easier if co-teachers have a shared teaching paradigm • Design team-based tasks for teachers to share responsibility during creation/ implementation
		Provide teachers with an online learning module experience, to immerse them in the student experience

		Compromise: Teachers reach an agreed upon mode of co-teaching which may/ may not involve a shared approach. They may 'compromise' on each teaching in their own way. (Few, 2002)
		Invoke a sense of belonging to a community, with shared goals, to motivate participation
	(b) Community and boundary crossing	
		Join conversations and communities who engage in technology, and social computing use in T&L
		Initiate entry into a T&L community via peripheral participation
		Plot a learning trajectory for T&L practice: i.e. remain a peripheral participant, choose an inbound trajectory, or leave the community
		Individuals create a robust network by developing relationships and working horizontally and vertically, across boundaries, within the institution
		Co-teaching based on trust relationships reduces the risk in choosing to experiment pedagogically
		Use boundary crossing relationships and artifacts as a platform to develop teaching innovation, SoTL and research collaboration
	(c) Specific interactional tactics	
	• **Emulation/ diffusion**	A productive approach is copied by another HE teacher. Reduces transaction costs (Krinsky & Mische, 2013); (Repenning, 2002)
	• **Creative dyads/ innovative pairs**	Teachers are jointly engaged and share responsibilities, develop personal relationships and deeper levels of trust. Do not have separate 'roles' but share ownership of the whole module (Bellis & Verganti, 2020; Rouse, 2020)
	• **Mentorship**	Numerous strategies are used: 1-to-1, 1-to-many, many-to-many
		Mentor may use episodic power to request continued use of an approach once developed. This tactic will also be employed if modules are shared
		Mentorship can be informal: Teachers at all skill levels can help bootstrap colleagues use. Mentoring is not limited to 'experts'
		Mentorship may be easier to establish if the discipline/ profession is commonly based on a community of practice model e.g. in health sciences
	(d) Potential interactional tactics not identified in this data	
		Opportunity hoarding/ Exclusion: Limit access to resources if an actor is an "outsider. Addresses potential inequalities e.g. access to resources (Krinsky & Mische, 2013); (Few, 2002)
		Manipulation: Interaction that involves deception. Use of episodic power, positional autonomy and non-participation may be forms of manipulation but this could not be confirmed by the data (Few, 2002)
6.	Push back against standing conditions	
	Resistance: Teachers ignore or critique the TW time allocations for teaching activities if these are unrealistic and not conducive to the implementation of teaching best practice	

The meta-analysis of the system models highlighted two aspects for consideration if this analytical technique is to be used in a different case study context: these were the delays in the system and the potential 'disruption' which can be caused by the teachers themselves. During system modelling 'delays' were identified which indicate points where the movement to the next step in a process, or the outcome of a specific relationship or mechanism, may not be realised immediately. These delays may have a major impact on the operation of the system. Specific delays were identified at the teacher level: they included, firstly, a delay in seeing the results of the SC activity due to a lack of student participation; and secondly, because the teacher may need to undertake numerous iterations of reworked tasks before the desired results are achieved; thirdly, there may be a delay in diffusion of the SC teaching practice as a lag may occur before the results are recognised by colleagues; or fourthly, colleagues may lack the motivation to engage in the practice. Even if a colleague recognises positive results and feels motivated to change their practice, there are still high levels of inertia which must be overcome because of the effort required to implement SC. The final delay was thus the time required to learn the technology and the pedagogical elements necessary for SC use in HE teaching. In addition, actors can be a source of disruption within the system. HE teachers did not speak of disrupting the physical process of teaching e.g. by strike action, but this is a possibility in some contexts. A number of teachers did, however, see their pedagogical innovations as disrupting the status quo although they characterised this as a positive deviation from the norm. Another form of disruption which can destabilise teaching and the progress of innovation is when a module that has been reworked is transferred to another teacher, with no agreement regarding continuity, which can then result in all progress being lost.

11.6.3 Social computing motives, resources and tactics

SC, as an object within the teaching space, represents a specific motive instantiated via an appropriate software design (Table 17). The resources (or affordances) it makes available allow it to present opportunities for user empowerment and social interaction. While it does not make any specific claims as an educational medium, it relies on its ability to mimic conversation and allow participants the ability to introduce topics and artifacts as one would in a face-to-face conversation, for its success. One aspect which has not been explored in this study, but which suggests an area for further study, is SC power/ neutrality. Users create the nature of the SC space through their interactions. As a result, use of SC in teaching can result in a module discussion developing into an echo-chamber of reinforcing opinions. This may limit students' ability to develop critical thinking skills. However, all software has some form of bias as its developers make assumptions about reality (even if unconsciously) when developing the system.

Table 17: Motives, resources and tactics embodied by social computing in a teaching space

	MOTIVES
1.	Empower the individual through social computing application use
	• Opportunity to digitally connect (social connection)
	• Opportunity to digitally collaborate (social collaboration/ construction)
	• Opportunity to create, publish and curate content
	• Opportunities are available on an anywhere and anytime basis
2.	Presents itself as a neutral entity without pre-existing bias
	RESOURCES
1.	Potentially helps develop highly-motivated participants (teachers and students) when its affordances align with their goals and thus empower the individual
2.	Allows for a social discourse and connection to other participants which extends beyond the conventional connections made in a physical classroom
3.	Provides synchronous and asynchronous communication options
4.	Provides access to material and notices
5.	Provides automated assessment options
6.	Provides access to resources in times of disruption at the institution when physical resources are unavailable.
7.	Provides a level of anonymity which is empowering if a participant feels socially constrained in a physical classroom
	TACTICS
1.	Suggests itself as an efficient and effective platform. Does not claim to improve learning
2.	Provides a stream of activity, with a quick and responsive format which mimics social conversation
3.	Relies on the authenticity of the communication to draw in users, so that a single interaction can be amplified into many interactions
4.	The application is 'non-judgemental' as it is not self-moderating, but relies on user moderation. This suggests the social computing space is itself socially neutral i.e. user-determined.

SC may initially have been a disruptive technology in the same way as many Web2.0 applications changed the face of technology and society, irrevocably. Over time these technologies have however become accepted as part of the current technological societal landscape although this is not the case in attendance universities. New SC applications are released continually and their potentially transient nature should be recognised for its disruptive potential. It is possible that these Web2.0 technologies can be removed from circulation at short notice as they are considered to be released under beta-testing conditions: An example of this was reported in the study, where an assessment had to be changed because the platform would cease to exist during the module (P5 and P6).

11.6.4 Student motives, resources and tactics

Students are goal-oriented. They are focused on passing modules and attaining a degree and prefer to have some control over their learning and a sense that the knowledge and skills will be valuable in their future career. Students rely on their prior experience, networks and institutional resources. They are significantly influenced by prior educational and SC experiences and bring specific expectations to their HE institution. These motives and resources are presented in Table 18, along with the tactics they employ in the teaching space. Students clearly signal their acceptance of a pedagogy through their behaviour. If they do not perceive a task as having value they will not participate. They base their decision on the authenticity of the skill being developed, the knowledge explored, or the weighting assigned to the task in an assessment. Students will share their experiences through formal and informal channels, verbally and in writing. While those who value the experience may also suggest technologies they are familiar with, or which other teachers have used, others may insist on the conventional instructivist classroom experience they have been schooled to expect.

Table 18: Student motives, resources and tactics used in a social computing, teaching space

	MOTIVES
1.	Want to pass a module/ gain a degree
	Social computing empowers student access to module resources
2.	Seek to optimise 'effort-invested' vs 'result-gained'
	Prior success motivates ongoing participation online
3.	Students want some control over their educational experience
	• SC tools are a resource for self-directed study/ lifelong learning
	• SC empowers student creation of content
	• During student unrest students are motivated to operate online so they can continue studying
	RESOURCES
1.	Students' lived experience and knowledge form a basis for their academic interactions
2.	Prior SC experience acts as a resource to increase student participation online
3.	Personal networks provide resources for understanding academic content and solving technical problems
4.	Institutional resources complement personal resources
	TACTICS
1.	Demonstrate acceptance of a pedagogy by their behaviour: Range from active participation to non-participation
	Will participate if they trust there is a benefit in doing so
	Will participate if activities are perceived as authentic
	Will participate if there is an obvious alignment between activities and assessment strategies
	Assume teachers will resolve technological challenges
2.	Provide feedback on their experiences
	Provide Word of Mouth (WoM) feedback to the teacher, other teachers, support staff (e.g. tutors, postgraduate assistants), line managers, SRC etc.
	Written feedback provided via QPA feedback surveys
3.	Insist on conventional 'teaching'
	Students may insist on instructivist, contact teaching as they consider this the norm
	Demand access to "conventional materials" e.g. notes, PowerPoint slides
4.	Suggest technology for use in the teaching space based on prior social and educational experiences

Students may disrupt teaching if they feel they are not being presented with the learning experience they expect or are due. This may be related to a specific module, as discussed by P3, whose students reported the situation to the line manager. Students may disrupt the academic programme at an institutional level e.g. if they feel their right to access HE is being denied. In such cases of widespread disruption, the provision of online SC tasks can allow learning to continue for on-campus and off-campus students.

11.6.5 Academic discipline and other academic colleagues' motives, resources and tactics

While different colleagues may enter into different types of relationships with HE teaching academics, this study has shown significant similarities in terms of their influence on the use of SC for teaching. In this section they are thus discussed together and where there are differences, these are highlighted within Table 19. Colleagues can be a major motivating and supportive influence for HE teachers. If there is agreement on the role of SC within the discipline pedagogy, positive feedback is received and a clear learning trajectory is identified to assist teachers in establishing use of SC. The necessary resources are made available which then facilitate the use of SC by the teacher. Positive feedback is motivating and numerous modes of co-teaching can assist in scaffolding SC use. If the use of SC is however seen as not aligned with the accepted pedagogy within the discipline then colleagues may isolate the innovative teacher and treat them as an outsider (or 'other'). Support and resources are then unlikely to be forthcoming.

Table 19: Colleagues' motives, resources and tactics used in a social computing, teaching space

	MOTIVES
1.	Maintain shared epistemological views of knowledge within the discipline (knowledge code/ knower code)
2.	Word-of-mouth and observed results motivate continued use & motivate colleagues to participate
3.	*Other academic/ professional colleagues:* Aim to capitalise on experience gained
	• Supportive as they see the potential to 'leapfrog' ahead to a more advanced point of SC use
	• See the opportunity for horizontal, vertical or external collaboration
	RESOURCES
1.	Have a clear trajectory to follow to become an active participant
2.	Provide constructive input
3.	Shared innovative task development (time invested)
4.	Provisions of resources, based on positive feedback
5.	Provides a community support structure

6.	*Other academic/ professional colleagues:* Establishes a network which extends beyond a discipline, that can provide numerous resources
	TACTICS
1.	Promote the "accepted" norm of the role of formal content/ knowledge structure and associated pedagogies in the discipline
	Support an appropriate educational task-to-technology pedagogical alignment option if one is supported in the broader community
2.	Provide support for social computing use
	• Word of Mouth (WoM) support and resource assistance can promote use
	• Positive reinforcement via co-teaching reduces "risk" involved in trying innovative approaches
	• Partnership joint ventures
	• Mentorship: mentoring and being mentored
	• Professional colleagues provide positive feedback
3.	Isolate individuals who are seen to deviate from dominant teaching practices ('othering')
4.	A supportive academic community can leapfrog individuals' progress
5.	*Other academic/ professional colleagues:* Participate in boundary crossing behaviour and artifact creation.

Colleagues may play a disruptive role in the HE teaching space. One example of this would be if a co-teaching colleague is not prepared to locate any aspect of their teaching (including e.g. posting of notices or provision of PowerPoint slides) in the collaborative, discursive space. This results in cognitive dissonance for students as the messaging received from the two teachers is contradictory. Structural disruption at the institutional level can create discipline-level repercussions for individual teachers. Three participants from Education (P1, P14 and P15) had different perspectives of SC use and its integration into teaching partially due to epistemic differences between members on different campuses. The restructuring of the faculties into college structures changed the way in which such groups were managed and forced closer alliances than had perhaps previously existed. As the data collection occurred during the early days of the transition to the college structure, it is likely that some mistrust existed and played a major role at all levels of interaction. It should be noted that structural changes can have major impacts even if they are as small as, for example, the appointment of a new professor. If the professor has an impressive track record and was not sympathetic towards existing collaborations or was intolerant of activities which differ from the norm, this can cause a major shift in teaching practices due to the positional power which can be leveraged by the new individual.

11.6.6 Academic leader motives, resources and tactics

The academic leader (AL) has a unique position located between management and the discipline, and between the discipline as a community and individual community members. This role is thus imbued with authority but also places the AL within a collegial network, that is potentially trust-based. As with any position of this nature it can represent either a position of leadership, management or both. The motives and resources are thus focused on meeting individual needs as well as a variety of institutional goals (Table 20). The tactics employed may be highly dependent on the individual and how they balance the range of responsibilities: this can range from a very autocratic, to a democratic approach, while also varying along the dimension of optimising for the individual academic's need, to optimising the situation based on the needs of the discipline as a whole. The performance management process is a tool monitored by the AL. In addition, should there be any queries or challenges related to a teacher's behaviour, the AL will weigh word of mouth feedback and formal inputs, with what is known of the teacher's track record, to provide feedback on a situation.

Table 20: Academic leaders' motives, resources and tactics used in a social computing, teaching space

	MOTIVES
1.	Develop and maintain the integrity of the academic discipline. Custodial responsibility
2.	Maintain the discipline's access to resources via the discipline, School, College and institution
3.	Fulfil managerial and administrative duties for the academic discipline
	RESOURCES
1.	International and local representatives of the discipline and recognised norms of behaviour
2.	Support of other academic leaders, and academics within the School
3.	Resources of the discipline, School, College and institution
4.	Relationships based on existing networks with academics in the discipline and within management (Dean/ Head of School, DVC etc.)
5.	The achievements of discipline members serve as a resource to motivate the discipline as a whole.
	TACTICS
1.	Monitor performance of academics to ensure integrity of the discipline and compliance with management requirements (TWL, PU in particular as they have measurable metrics).
2.	Encourage, monitor and profile academic success to secure additional resources
3.	Receive and weigh complaints related to teaching
	Note:
	A lack of metrics for teaching innovation (TI), community service and academic service, leave these requirements of academics without practical forms of monitoring or guaranteed recognition.

11.7 Conclusion

This chapter has highlighted this study's contribution to knowledge, regarding the use of SC in HE teaching, including a focus that allows these findings to be considered in the broader context of innovative use of technology in HE teaching. The chapter has focused on building big-picture perspectives of the findings of the study. The detailed discussion of the systemic view of the HE teaching space (Chapters 7-10) provided the insights necessary to determine the relevant interactions and relationship from the raw data to provide a nuanced description at the individual level. This chapter has focused on abstracting these discussions by creating a theoretically synthesised view of the teaching context at UKZN. This abstraction initially presented a picture of how the various actors, structures and causal system loops were related in the domain. These interactions were then theorised within a circuit of power that included the institution as well as its broader environmental context. In addition, the discussion has shown how this can be mapped onto a more generalised framing which highlights the to-and-fro of negotiations in a space where power is a critical element of all interactions. This arena of social integration and negotiation requires that one considers the motives, resources and tactics of each object in the domain i.e. locates the individual teacher within their context. The chapter thus concludes by returning to the individual level to suggest how this deconstruction of interactions in terms of the motives, resources and tactics of each participant, can be a valuable complement to the causal loop analysis when trying to describe and explain the teaching space.

12 Conclusion

> *The bits may come together and be held in some tension with one another, there may be some sort of story that we can read, but they do not come together as a whole that denotes something more than their sum; which is why I have used the metaphor of the facet. If there is a whole, the gem that our analysis seeks to capture, we can never see it except through a myriad of many distinct, if connected facets that refract and unsettle a total perspective. (Hetherington, 1998, p. 12)*

12.1 Introduction

This study has provided a descriptive and explanatory perspective of SC use in HE teaching. The final analysis, presented in Chapter 11, developed an overarching framing highlighting the motives, resources and tactics of actors in the system, and the power manifested through mechanisms, processes and structures within the institutional teaching system. While a multi-stakeholder perspective of a phenomenon is preferable, this is feasible when the phenomenon is well understood and a smaller, precisely scoped study can be crafted to allow for input from numerous stakeholder positions. This has not yet been achieved in this problem space and thus the insights presented are solely from the participant teachers' perspectives.

This concluding chapter will provide a summative overview of the research findings and review the limitations of the study and recommendations for future studies in this area.

12.2 A narrative overview: Social computing use in HE teaching at UKZN

'Social computing' refers to applications that can be used for the social construction of knowledge and knowledge artifacts. The terminology is ill-defined as these applications are continually evolving and are also referred to as social media, social networks or Web2.0. Some HE teachers were hesitant to participate in this study as they weren't sure if they 'qualified' for inclusion, as the degree to which any of the characteristic SC features were implemented, varied. Participant teachers can be viewed as positively deviant because they represent a small percentage of teaching academics at UKZN, and their practices deviate from the norm. The majority, however, still considered the potentials provided by face-to-face teaching to be important. These teachers first made pedagogical choices appropriate for their discipline content, and then looked for the technology to support their approaches. In a shifting technological landscape consisting of numerous applications, with a variety of features, and promising a range of evolving affordances, it is a challenge for the HE teacher to establish a firm foothold and make a choice. Selection of a technology that has a good alignment, or fit, with the teacher's objective, decreases the effort required from the teacher. It is suggested that viewing such decisions as a 'beta-choice' (i.e. satisficing and open to change, rather than being seen as a perfect solution) allowed teachers to approach these teaching innovations with less apprehension. Focus was often on small 'wins' that were important to shifting the perception of students, colleagues and management. The teaching space was filled with dynamic interactions between teachers, students, colleagues and institutional structures, with periods of constancy interspersed with times of tension and events that caused ripples of destabilisation or a reset to a new norm.

Although these teachers used a wide variety of applications, the options most frequently selected include the institutional LMS (Moodle at UKZN), as well as Skype, Facebook and YouTube. Participants expressed differing opinions on whether it was better to select an application that students routinely used (i.e. 'go where they are') or to rather select a different application (i.e. so that there is no overlap between social and academic use). A general trajectory of teacher use was based on teachers' needs and was dependent on the ease of use of the application or feature. Teachers initially automated administrative functions that focused on the transmission of information (post notices and provide resources) and then developed exploratory features such as discussion forums and online assessment. The focus was thus on transmissive and ritualised communication. While educational technology literature speaks of the transformational role of technologies in general, and SC in particular, both the literature and the participants suggested that conventional use of an LMS was rarely transformational. Transformational use, which was difficult to achieve, required collaboration, knowledge creation and students' development of process awareness. This can be promoted by teachers' meaningful use of SC but is also supported by ongoing research on the reframing and evolution of technology applications and their affordances.

The HE participant teachers' reasons for SC use were similar to those related in the literature. While they did not all share, or stress, the same aspects, they covered a range of personal, professional and institutional issues. They saw their personal passion for teaching, and creating interest and a sense of engagement, for themselves and their students, as important drivers. While technological knowledge and skill played a role in their decisions, it was not the dominant factor in overcoming the motivational threshold to innovate use of SC in their teaching. Their academic identity, nature of knowledge in the discipline and their focus on a student-centred pedagogy were important factors in their decision-making. Teacher agency can be deconstructed and represented by a combination of their motives, resources and the tactics (mechanisms and processes) at their disposal. Once a motivational threshold was reached, a teacher became committed to a course of action e.g. to innovate using SC in their teaching. To achieve this objective, they needed to expend available effort to develop, implement and monitor the SC activities in the hope that positive results could be achieved. While there were numerous factors that influenced their sense of commitment and their available effort, these may be linked to the individual or be structural, and may have a positive or negative impact.

Teachers found that flexibility in their formal teaching duties e.g. a part-time rather than a full-time teaching load, and postgraduate rather than undergraduate responsibilities, made it easier to arrange the time required to invest in innovation. Positive results led to the continued use of SC and one would expect that a poor result or negative experience would discourage the teacher. While this may occur, this study has highlighted that teachers who engaged in innovative activities were resilient: if they felt the activity had value, they would use constructive criticism to improve their results, as well as weigh negative feedback based on its source. If a critic operated within a different paradigm, a teacher may take this into account when gauging their reaction. Even if an attempt was not successful, a teacher may still elect to continue, and revise their approach. Innovative pedagogical processes are seldom completed without delays: delays can be due to the time required for a teacher to learn the computer application as well as the fact that the activity may need reworking before it can be used; or requires iterative improvement to achieve successful results. This process was less stressful if the teacher had a growth mindset i.e. considered themselves to be lifelong learners. If they were open to the adaptation and exploitation of existing teaching resources developed personally, or by colleagues, this also reduced the costs of SC use.

Instructivist teaching was the teaching norm expected by incoming students and reinforced by the majority of students' UKZN experiences. Teaching activities are considered to achieve their aim if students learn by using them. While this study did not delve into the 'success' or 'learning' associated with the SC activity, it stressed that without student participation and engagement, SC activities cannot hope to achieve their objective. Use of SC allows students some control over their learning. The empowerment of students was a major motivator for HE teachers, while the successful empowerment of students served to not only positively reinforce teachers' use of SC but also reinforced students' active participation. Students' commitment and effort i.e. their motivation and participation, could not be disaggregated as all 'student' input was provided through the HE teacher lens. Key challenges faced by students, that delay their ability to engage, included lack of access to electricity, devices and connectivity as well as a lack of technological competence. Students related their experiences to other students, academics and discipline management either in writing or by 'word of mouth'. Of particular note was the fact that the results of an activity may vary year-on-year. This highlights the dependence of the results on the context and the student participants. Student feedback can have a positive effect, but may be negative if students object to a more participatory pedagogy that they interpret as more demanding. Line managers, such as academic leaders of the discipline, are required to judge the nature of such claims and determine a reasonable way forward. Student perception was also strongly influenced by the behaviour of other academics, specifically those in the same discipline as the module teacher. A teacher who shares a module but does not engage in any use of the online space creates a mistrust of the other teacher's pedagogy. The lack of 'endorsement' from the independent co-teacher can cause students to become sceptical of the need for engagement as it signals the use as unnecessary.

Colleague involvement and responses to SC use were important to their wider acceptance and implementation. The most common form of duplication of an innovation is when a teacher emulates the activity or process implemented. This interest in creating an activity may occur as a result of comments by students, other academics, or their own observation of the results. Until personal motivation reaches the threshold where a commitment to the initiative occurs, the teacher may remain as an interested observer rather than an active SC user. While the independent co-teacher represents the most disconnected form of co-teaching, the co-teaching partnership, a trust-based, co-creating pair (dyad) is the most closely linked form of co-teaching. This process involves two fully engaged teachers who share responsibility for all aspects of the module rather than separating responsibilities into different roles. SC use may be promoted through a teacher mentor. A mentor may provide resources at different points in the process, namely: when a teacher is considering or committing to the innovation, putting in effort or resources to develop, implement or monitor the activity, as well as helping to achieve the result and share the outcome. Mentor resources may be in the form of advice, knowledge, skills, support staff, time or even funding. Mentorship occurs in numerous modes i.e. on a one-to-one, one-to-many or many-to-many basis, and can create a cascading effect within a discipline or community. Discipline colleagues or other academics may aid teacher commitment by offering support or contributing towards the effort required. This was more common where the teacher was included within the discipline and shared the dominant discourse. If the teacher operated in a different paradigm, their work may not be acknowledged and they may feel isolated from their discipline colleagues. In these cases, the value of their attempts to engage colleagues in SC use may only be recognised in the long term.

Teachers find it difficult to meet all the performance management requirements of teaching, research, community engagement and university administration. UKZN measures research performance in publication units (PU) and teaching via a teaching workload system that specifies the time allocated to different teaching activities. Academic performance is monitored and where it does not meet the required level, normative pressure is applied. When an academic approaches or reaches the required level, management pressure is reduced and only comes into play again if the academic falls below the norm. In addition, UKZN has as its first institutional goal: “To achieve excellence in teaching and learning”, although in practical terms the focus is on quality control rather than excellence. The requirement for ‘excellence’ suggests ongoing pedagogical review and innovation but this goal has been lowered due to pressure from academics. This goal has ‘drifted’ to a point where a module’s presence on the LMS, Moodle, is considered adequate engagement in the online space. The higher time demands made on teachers if they chose to innovate in their teaching occurred at teachers’ expense. This cost was either in terms of use of their own funding resources or in terms of work-life balance and mental well-being. Funding may be available via external grants, supported by guaranteed research productivity (PU) funding via the national department, or be based on internal competitive grants available for teaching innovation. Teaching innovations were embedded within modules that formed the teacher's workload. Use of SC thus results in a blended learning module, as opposed to the conventional face-to-face module. The challenge was that blended learning was not an imperative and a teacher is required to place more emphasis on achieving classroom instruction, as this is the required norm. Teachers reasonably expected that the resources for face-to-face teaching would be made available as this was a core institutional function. However, with financial constraints due to massification and commodification at UKZN, funds for supportive resources e.g. tutors, are no longer readily available, and thus quality teaching may be constrained. This places the support of blended modules and face-to-face modules in competition with each other for resources.

Interestingly, online and SC teaching, were seen as tempting solutions to this problem as they were seen as both efficient and effective in terms of reducing the need for teachers and allied resources. The literature and findings of this study showed this was not the case. In particular, the time required to develop, implement and support online activities has been vastly underestimated. Two aspects of available teacher time were relevant to this situation, namely, the time a teacher required to learn about, and implement SC; and the time required to monitor online student participation and provide constructive, formative feedback. In each case there was a short-term and long-term solution. A university can provide technical/ educational design support so that activities can be created quickly based on the teacher's needs, at a specified financial cost. This can, however, result in the teacher not developing the necessary skills and becoming disempowered as a result. The alternative was to train and empower the teacher to develop their own activities but this required a greater time commitment, took longer before activities were available, and may still involve a cost to the institution. Likewise, the problem of providing adequate feedback to students can be solved by acquiring additional support staff to assist with feedback, at a financial cost. The alternative is to adjust the online pedagogy so that it requires less teacher input by being more instructivist. The challenge is that this does not develop the necessary knowledge and skills for students to develop the critical thinking, and higher order skills, required in the workplace. Attempting to balance teachers' time availability and financial costs to the institution, at a time when the HE sector is under pressure internationally, is a wicked problem.

Academic responsibilities and relationships are complex and an individual may belong to numerous communities. Participants indicated that multidisciplinary experiences and interests can expand the communities in which a participant operates even further. Boundary crossing behaviour and objects can help in the development of synergistic activities. Innovative teaching can lead to publications related to the scholarship of teaching, which can produce research funding. An academic can also choose to use research funds gained from their specialist area research to fund their teaching innovation. While academics who become skilled at leveraging the available funding systems and institutional resources are being strategic, they may be disadvantaging their colleagues through their success. In most cases where funding is gained through a competitive process, there will be others who were not successful. A successful applicant is better positioned to achieve success in their innovative implementation which will then place them in a more convincing position to access further funding as they have established a track record of innovation and achievement. Current systems may be limited in their ability to address this.

This discussion stresses the fact that innovation requires change and disruption of the status quo. The costs associated with such change are generally carried by the teacher. This study has shown how student unrest and its disruption of teaching has led to productive use of online and SC platforms to continue with teaching. It has also highlighted how structural changes, such as the move from a Faculty model to a College model, can disrupt the teaching space in terms of resource availability, collegial collaboration, and existing teaching initiatives which have to be reconfigured. This case study did not deal with disruptions which could result from outside the institution or that could arise due to a change in the basic operational premise of the institution. Such changes could impact the teaching space via relationships, dynamics and processes already outlined.

Section 12.3 provides an overview of the constructs which were used to develop a theoretical, conceptual framework based on the findings of this study.

12.3 A theoretical overview: Social computing use in HE teaching at UKZN

The theoretical overview is based on two figures that show firstly, the process of SC use as instantiated by the individual HE teacher (Figure 49) and secondly, the full teaching context in which the teacher, and the innovation, are located (Figure 50).

Both positive and negative inputs (resources and tactics) provided by other stakeholders, are considered in terms of the value they can provide the teacher, as based on their prior experiences (Figure 49, light-dotted arrow). The teacher's identity (Wenger, 1998a); socially constructed, student-centred and technologically aware pedagogy (Lave & Wenger, 1991; Mishra & Koehler, 2006; Pfadenhauer & Knoblauch, 2019); motives, and personal and stakeholder resources and tactics (Few, 2002) assist them in reaching their motivational threshold (Repenning, 2002). This allows them to become committed to a process of innovation i.e. the use of SC in their teaching (cycle represented by dark-solid arrows).

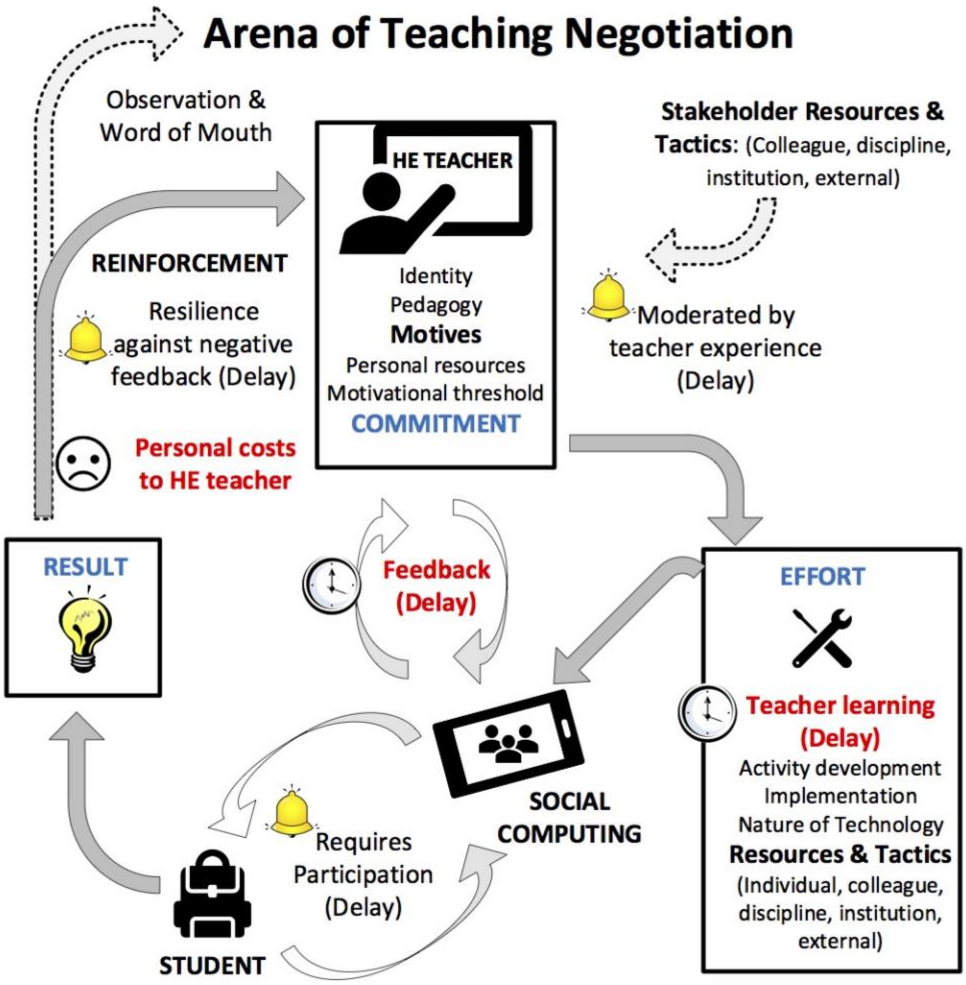

Figure 49: The HE teacher's process while developing a social computing activity

Once a teacher commits to this course of action they need to invest the necessary effort to develop and implement the SC activity (Repenning, 2002). This effort is not insignificant and the process is time intensive. This may require a teacher to consider the resources and tactics at their disposal: the nature and alignment of the technology with the task (task technology fit according to (Goodhue & Thompson, 1995)); their existing technology knowledge and skills; and the new learning they may need to embrace. Once the task is completed, students need to actively choose, or be able, to participate and engage in the SC activity. The social, collaborative and constructive nature of such activities require interaction with both their peers and the teacher (Brown, 2012). Teacher feedback is a critical, formative component of this learning experience. However, these processes come at a personal cost to the teacher, as both the teacher's learning and feedback require the investment of time, as well as personal resources. The HE sector globally reports increasing incidence of poor work-life balance and mental well-being that is influencing the turnover rate for academic staff (Griffith & Altinay, 2020; Vican et al., 2020). The variety of delays mentioned (including light-solid arrow loops) can pause or halt a process. Once a result is achieved, it may serve to reinforce the teacher's commitment to the activity and lead to further SC development. Results from the SC activity will be noted and commented on by other actors (Word of Mouth (Repenning, 2002)) (light-dotted arrow). Negative feedback from the process may not stop the teacher's innovative process if this can be rationalised; or the teacher accepts the constructive, critical feedback from others (or their own analysis) and believes this can improve the outcome.

The teacher does not work in isolation and is embedded in a teaching system of numerous stakeholders (Figure 50). The power and tensions in the teaching arena (Few, 2002) are based on teacher agency and the power of other actors and structures which form an arena of teaching negotiation (Orsatto & Clegg, 1999). This results in circuits of power in the teaching space (Silva, 2007; Zelizer, 2011)indicated by dark arrows. External stakeholders, influence the system, indicated by light arrows, primarily via grant funding and national policies. There are, however, also competitors in the HE education sector who provide both contact and online learning opportunities. Platform providers are also potential competitors or challengers to HE teachers' authority in the HE pedagogical space. Individual teachers may experience these actors as either supportive in delivering content or as usurpers deprofessionalising the role of specialist teachers (Williamson, 2021). While the institution is influenced by these external stakeholders, it also provides feedback into the larger HE national and global context.

The outcome of the SC activity will influence the process of system and social integration (Orsatto & Clegg, 1999). In both cases there are obligatory passage points facing the teacher.

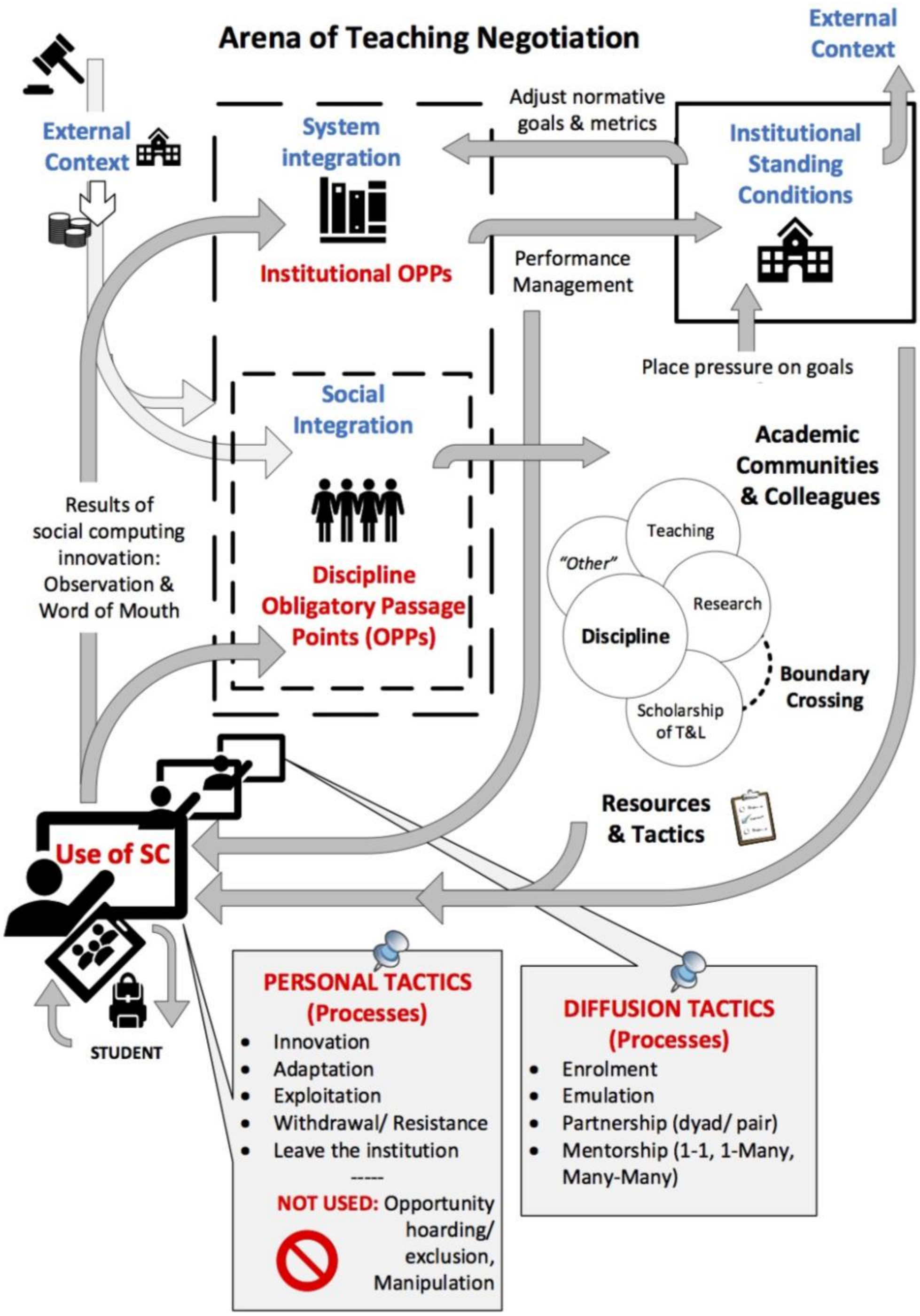

Figure 50: The circuit of power: Processes in the teaching arena

At an institutional level academics face specific performance management goals (specifically related to research and teaching). The standing conditions that maintain the operational norms for the institution determine the normative goals and metrics for academic performance. When the institution began to actively promote the development of online activities to move towards blended learning, there was academic push-back which resulted in adjustment of the goal to a more achievable, yet less strategic goal of establishing a presence in Moodle (LMS). Social integration depends on the development of appropriate resources for teaching, learning and assessment in accordance with the norms expected in the academic space according to the dominant discipline discourse. The academic discipline is the community that plays the major role in the life of the teacher. The teacher may be a member of other communities of research, teaching or scholarship of T&L, as well as other groups such as professional bodies (Wenger et al., 2002). A boundary crossing mechanism (Bhaskar, 2008; Krinsky & Mische, 2013; Tilly, 1998) allows the teacher to leverage teaching innovations to produce scholarship in T&L, that allows for guaranteed funding similar to specialist research at UKZN. Resources and tactics associated with the variety of actors will influence the individual teacher's process of SC use in teaching. Figure 50 also highlights the tactics the individual teacher may use e.g. innovation, adaptation, exploitation, withdrawal or resistance, and leaving the institution. While raised as potential tactics, opportunity hoarding/ exclusion was not noted in this study and evidence of manipulation was not obviously identifiable (Krinsky & Mische, 2013; Tilly, 1998). The diffusion of SC use in teaching can occur via processes of enrolment (Few, 2002), emulation (Repenning, 2002), partnership, or mentorship.

The framing this study provides for use of SC and teaching innovation in HE cannot claim to be comprehensive. The following two sections deal with the limitations of the study and suggest areas of research recommended for future study.

12.4 Limitations

The term 'social computing' is vague and may not be understood in the same way by all participants. There is thus the potential of the blurring of meaning by participants: in some cases participants referred to the use of an application, or suite of applications, that had been used innovatively in teaching as their 'social computing practice' when the use may not necessarily have involved a ‘social’ learning component. In other situations the technology was used to support social construction of learning in a contact F2F classroom which may, or may not, have also migrated onto an online application. The nuances of use and individual understanding of the terminology may introduce limitations in terms of how this data can be compared to that in other contexts. In addition, SC was theorised as an object in its own right in section 11.6.3, with its own motivations, resources and tactics. This was a device employed during the synthesis of theory, based on the researcher’s paradigmatic position. Participants more commonly referred to the software applications as platforms, tools or devices employed in their teaching. Any assumptions made during the synthesis of SC as an object of equal standing to the actors in the learning space are thus those of the researcher.

In addition, the decision to focus on those teachers who used SC in their teaching, while well motivated, requires a cautionary mention in relation to how the results may be applied in a different context. While teachers suggested stimuli that had motivated their use, and others that hampered their use of SC at UKZN, it cannot be assumed that the opposite in each case would be true of teachers choosing not to use SC. The absence of the motivators cannot be assumed to lead to non-use of SC and likewise the absence of these challenges will not automatically lead to SC use. Factors influencing teachers vary on an individual basis and interact based on their circumstance. The factors, mechanisms and processes discussed are thus suggestive. The fact that these may apply differentially in other contexts is acknowledged.

The decision to focus only on the HE teachers means that all comments relating to other stakeholders have been discussed from the teacher perspective. This means all data was produced through a single, limited lens which may have distorted the perspective presented and thus biased the data. The scale of the research endeavour required to include the relevant stakeholders, specifically the students, for each participant, made this an impractical approach for this study. It is hoped that the anecdotal discussion of events, as presented in the data, has helped to provide insight into the actual mentions, where the tone of the discussion, and the multiple quotes (where relevant) provide a sense of the intention of the participants. Any potential bias or misrepresentation of the position of other stakeholders can thus be assessed by the reader. Where such incidences were apparent to the researcher they have been discussed, but it is possible that another reader may note other issues of bias within the data, not highlighted.

The analysis of the underlying structures and forces that influence teacher behaviour have been represented by the mechanisms and processes of systems modelling, using causal loops. A limitation of this analytical process was that it did not allow for a repetitive, recursive action between mechanisms, within a loop. Time was represented linearly within a single cycle of a loop, with a pause in action indicated by a 'delay' i.e. some time may pass before the result of an action is noted. Iterating within a mechanism of a process i.e. within a single stage within a causal loop, was not modelled. It should, however, be noted that such actions do exist. One example of this was present in the R1 basic, individual reinforcement loop: a teacher may think of issues influencing their commitment to an action, take the action, and when they realise the effort involved, they may revisit their commitment to the action and stop the activity. If they, however, receive input which reactivates their commitment, they could then restart the process. Currently the format used to depict the causal loops does not provide for these 'intermediate' partial processes which may be required when applying this theoretical framing as an analytical tool in a different context.

During analysis, the coding process was highly subjective. As the research was linked to an academic qualification, it would have been inappropriate to use second-researcher confirmatory coding and thus the study was reliant on the coding abilities, consistency and insights of a single researcher. All coding was thus completed by the primary researcher guided by the codebook developed pre-analysis and expanded organically during analysis. While all attempts were made to ensure consistency in the process, additional complexity was introduced by the multifaceted nature of coding that codes actual statements, as well as coding for participant intention. As an example, if a participant mentioned that a colleague had provided feedback on students' comments of a teaching activity they delivered, this was coded as input from a colleague, as well as being coded as student feedback. This would serve as positive reinforcement for the participant teacher. However, disentangling the component parts of the mechanisms linking the 'result' and the reinforcement of participant 'commitment' was difficult; determining the extent of influence of colleague-driven feedback versus student-driven feedback, respectively, may not be possible.

These limitations to some degree also suggest areas for future research.

12.5 Future research

The fact that SC as a term was not clearly understood by teachers may have resulted in blurring of issues during the interviews, resulting in limitations in the conclusions drawn. Finding a targeted approach to define the technological use in relation to teaching and learning objectives may assist with better specifying the phenomenon of interest. How this might be determined is itself an interesting research exercise as the use of 'affordances' of technologies or 'pedagogies' of teaching, as the phenomenon determining the selection of a technology for teaching, are themselves limited framings. The assumption that software is neutral and does not promote a specific position, or introduce bias into a context in which it is used, is considered naïve. Chapter 11 has introduced this position in relation to the power which exists, enters and circulates in the HE teaching domain. In the case of computer software, its development will be influenced by the design specifications and choices made by developers who choose which data is important and how it will be represented. The development of the software introduces processes where specific data or processes may be privileged over others. How a user implements and uses software presents an additional layer of influence, in terms of the result of using the application. Choices made by an institution, individual or group of individuals in relation to software use, may have a trivial or profound impact. This will depend on how the information systems and applications, both those used in teaching and those used administratively and managerially within the institution; are aligned with the socio-cultural norms in the broader domain or areas within the institutional domain. This has particular relevance in relation to business models based on the concept of 'platform capitalism', where the access to data is itself a currency in an information and data-driven digital society. Interrogating these elements of SC choice in teaching and the information systems that impact this space such as workload allocation models, research productivity records and performance management systems, present an area of research that is of interest to both educational and information system technology researchers.

Similarly, a number of the teacher participants identified as creative, innovative, and drawn to fun, active and social constructivist pedagogies. These personality traits can also be associated with an agile approach to problem solving, focused on being flexible and adaptable to change. While this characteristic is beneficial in a technology environment, it was difficult to determine whether participants used SC in their teaching because, as individuals, they were highly adaptable; or if their use of SC and the fluid and challenging nature of that operational context, had made them more responsive and agile as individuals. This was an interesting research study as agility, adaptability and innovation are characteristics that are highly sought after. These characteristics feature strongly in the dynamic teaching context of the integrated social, biological and technological dimensions of the fourth industrial revolution. In order to prepare students for such environments it is necessary that teachers are able to grasp, integrate and evolve teaching arenas which can serve the needs of these next generation students. In addition, this agility and creativity makes these teachers highly sought after and mobile. Retaining valuable, skilled academics is thus an important focus of HE human resource departments. Research into reasons why teachers leave, supportive working conditions, wellness programmes and appropriate retention strategies are necessary to gain an understanding of the factors impacting academic turnover rates.

A related issue raised in the research was the role of a multidisciplinary perspective on a teacher's decision to use SC. Many participants were members of numerous communities that appeared to influence their SC-decisions, and which underpinned a variety of boundary-crossing behaviours and associations. This aspect of the phenomenon lends itself to a targeted study. The role of colleagues in the use of SC in teaching has also raised the potential of specific configurations of collaboration between colleagues which may give rise to, or support, SC use. These associations have been identified as individuals working alone (by choice or by circumstance), pair-based teams, or multiple team member modes including one-to-many or many-to-many associations. These categories arose organically during data analysis and need to be explored as the focus of a study. This could result in the development of a typology that may lead to the identification of specific mechanisms and processes which operate more generally, or specifically, for individual association types. The idea of a typology may also be useful in disaggregating a teacher's SC use in relation to F2F teaching, blended learning, or a solely online module. The use of SC may exist on a continuum, rather than instantiating in a predefined way for each of these modes of teaching. Rather than static categories related to modes of SC use, it may be useful to research SC use in different contexts by determining specific dimensions, against which a teaching interaction, or teacher's pedagogy, can be analysed. In this instance these dimensions may include the role of specific mechanisms or processes, for each teacher.

This study can be replicated in a variety of contexts to determine the degree to which constructs are robust across different areas of application. Differences in context can relate to different modes in which HE is delivered. A participant in this study made limited use of SC applications as her classes were small enough to facilitate a democratic, fully inclusive, social constructivist series of activities and collaborations in the F2F classroom. A comparison of the factors influencing this form of blended teaching with those classes featuring hundreds of students, either wholly online or in a blended teaching space, may provide additional insights into the phenomenon. A study which compares the behaviour of SC users and non-users, in the same context, could add additional detail to the relevance of the enabling factors of SC use. This could also foreground if differences exist in terms of how institutional mechanisms and processes operate for different teachers, or groups of teachers.

Future research would benefit from scoping a study that allows all stakeholders in the teaching arena to present their own perspective of the mechanisms and processes impacting actors. This could include both an individual's perspective of their own role in a process, as well as the perspective of relevant, other actors. This can be particularly useful in understanding the student position in the use of SC in teaching and learning. In this study it was not possible to separate the effect of student commitment, and student effort on the result of an SC activity. It may be beneficial to rather consider 'student motivation' and 'student participation' as analytical constructs as these can respectively be interrogated, and recorded for analysis. In this study this input from students was modelled as a single mechanism as perceived by the teacher.

In all instances, undertaking research based on this study, in different geographical contexts, will allow the role of international and national HE imperatives, to be clarified. It will also allow the different ways in which teaching and learning is managed to be compared. Even within South Africa, not all HE institutions operate under the same localised guidelines. For example, UKZN directs a proportion of the funding received from DoHET for research productivity, to the individual researcher's research account which can be used at their discretion for further research (within specified boundaries). This is not the case in all South African HE institutions. Mechanisms and processes may thus be altered, introduced or obsoleted at different institutions.

Another area of interest in this study is the way in which multiple theories were required to develop the research methodology and analytical approach applied to the data. The potential strengths and challenges associated with this type of research strategy would benefit from rigorous investigation. Specific attention to the use of critical realism as the underlabourer for the study and the use of multiple theories to investigate different levels of abstraction, as identified by CR, within the problem domain, may be useful.

12.6 Final thoughts…

This study was located within an institution that experienced structural change and disruption, in an attempt to interrogate a highly pressured environment that would normally serve to discourage experimentation in teaching due to the high level of existing stress experienced by teachers. As a result, although data production occurred prior to the COVID-19 pandemic, the analysis explored the impact of disruptions from numerous quarters, on the teaching process. The analysis has shown that although disruptions can provide an opportunity that enables greater SC use, the physical disruption of where teachers and students are able to work from, can negatively impact the efficiency and effectiveness of SC use in teaching. These aspects arose during analytical data coding and thus were not a focus of questions posed to participants. More targeted exploration of how specific mechanisms and processes are influenced by different forms of disruption, or the different potential sources of disruption, would be particularly relevant in a post-COVID pandemic environment.

As discussed, UKZN-based case studies provide fertile ground for studying phenomena under conditions of disruption as in this case; where structural changes and student unrest provided the context. It is however relevant to note that the theoretical framing, the 'Circuit of HE Teaching Power' (CHETP) conceptual framework, as developed during this research study, has been applied to the teaching of a single module at UKZN in 2020. The initial module delivery was impacted by student unrest disruptions which resulted in a teacher voluntarily migrating teaching online, and the rest of the module teaching was impacted by the South African COVID-19 lockdown which resulted in a compulsory migration of the balance of teaching online by the module co-teacher (Quilling et al., 2022). This test case of the findings from this study i.e. the use of the 'Circuit of HE Teaching Power', employed the framework both as a methodological structuring device to assist with data production and analysis, as well as an explanatory theoretical conceptual framework. The results showed that the findings of this doctoral study may be applicable under different conditions, both pre- and post-COVID as similar delays were identified in the two phases of the module delivery (voluntary/ pre-COVID and compulsory/ COVID, moves online). In addition, a key delay noted in the 2020 study was the time spent critically assessing the module from a pedagogical perspective and planning the required pedagogical transformation to an online module. This aspect did not feature in this thesis as the participants had already, voluntarily, engaged in this process of pedagogical transformation prior to the technological decisions and implementations required to enable delivery of teaching. In their interviews they stressed that their decisions were primarily pedagogically-, not technologically-, driven but the bulk of their contributions dealt with the operationalising of the movement online to the use of SC.

At its centre, this study has been about, firstly, a passion for teaching and liberation of student thought and creativity; secondly, a fascination with social, interactive and collaborative computing technology; and finally, the structural influences which teachers choose to allow to influence their decisions, or that they feel forced to accept. How each teacher operates in this arena of competing choices, responsibilities, tensions and tactics results in a highly personalised experience, yet which also includes universal mechanisms and processes that are presented to all HE teachers, irrespective of the spaces in which they teach.

And thus it feels appropriate to end with a quotation which troubles the definition of teaching, and provides a teacher the opportunity to pause and consider its relevance at a personal level:

> *Hey, I've done it!*
> *Good teachers are those who want to be good teachers, who take risks, who have a positive attitude, who never have enough time, who think of teaching as a form of parenting, who try to give students confidence at the same time that they push them off balance, who motivate by working within the students' incentive systems, who do not trust student evaluations, and who listen to students.*
> *Who says no one has ever defined*
> *what makes a good teacher? (Beidler, 1996)*

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Appendix A. The meaning and history of 'social computing'

Understanding what social computing is, is key to understanding the nature of this study. When 'social' and 'computing' are used together as part of the nomenclature related to computers it carries a meaning which may differentially emphasise, or call on, the individual word meanings. Terminology is itself often a fluid construct which changes over time and is dependent on context. Kress (2010, p. 110) definition is clear: "Discourse deals with the production and organization of meaning about the world from an institutional position". The positionality of discourse is stressed when he asserts "discourse offers meanings to be realised" and "provides a social-conceptual location" for "ideational 'content'" (Kress, 2010, p. 114).The term may thus not always be understood to mean the same thing when used in different situations by different people. This appendix will thus discuss two aspects of the term 'social computing' namely, the meaning of the individual words and the historical use of the term.

'Social' and 'computing': Dictionary definitions

The dictionary meaning of social is "of or relating to people or society in general" but includes "the interaction of the individual and the group" and "tending to form cooperative and interdependent relationships with others" (Merriam-Webster, 2014c). While this extended definition provides insight into the nuances of potential meanings it is interesting that the abbreviated definition places more stress on the positive emotional aspect of the interactions. This is reflected as "doing enjoyable things", "liking to be with", and "happy to be with". Thus, while social may refer to a varying number of people, interacting to varying degrees with each other, the suggestion is that the interactions may be positive experiences associated with a sense of belonging and personal choice of association. A less positive view is that there exists the potential of being assigned to a group by a societal norm or characteristic and that such associations may involve specific power-related dynamics.

'Computing' is derived from the verb 'compute'. To compute is "to find out (something) by using mathematical processes" or "to determine or calculate by means of a computer" (Merriam-Webster, 2014a). This suggests that computing is a clearly defined process governed by "the science of numbers, quantities, and shapes and the relations between them"

(Merriam-Webster, 2014b). The term ‘computing’ thus suggests a deterministic and perhaps even mechanistic process.

Bringing these two words together into a single term creates an implicit syntactical hierarchy that highlights the computing function as the defining element within the term. Because the term does not refer to a single, highly specified object – there is a sense of tension between the person- and relationship-centric ‘social’ element as compared to the deterministic mechanistic ‘computing’ element. Tension between two elements can produce a variety of outcomes, that represent a range of potential modes of understanding for ‘social computing’ and hence perhaps an individualised meaning for each user.

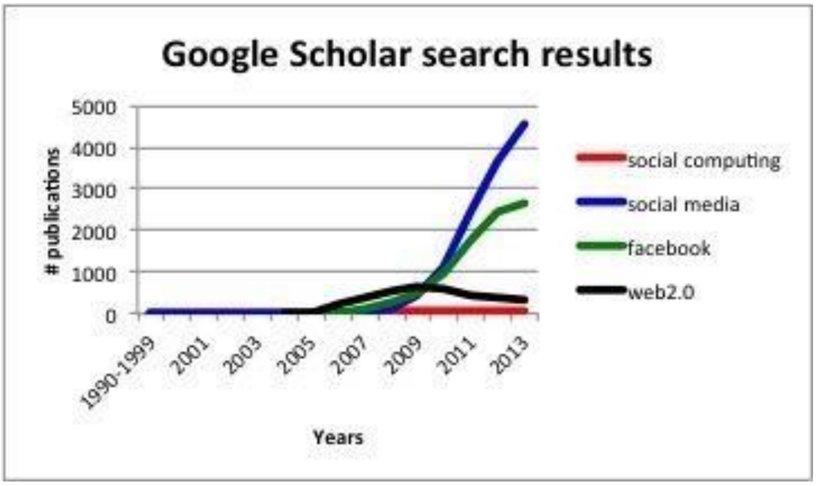
Trends in terminology use

The academic use of the term ‘social computing’ can be established by contextualising it in the broader body of published research. To achieve this, it is necessary to select a search strategy to form the foundation of the comparison between social computing and similar terms such as ‘social media’ and ‘Web2.0’. Based on the search results, it is then possible to address two aspects of the use of the term, the historical pattern of use and the actual definitions which have been used in research.

The metric selected to review the use of the term ‘social computing’ is the calculated number of publications published, as indexed by a specific search engine or database. According to Bakuwa (2014, p. 113), the top three journal databases are the ISI Web of Science (WoS), Elsevier’s Scopus and Google Scholar. He suggested the Web of Science is the largest and most reliable of these although each metric has its strengths and weaknesses. One of the weaknesses of the Web of Science is that it indexes few of the sub-Saharan African journals with only 40 of approximately 250 South African journals indexed (Bakuwa, 2014, p. 114). In addition, he stressed that within the WoS there is a bias towards science journals. Google Scholar (http://scholar.google.co.za/), in contrast, is becoming a preferred search engine for academic work as it is freely available and indexes a wide range of scholarly material (Van Aalst, 2010). A major benefit of Google Scholar is also that it provides more detailed information per publication in its search results than other databases, which makes it particularly useful for identifying major contributors in a field (Van Aalst, 2010).The concerns with the use of Google Scholar relate to the validity of citations quoted via Google Scholar due to a lack of review and moderation (Van Aalst, 2010) and the poorly trained web crawler results (Jacso, 2010). Jacso (2010) also mentioned the problem of 'phantom articles' which have no publication date or which have been incorrectly entered: The former cannot be explicitly searched for and the latter may not be identifiable and may result in multiple tallies of the same document. He also noted that the number of hits for a particular search string is known to be volatile. It thus appears that a decision as to whether one or more search engines or databases is necessary in any particular search exercise, as well as which ones should be used, is very dependent on the aim which is to be achieved.

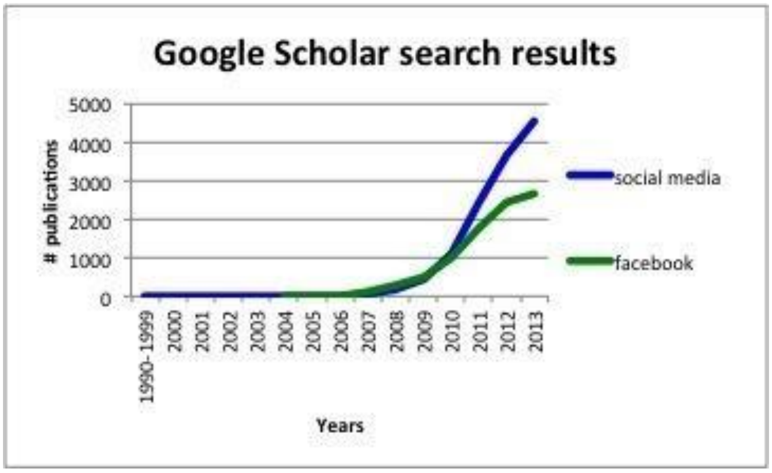
Google Scholar was selected as the search engine for this enquiry. In order to provide a sense of the historical trend of the use of 'social computing' and a comparative sense of how it has been applied at various points in time, it was not necessary to provide a finely nuanced idea of the nature of publications. In addition, the actual number of publications, as a relative measure, was more important than the discrete count it represents. In particular, it was important to gain a broad based perspective which illustrates the use of the term 'social computing' as compared to other similar terms, in particular 'social media' and 'Web2.0'. This search engine reduces geographical location-, and discipline-based bias in the data. The potential for a 'social' versus 'computing' use of the term may speak to different discipline interests (sciences and the humanities) and this study, based in South Africa, required the inclusion of a regional perspective. Considering these requirements, and notwithstanding the problems associated with its use, Google Scholar provided an easily accessible platform for this comparison.

The Google Scholar searches were performed between the 15-22 September 2014. The searches only included 'in title' searches and excluded citations and patents. Search selection periods included 'anytime' as well as individual year ranges. In addition to the three terms already mentioned (social computing, social media and Web2.0), a search was also performed on Facebook. Facebook is the largest social networking site globally and has received extensive research attention, particularly in HE (Ranieri et al., 2012). As such, it represents the most highly profiled of the social networking sites and is the most obvious choice if one wishes to focus on one specific computer application within the domain of technologies available to support social interaction.

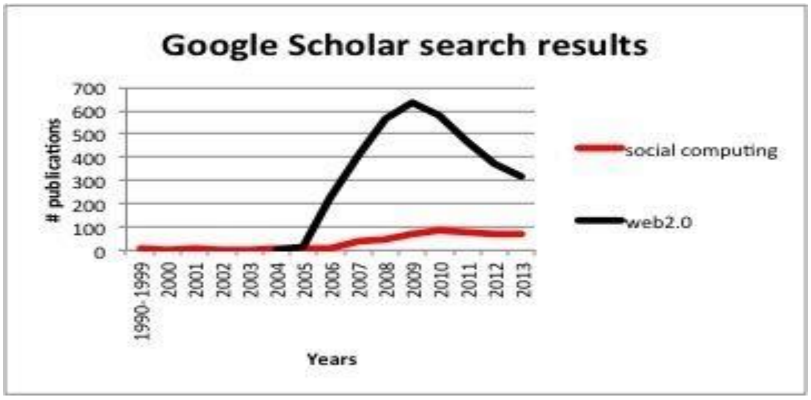


'Social computing' and 'social media' have been in use for a number of decades. The earliest article using social computing in the title appeared in 1971; the next appeared in 1993 and thereafter some sustained interest is shown, until a sudden increase in number of articles in 2007 (36), reaching a peak in 2010 (85) and then decreasing to 2013 (72). This makes a total of 516 articles. The earliest article on social media was in 1970; another appeared in 1980 and then again a decade later in the '90s, a little flurry of interest was exhibited. A clear leap in interest occurred in 2007 (68), with a marked increase in 2009 (430) and a near doubling of publications annually since then to a figure of 4 540 in 2013, making a total of 15 639. It is thus clear that while both these terms appeared in journal titles in the period from 1970-2000, the bulk of the publications have happened in less than a decade. In addition, while social computing appears to have received moderate attention and has reached a peak, the interest in 'social media' is thirty times greater and appears to still be increasing.

An examination of the profile of publications for Facebook, alongside that of social media, may be useful in explaining this phenomenon. The specific software technologies associated with Web2.0 "harness collective intelligence" (O'Reilly, 2005, p. 5) by promoting user-generated content. The impact of individual platforms on available content increases dramatically as original and reconfigured material is promoted by users empowered through Web2.0 platforms, such as Facebook.



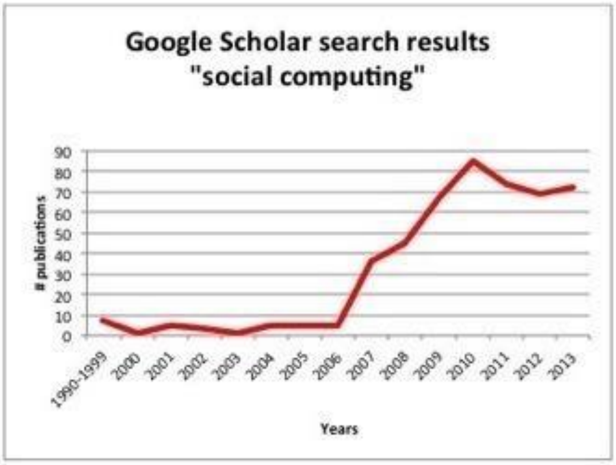
The impact of these activities are not only of interest technologically, but also socially and thus the increase in research into these individual platforms and the broad area of social media increased dramatically. As terminology gains social popularity it becomes more common within publication titles. The first Facebook publications reflect in 2004 and a notable increase occurred in 2007 (108) with a steady increase since then, until 2013. The increase in Facebook-titled publications has, however, slowed more noticeably than those for the broader category of social media. This is to be expected as the interest in social media is in some senses an aggregate of the attention being paid to individual applications (such as Facebook, Twitter, LinkedIn, and Instagram).

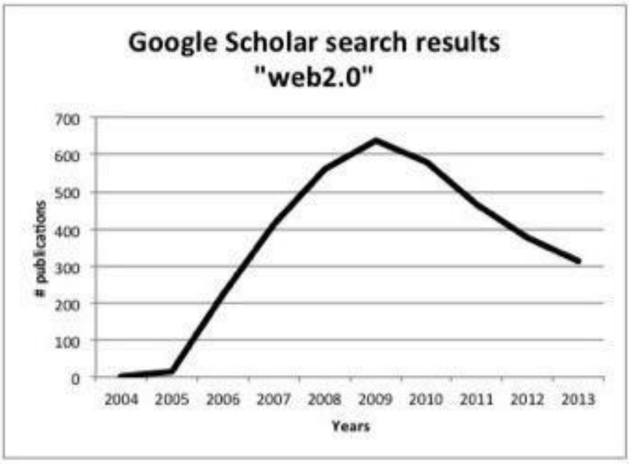


Web2.0 introduces the idea of user generated content, and as with social computing, has more of a technological focus, although it is used much more often in article titles. Like Facebook, the earliest publication of Web2.0 was in 2004 with a marked increase in 2006 (221) and a

peak in 2009 (636). Numbers of publications featuring Web2.0 in their titles have decreased since 2010 reaching 314 in 2013.

The similarity in the trends in social computing and Web2.0 publication trends are more noticeable when viewed side by side.





The broader trends in terminology use have been established. While social computing and social media are terms which have a longer history (since the 1970s), they gained prominence in the 2000s. The term ‘social media’ has appeared in substantially more publication titles than social computing (by more than an order of magnitude) and appears to be linked to increased attention being paid to individual social platforms such as Facebook. Thus, while the number of publications including social media or Facebook within their title appear to still be on the increase those including social computing and Web2.0 have reached their peak and publication popularity has waned. Both of the overarching terms, ‘social computing’ and ‘social media’, exhibit some evidence of a moderated impact on publication frequency when compared to the more obviously reactive profiles of Facebook (an individual application) and Web2.0 (a specific ‘buzzword’ (O'Reilly, 2005)). This may well also be impacted by the fact that these terminologies are often used interchangeably.

Appendix B. 2008-2016 Articles dealing with actual use of technology in HE: Demographic analysis

ALL demographics for the selected articles

	Year	Author(s)	Country	Institutions	Criteria/ Disciplines	Pop.	Sample	Male *	Female*	Experience	Rank	Age	Class size	U grad/ post grad
1	2008	Ajjan & Hartshorne	USA	Large SE University			136	43%	57%		Lecturer 20% Assistant Prof 37% Assoc Prof 25% Prof 11%	<30 2% 30–39 34% 40–49 23% Over 50 41%		
2	2008	Georgina & Olson	USA	15 in N. Dakota, (Doctorate granting)	Colleges of Educ	1115	237	35%	65%		Prof 20.7% Associate Prof 21.6% Assistant Prof 33%			
3	2008	Unwin	42 African countries	e-Learning Africa database	Kenya 15% SA 12% Nigeria 11% Ethiopia 9% Uganda 8%		316	75%	25%		HE 37%			
4	2009	Wasilik & Bolliger	USA	Land grant U. (11 600 students)	Taught 1 online course (2007/2008)	83.6% response	102 pre-check		60%	0-20 yrs (M=4.67)		24- 69 yrs (M = 50)		
5	2010	Ottenbreit-Leftwich et al.	USA	Michigan State	award winning	31	8		100%					

					school teachers #									
	Year	Author(s)	Country	Institutions	Criteria/ Disciplines	Pop.	Sample	Male *	Female*	Experience	Rank	Age	Class size	U grad/ post grad
6	2011	Bair & Bair	USA	Grand Valley State U Michigan,	Online teaching	Self-study 2 authors		(A)	(B)				15(A) 29(B)	U grad (A) post grad (B)
7	2011	Bart	USA	2 & 4 yr public & private institutions		Faculty Focus subscribers & twitter followers	841-862 (per question)	Not reported		<5 22% 6-10 25% 11-15 17% 16-20 13% above 20 24%	Prof/ Instructor 62% Academic Admin 14% INst design 9%			
8	2011	Ocak	Turkey	4 universities	Art & Sc 20% Educ 29% Engineering 21% Business 30%		117	56%	44%	Teaching blended: <1 8% 1-2 21% 3-4 53% 5-6 12% over 6 6%	Lecturer etc 25% Assistant prof 35% Assoc prof 29% prof 11%			19 % /81%
9	2012	Cochrane et al.	New Zealand	Largest polytechnic	Model of lecturer professional development		2 acad advisors to CoP 3 learning advisors							
10	2012	Lameras et al.	Greece	6 uni	Comp. Sc. 18 VLE-A 7 VLE-B +		25							
11	2012	Lwoga	Tanzania	6 of 8 public instit. (10yrs+)	ICT personnel $	Not stated. Interviews, policy & websites reviewed.								

	Year	Author(s)	Country	Institutions	Criteria/ Disciplines	Pop.	Sample	Male *	Female*	Experience	Rank	Age	Class size	U grad/ post grad
12	2013	Backhouse	SA	22 HE institutions (Aug-Sep 2011)	Professions & appl sc=46% Soc Sc=11% Formla sc=9% Humanities=9% Natural Sc=7%	262 respondents					Assoc lec=10% Lec=34% Snr lec=20% Assoc Prof=8% Prof=7%			
13	2013	Bozalek et al.	SA	22 HE institutions (Aug-Sep 2011)	W Cape 57% Stellenbosch U=20% (bias) (UKZN=0)	(242 respondents)	149 complete		134/ 242 = 55%	<5 34%	21% non-academic			
14	2013	Cao et al.	USA	Carnegie-classified Doctoral Research U on the west Coast	Use of social media Arts & soc sc 25% Bio & phys sc11% Bus 25% Educ 35% Others 4%	210 full-time and 427 part-time =637	168use social media (249 responses)	44%	56%		non-tenured 66% adjuncts/ instructors 51% assistant prof 15% associate prof 17% prof 17%	<45 35% 46-55 28% 56-65 21% over 65 11%		
15	2013	Hussein et al.	Gulf States	2 institutions			389 UAE= 133 Qatar= 177 Oman =39 Bahrai	72%	28%		Students=249 Instructors=52 Management= 39 Observers=49			

							n=12 non-Gulf =28							
	Year	Author(s)	Country	Institutions	Criteria/ Disciplines	Pop.	Sample	Male *	Female*	Experience	Rank	Age	Class size	U grad/ post grad
16	2013	Isaacs et al.	42 African countries	e-Learning Africa database	Nigeria 15% SA 10% Kenya 8% Tanzania 6% Zambia 6%			70%	29%		HE 42%			
17	2013	Lawrence & Lentle-Keenan	New Zealand	Tertiary institution	business, IT, social sc, engineering		6 teachers	4	2	2mths-26yrs		37-62 yrs		
18	2013	Scott	Australia	research-intensive, campus-based U	Health Sc & Design inter-professional student project (over 2 non-concurrent semesters)	Purposive Case study of 2 lecturers (over 2 non-concurrent semesters)		A (Design)	B (Health)					B/ A
19	2014	Bower et al.	Australia & New Zealand	38 of 39 Australian All 8 N Zealand	Blended Synchronous Learning Project (BLendSync)	1748 received	750 complete & 7 case studies	46%	54%			M=48		

	Year	Author(s)	Country	Institutions	Criteria/ Disciplines	Pop.	Sample	Male *	Female*	Experience	Rank	Age	Class size	U grad/ post grad
20	2014	Chimbo & Tekere	SA	UNISA	Sakai use Targeted disciplines Comp sc 39% Science 21% Arts (most from lang) 41%	346	101	52%	48%	<5yrs 51% 5-10 16% 10 above 31%	Jnr Lec/ lecturer 47% Snr lec 32% Ass Prof &prof 14%	Roughly evenly spread: (21-30, 31-40, 41-50, above 50) 31-40yrs highest no.		67%/ 6 % 27% Hons (yr4)
21	2014	Rambe & Nel	SA	1 SA univ	Comp Sc & informatics		12	7	5					
22	2014	Schoonenboom	Netherlands	VU University Amsterdam	business 52 (28%); science, 46; (25%) social sc, 38; (21%)humanities, 30 (16%); B+SocS+H= 56% medicine, 9 (5%). (adds to 185???)	1600	180	x	47%	M=10.8		M=40.8 yrs		
23	2014	Seaton & Schwier	Canada	U of Saskatchewan	Teach online course in 2012 EXCLUDE Comp Sc & Education Arts&Sc 6 Agric 3 Haelth Sc 3	51	12	Even split		<1 =2 3-5=2 6-10= 6 over 10=2			unfamiliar <1=2 1-15 =4 6-10=6	

24	2014	Shelton	England	27	Bus&social 24% Design/ arts 12% Educ 13% Humanities 14% Medicine 18% STEM 19%		795	47%	53%			<30 3% 30–39 24% 40–49 33% 50–59 36% 60 over 8%		
	Year	Author(s)	Country	Institutions	Criteria/ Disciplines	Pop.	Sample	Male*	Female*	Experience	Rank	Age	Class size	U grad/ post grad
25	2015	Chawinga & Zinn	Malawi	Mzuzu U	Faculty of Information Sc & Comm.		Survey 19 Interview 7	17	2					
26	2015	Gebre et al.	Canada	Eastern research U	Geog= 6 Lang=2 Philosophy. Management, physics, law, engineering		13Prof 232 students	Students ~equal Teachers not reported		<5=2 5-10=6 11-20=2 20 over=3	2 non-tenure track 11 assistant prof or more			
27	2015	Straumsheim et al.	USA	Public & private institutions	Humanities 28% Soc Sc 20% Engineer 3& CS & IS 4% Phys Sc 9% Bio Sc 8% Professional schools 12% Other 16%	21 399 faculty 885 tech. admin		54%	46%		Tenured 49% Fulltime 76%	<30= 1% 30-39= 8% 40-49= 26% 50-59= 37% 60-69= 26% 70 older= 3%		
28	2016	Manca & Ranieri	Italy	Ministry of Educ database	Math, CompSc Nat Sc=27% Professions,	58 175	6139	61%	39%	< 5yrs= 11% 5–10=17% 10–20=41%	Assistant Prof 52% Associate Prof 28%	25–34=4% 35–44=32% 45–54=36%		

	Year	Author(s)	Country	Institutions	Criteria/ Disciplines	Pop.	Sample	Male *	Female*	Experience	Rank	Age	Class size	U grad/ post grad
					Appl Sc= 32% Humanities, Arts, Soci Sc= 41%					20+ = 30%	Prof 20%	56over =29%		
29	2016	Onwuagboke & Singh	Nigeria	Imo State, 60 from each of 5 institutions		300	243	54%	46%					
30	2016	Sobaih et al.	Egypt	8 institutions		403	190	51%	49%		Teaching ass <30 90% Prof 41-60 85%			

M mean
* articles report %
# Teacher value beliefs focused *(exception)*
+ VLE(virtual learning environment) VLE-A (commercial) B (open source)
$ not specifically teaching staff
^reported values exceed 100% (recalculated)
% rounded up

Summary
n = 30
USA=8, Canada=2, Europe=4, Africa & Middle East=12 (SA=4), Australia & New Zealand=4
Focus on a single university=14 Multiple (2+)=16
Gender
Equal gender split (48:52%)=6 Reasonably close (<70%)= Males higher (6) female higher (7) Large difference (70+%)= Males higher (4) Female higher (1)
Males higher: (Unwin, 2008) 75% (Africa) (Hussein, Aryaci, et al., 2013) 72% (Gulf States) (Isaacs et al., 2013) 70% (Africa) (Chawinga & Zinn, 2015) 90% (17/19) (Malawi)
Females higher: (Ottenbreit-Leftwich et al., 2010) 100% (USA) 8 responses from 31 award winning school teachers approached.

Age of research participants

Roughly a third - 10 papers reported the age distribution : 40+ yrs. ranged 63% (Cao et al., 2013) to 92% (Straumsheim et al., 2015). 50+ yrs. old 29% (Manca & Ranieri, 2016) to 66% (Straumsheim et al., 2015).

							40+	50+	
1	2008	Ajjan & Hartshorne	USA	Large SE University		136	64%	41%	<30 2% 30–39 34% 40–49 23% Over 50 41%
2	2009	Wasilik & Bolliger	USA	Land grant U. (11 600 students)	83.6% response	102 pre-check		M=50	24- 69 yrs (M = 50)
3	2013	Cao et al.	USA	Carnegie-classified Doctoral Research U	210 full-time and 427 part-time	168use social media (249 responses)	(<56) 63%	(56+) 32%	<45 35% 46-55 28% 56-65 21% over 65 11%
4	2014	Bower et al.	Australia & New Zealand	38 of 39 Australian All 8 N Zealand	1748 received	750 complete & 7 case studies	M=48		M=48
5	2014	Chimbo & Tekere	SA	UNISA	346	101	Evenly spread		Roughly evenly spread: (21-30, 31-40, 41-50, above 50) 31-40yrs highest no.
6	2014	Schoonenboom	Netherlands	VU University Amsterdam	1600	180	M=40.8		M=40.8 yrs
7	2014	Shelton	England	27		795	80%	47%	<30 3% 30–39 24% 40–49 33% 50–59 36% 60 over 8%
8	2015	Straumsheim et al.	USA	Public & private institutions	21 399 faculty 885 tech. admin		92%	66%	<30= 1% 30-39= 8% 40-49= 26% 50-59= 37% 60-69= 26% 70 older= 3%

9	2016	Manca & Ranieri	Italy	Ministry of Educ database	58 175	6139	(45+) 65%	(55+) 29%	25–34=4% 35–44=32% 45–54=36% 55over =29%
10	2016	Sobaih et al.	Egypt	8 institutions	403	190	Prof 41-60 85%		Teaching ass <30 90% Prof 41-60 85%

Positions/ Ranks of research participants

Less than a third reported. Range appears to be 34-42% are associate and full prof. SA the % is much lower (14, 15%). Whereas the highest was for Italy (48%)

								Assoc Prof & Prof	
1	2008	Ajjan & Hartshorne	USA	Large SE University		136		36%	Lecturer 20% Assistant Prof37% Assoc Prof25% Prof 11%
2	2008	Georgina & Olson	USA	15 in N. Dakota, (Doctorate granting)	1115	237		**42%**	Prof 20.7% Associate Prof 21.6% Assistant Prof 33%
3	2011	Bart	USA	2 & 4 yr public & private institutions	Faculty Focus	841-862 (per question)	<5 22% 6-10 25% 11-15 17% 16-20 13% above 20 24%		Prof/ Instructor 62% Academic Admin 14% INst design 9%
4	2011	Ocak	Turkey	4 Universities		117	<1 8% 1-2 21% 3-4 53% 5-6 12% over 6 6%	40%	Lecturer etc 25% Assistant prof 35% Assoc prof 29% Prof 11%

5	2013	Backhouse	SA	22 HE institutions (Aug-Sep 2011)	262 respondent s			15%	Assoc lec=10% Lec=34% Snr lec=20% Assoc Prof=8% Prof=7%
6	2013	Cao et al.	USA	Carnegie-classified Doctoral Research U	210 full-time and 427 part-time	168use social media (249 responses)		**34%**	non-tenured 66% adjuncts/ instruct 51% assistant prof 15% associate prof 17% prof 17%
7	2014	Chimbo & Tekere	SA	UNISA	346	101	<5yrs 51% 5-10 16% 10 above 31%	14%	Jnr Lec/ lecturer 47% Snr lec 32% Ass Prof &prof 14%
8	2016	Manca & Ranieri	Italy	Ministry of Educ database	58 175	6139	< 5yrs= 11% 5–10=17% 10–20=41% 20+ = 30%	48%	Assistant Prof 52% Associate Prof 28% Prof 20%

Disciplines polled

1	2008	Georgina & Olson	USA	15 in N. Dakota, (Doctorate granting)	Colleges of Educ
2	2011	Ocak	Turkey	4 Universities	Art & Sc 20% Educ 29% Engineering 21% Business 30%
3	2012	Lameras et al.	Greece	6 uni	Comp. Sc. 18 VLE-A 7 VLE-B +
4	2013	Backhouse	SA	22 HE institutions (Aug-Sep 2011)	Professions & appl sc=46% Soc Sc=11% Formal sc=9% Humanities=9% Natural Sc=7%

5	2013	Cao et al.	USA	Carnegie-classified Doctoral Research U	Use of social media Arts & soc sc 25% Bio & phys sc11% Bus 25% Educ 35% Others 4%
6	2013	Lawrence & Lentle-Keenan	New Zealand	Tertiary institution	business, IT, social sc, engineering
7	2013	Scott	Australia	research-intensive, campus-based U	Health Sc & Design inter-professional student project (over 2 non-concurrent semesters)
8	2014	Chimbo & Tekere	SA	UNISA	Sakai use Targeted disciplines Comp sc 39% Science 21% Arts (most from lang) 41%
9	2014	Rambe & Nel	SA	1 SA univ	Comp Sc & informatics
10	2014	Schoonenboom	Netherlands	VU University Amsterdam	business 52; science, 46; social sc, 38; humanities, 30; medicine, 9.
11	2014	Seaton & Schwier	Canada	U of Saskatchewan	Teach online course in 2012 EXCLUDE Comp Sc & Education Arts&Sc 6 Agric 3 Health Sc 3
12	2014	Shelton	England	27	Bus&social 24% Design/ arts 12% Educ 13% Humanities 14% Medicine 18% STEM 19%
13	2015	Chawinga & Zinn	Malawi	Mzuzu U	Faculty of Information Sc & Comm.
14	2015	Gebre et al.	Canada	Eastern research U	Geog= 6 Lang=2 Philosophy. Management, physics, law, engineering
15	2015	Straumsheim et al.	USA	Public & private institutions	Humanities 28%

					Soc Sc 20% Engineer 3& CS & IS 4% Phys Sc 9% Bio Sc 8% Professional schools 12% Other 16%
16	2016	Manca & Ranieri	Italy	Ministry of Educ database	Math, CompSc Nat Sc=27% Professions, Appl Sc= 32% Humanities, Arts, Soci Sc= 41%

Arts, Humanities & Social Sciences (including Education)=14 (of which 4 include education)
Physical & Natural Sciences, Engineering, Technology and Health Sciences=16 (7 of which include CS, IS , Tech)
Professions and business=8 &1 study explicitly excluded CS and Education. (Seaton & Schwier, 2014). [This was …]

Appendix C. Introduction email sent to potential participants

SUBJECT LINE:
Introduction/ request for participation: PhD study involving social computing

CONTENT OF EMAIL:
Dear ..…formal title eg Prof X?

My PhD research focuses on social computing use in teaching at UKZN (ethical clearance (HSS/1248/011D) and a colleague has suggested you as a potential participant for this study.

"Social computing" refers to technology platforms being used firstly, for "social"-/ group-learning and secondly, so that learners can contribute to knowledge, not only be consumers of knowledge. These platforms could include blogs, social networks, wikis, chats, discussion forums or other virtual spaces that are used to support this engagement.

I am using a multiple-case study approach with each lecturer representing a single case study of higher education teaching at UKZN. I am happy to arrange individual interview schedules for each participant. A maximum of 3 interviews is planned. If possible, my methodology suggests the use of supporting documents and transcripts to supplement discussions.

This mail is to ask:

1) If you use social computing in your UKZN higher education teaching? And
2) If you would be prepared to participate in this research study? Interviews are planned for this semester.

There are a limited number of potential participants for this study and I would thus really appreciate it if you would make yourself available for selection as a participant.

Many thanks
Kind regards
Rose

Appendix D. UKZN Ethical Clearance (2011)

UNIVERSITY OF
KWAZULU-NATAL
INYUVESI
YAKWAZULU-NATALI

Research Office (Govan Mbeki Centre)
Westville Campus
Private Bag x 54001
Durban, 4000
TELEPHONE: 031 260 3587
EMAIL: ximbap@ukzn.ac.za

6 December 2011

Mrs R D Quilling (831831709)
School of Postgraduate Studies/Higher Education

Dear Mrs Quilling

PROTOCOL REFERENCE NUMBER: HSS/1248/011D
PROJECT TITLE: HE teachers' use of social computing in their HE teaching

EXPEDITED APPROVAL

This letter serves to notify you that your application in connection with the above has now been granted full approval following your response to queries raised by the Humanities and Social Sciences Research Ethics Committee.

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/Methods must be reviewed and approved through an 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 school/department for a period of 5 years

Best wishes for the successful completion of your research protocol.

Yours faithfully

[redacted]

Professor Steven Collings (Chair)
Humanities & Social Sciences Research Ethics Committee

cc Supervisor – Dr Wyne Hugo
cc Mr N Memela/Mrs S Naicker

1910 - 2010
100 YEARS OF ACADEMIC EXCELLENCE

Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

Appendix E. UKZN Ethical Clearance (Final recertification 2019)

UNIVERSITY OF ™
KWAZULU-NATAL
INYUVESI
YAKWAZULU-NATALI

11 November 2019

Mrs Rosemary D Quilling (831831709)
School of Education
Edgewood Campus

Dear Mrs Quilling,

Protocol reference number: HSS/1248/011D
Project title: HE teachers' use of social computing in their HE teaching

Approval Notification – Recertification Application

Your request for Recertification dated 02 October 2019 was received.

This letter confirms that you have been granted Recertification Approval for a period of one year from the date of this letter. This approval is based strictly on the research protocol submitted and approved in 2016.

Any alteration s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study must be reviewed and approved through the amendment /modification prior to its implementation. Please quote the above reference number for all queries relating to this study.

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

Yours faithfully

[redacted]

....

Professor Urmilla Bob
University Dean of Research

/dd

Supervisor: Dr Wayne Hugo
cc Academic Leader Research: Dr SB Khoza
cc School Administrator: Ms Sheryl Jeenarain

Humanities & Social Sciences Research Ethics Committee
Dr 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 / snymanm@ukzn.ac.za / mohunp@ukzn.ac.za
Website: www.ukzn.ac.za

1910 - 2010
100 YEARS OF ACADEMIC EXCELLENCE

Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

Appendix F. Intended Unstructured Interview Schedules

Preparation & guideline documents

INTRODUCTORY MEETING: Initiating Discussions

Format: Unstructured/ Conversational
Duration: To be negotiated – max. 1 hr
Site: On campus
Note-taking: Recorded digitally (Olympus recorder)
Timing: ASAP: Once case selection completed & initial email contact established
Focus: POSITIONING THE HE TEACHER & THE RESEARCHER – establishing a connection

- FOCUS & NATURE OF THE RESEARCH
- POSITION OF THE RESEARCHER
- AVAILIBILITY OF HE TEACHER
- NEGOTIATING A WAY FORWARD
    - The teaching- module/s etc
    - The technology – what? Where? When?
    - The research process – planning & access

Interview Prompts:

- Thank you for agreeing to the meeting:-)
- Recap introduction to research: Research questions etc (already provided in email)
- Introduce myself and my "positioning": from Information Systems therefore look at **if** technology can assist in efficiency and effectiveness. Does not assume it automatically can. Also, inherent in IS is the concept of looking at not only migrating the current process but if the process itself can be positively impacted by the migration to technology i.e. "reengineered". That is my position.
- AVAILIBILITY OF HE TEACHER: Explain the nature of the research in terms of documentation that can be used, access to the social computing space(s) as well as the potential interview process. This will be supplemented by a list of potentially relevant documents and an interview outline document.
- Determine if HE teacher prepared to be involved and answer questions.
- NEGOTIATE A WAY FORWARD
    - Which semester is the teaching (semester 1, 2012 preferred)?
    - Which teaching module/s this semester? Which could be appropriate to include?
    - Has technology to be used been determined? – what? Where? When? Consider social computing aspects as well as potential of other (supportive) technology. (Email will have already determined that social computing IS TAKING PLACE)
    - Arrange access to materials and documents (to perhaps be emailed or collected) as well as engagement online and planning of interviews.

INTERVIEW SCHEDULE 1

Format: Unstructured/ Conversational
Duration: To be negotiated – max. 1 he
Site: Off-campus
Note-taking: Recorded digitally (Olympus recorder)
Timing: As early as possible- before module even begins?
Focus: LOCATING THE HE TEACHER: as a teacher, academic & user of technology

- TEACHING
  - Entry into teaching
  - Positioning lecturer as "teacher"
  - Positioning of teaching relative to other responsibilities
- AGENTS & COMMUNITIES
  - People (individuals/ groups) who influence teacher (general)
  - People (individuals/ groups) who influence teacher (teaching)
- COMPUTING
  - Entry into technology/ computing
  - Technology used in teaching (historical trajectory)

Interview Prompts:
Ask them prior to interview to think about:

- Earliest memory of technology?
- Something that you feel represents you as a teacher or how you think about teaching: can be anything- picture, music, videoclip, artefact, symbolic as in relates to an emotion or a goal or actual.

TEACHING

- How long have you been teaching in HE?
- How did you initially become involved in teaching? (When? Where? who influenced you?)
- …and HE teaching in particular?
- …has it changed over time?
- …as it is now?
- What is "teaching" in an HE institution?
- …(if experience in other location) Does this differ from teaching in XXX?
- I asked you to bring along something that you feel represents you as a teacher. Can you explain it to me…show me?
- …why this?
- So: If you had to sum up what you see yourself doing when you teach – what would that summary be?
- Can you explain your "typical" working day to me?
- …what position does your teaching have in that day?
- Is there a link between your other responsibilities and your teaching? E.g. your research area?
- What is your research area?
- …and your teaching?
- …and the links between them?

- …is a “teaching day” different to other days?
- ...how much of your time is “teaching? Or teaching days?
- …by choice? If not, what would your preference be? Why?
- <bridging question> Would you say this is similar to? Or different from your colleagues?

AGENTS & COMMUNITIES

- Who is the person (people) you interact with most about work?
- … what is this related to? nature of the interaction (collaboration, discussion…)?
- Given the available time, is this the person you would want to spend more time working with- or talking to? (use plural where necessary)
- … why? Or alternatively whom would you prefer to spend the time interacting with? Why?
- PROBE: relative engagements in relation to discipline? Teaching? Specific interests?
- Are there groups, societies, professional bodies you belong to?
- … what role do they serve?
- … level of importance in terms of what you do? And/ or your teaching?
- … what forms do your interactions with them take? (meetings, mails, lists, online community…?)
- How do you see yourself in terms of these relationships/ groups? Do you use them as a reference group? Contribute to them? Actively involved? Participate in events? Formal position?
- **<bridging question>** Do these relate to technology or using technology at all?

COMPUTING

- What is your earliest memory of technology?
- … and computers?
- How have you used computing in your teaching in the past?
- … what influenced that?
- How do you think your use has changed (if at all)?
- …was it just the technology that changed? Your use of it?
- … why?
- **<bridging question>** depends on where conversation has gone: Has social computing come up? WHAT social computing do you use in your teaching?
- Which of these will be used in the course/s this semester?

INTERVIEW SCHEDULE 2

Format: Unstructured/ Conversational
Duration: To be negotiated – max. 1 he
Site: Off-campus
Note-taking: Recorded digitally (Olympus recorder)
Timing: Within first 25-50% of module duration
Focus: SOCIAL COMPUTING IN TEACHING

- VARIABLE USE IN TEACHING?
    - Current teaching involving social computing
    - Historical variability in use
- SOCIAL COMPUTING
    - Current module/s
    - Identify events – to date, in the future
- SELF, AGENTS & COMMUNTIES
    - SELF: sense of course
    - AGENTS: Who? What? Why?
    - COMMUNITIES: Who? What? Why?

VARIABLE USE OF SOCIAL COMPUTING IN TEACHING?

- To pick up from last conversation….Confirm what social computing has been used in teaching in the past and what will be used in this course/s?
- Has your use of social computing changed over time?
- Has the actual technology platform changed (WebCT, OLS, Moodle, A.N.Other…)?
- Has the nature of the apps you choose to use changed e.g. blogs, discussions, YouTube, wikis??? (populate this list from what the person has said before)
- Do you find yourself repeating the same thing in different courses/ in subsequent offerings of the same course?
- …why?
- … how often does this occur?
- Do you think this is typical? For your field?
- ..in what way?
- What (if any) impact do you think this has on your decision to use social computing?

SOCIAL COMPUTING

- If there is more than one course need to consider if there are difference and ask the questions for each course.
- Reflect on what I have seen online/ in docs. I have seen you comment on, and use, XXX in the course…. are there other applications or technologies I haven't picked up on?
- Do you see the use changing during the course- or remaining the same throughout?
- … how?
- … why?
- Do you find yourself planning the use upfront and then following that plan- or do you find yourself changing it during the course?
- Is this the way you always do it? Or have done it?
- Why?

- Have you ever considered the alternative? What do you think would change if you did it the other way (never changed/ changed during the course)? ….or alternatively, Why do you change how you do this?
- If we go through some of the social computing tools/apps you use…XXXX (- is this the list? Are their others you have used?)..
- ..For each of these: What part does this play in your teaching ? frequency? How is it used?
    - Have you though about what motivated(s) your use of it?
    - Was this a conscious process? Was it a formal / structured decision? More organic- and can you talk me through it, in some way?
    - What is your experience of it- compared to how you thought about it?
    - Do you still use it? Would you go back to it?
    - What do your students think of it
    - …colleagues? others?
    - Does it come up?
- Which event(s) do you think have been key in the course/s so far? Positive or negative?
- What aspects?
- Who do you think they have been key for (you, students? All or some…)?
- … how do you think they have been key?
- ... any part you would do differently - If you could do it again?
- …why?

SELF, AGENTS & COMMUNTIES

- Try and deal with colleagues, students and any other ref groups like Faculty management, institutional, professional groups…
- When social computing comes up in relation to work & teaching….how do you feel about it or react?
- Do you raise it in conversation?
- …do others around you (with whom you interact)?
- …why do you think that is?
- …how do you respond?
- …is there anything about these interactions you would prefer to be different?
- …what?
- …why?
- Do you think you respond differently to different people who speak to you about it?
- … in what way?
- … what influences that?

INTERVIEW SCHEDULE 3

Format: Unstructured/ Conversational
Duration: To be negotiated – max. 1 he
Site: Off-campus
Note-taking: Recorded digitally (Olympus recorder)
Timing: After completion of teaching module/s
Focus: SOCIAL COMPUTING IN TEACHING (2)

- SOCIAL COMPUTING IN TEACHING
  - Identify events - overall
  - Why those events? For whom?
  - As planned? Why?
  - In future?
- IMPACTS/ INFLUENCES?
  - What (Who)? How?
  - Nature of influence
  - Overall impact on teaching using social computing
  - Overall impact either on teaching/ use of s.c./ or on "self" and choices
- SELF
  - Positioning: Same/ Different?
  - How did this happen?
- REFLECTION ON PROCESS
  - Role of this process
  - Role of the researcher

Preparation:

- Most positive/ most negative experience of teaching- and of technology (not necessarily in the same context)
- ...and in this course/s?

THIS COURSE & SOCIAL COMPUTING

-Let's look at the examples –

- +ve in teaching during the course? Why?
- –ve in teaching during the course? Why?
- +ve in social computing during the course? Why?
- –ve in social computing during the course/ why?
- This is your perspective of the events. What do you think (or perhaps even know/ have been told) other perspectives of this are? E.g. students?
- Any other events during the course you want to reflect on in relation to this?
- How do you think this may effect how you use it in future (if at all)?

IMPACTS/ INFLUENCES

- What (Who) influences your decisions around using social computing in your teaching?
- What is the nature of the influence? Positive? Negative? In what ways…
- How does this impact your use of social computing in your teaching?
- … do you feel this is a pretty constant influence?
- … can you explain why that is?

- … how do you feel about that?
- What is the overall impact on your teaching?
- … and the choices you make around this?

SELF

- Can you tell me about the best teaching experience(s) you've had?
- … and the worst?
- Why did you choose these?
- … where are you now in your teaching in relation to those events?
- And the technology? What events came to mind?
- …why??
- Do you think your positioning to technology is any different now, than then?
- If any changes… How do you think this happened?

REFLECTION ON PROCESS

- (Role of this process)… and after this course and participating in this research? Your teaching? Technology in general in teaching & social computing in particular?
- … why?
- What has been useful? Why?
- What would you change? Why?
- What aspects of this do you think are due to you, personally, i.e. being the person you are?
- …or to me, because of me individually- as the researcher?

LEAVING THE FIELD

Format: Unstructured/ Conversational
Duration: To be negotiated – max. 1 hr
Site: Not NB- can be on- or off- campus
Note-taking: Recorded digitally (Olympus recorder)

Discussion of where this goes from here? Some of the potential ideas

- Arranging a workshop or private session with QPA to help with the development of the teaching statement – or how to go about revising a teaching statement/ portfolio as a consequence of the event.
- Potential of a workshop bringing all the participants together to reflect on the experience/ insights
- Consider writing a book together: where I edit the Book and do intro and concluding pieces but where the chapters are co-authored?
- Other

Appendix G. NVivo 12 Pro Node Codebook

Name	Description
Adaptation (- transaction cost) -Effort (R1)	Everyday practices people use to cope with, and reproduce, distinctions. Minimises transaction costs. One of 4 mechanisms Tilly suggests): The other 3 being opportunity hoarding, exploitation, & diffusion/ emulation. (Krinsky & Mische, 2013). Meaning is not fixed it is negotiated via transaction processes (Zelizer,2011).
B1 TWL normative pressure	Balancing or Normative loop for Teaching: management/ colleagues @ the discipline level [and institutional] (Repenning, 2002). Metric is the TWL norm of 810 hrs p.a." teaching"
B2 PU normative pressure	Balancing or Normative loop for Research: management/ colleagues @ the discipline level [and institutional] (Repenning, 2002). Metric is the PU (productivity unit) norm assigned based on position/ rank. E.g. lecturer=60PU, senior lecturer=90, Ass. prof=120 (1 journal article, single author=60PU)
B3 Management Disruption normative pressure-REVISIT	
B4 Teaching SC(Innovation) normative pressure-REVISIT	
B5 Teaching SC(Innovation) - Research PU REVISIT- may be reinforcement virtuous loop	
B6 Teaching SC(Innovation) -TWL REVISIT may be reinforcement vicious loop	
C~BoundaryX	COMMUNITY Boundary crossing: artefact, behaviour, person. Can be an action/ object/ structure-like a committee. CoP speaks of boundary crossing but so too does Zelizer 2011 talking about circuits of power etc. Boundary is not specifically related to teaching/ research. Can involve crossing between disciplines, other interests like alumni and or other roles e.g. train the trainer
C~BoundaryX FocusRESEARCH (from B2)	COMMUNITY Boundary crossing: artefact, behaviour, person. Can be an action/ object/ structure-like a committee. CoP speaks of boundary crossing but so too does Zelizer 2011 talking about circuits of power etc. This looks at a crossing over from an aspect which seems more Research related to another (generally teaching related)
C~BoundaryX FocusTEACHING (from B1orB4)	COMMUNITY Boundary crossing: artefact, behaviour, person. Can be an action/ object/ structure-like a committee. CoP speaks of boundary crossing but so too does Zelizer 2011 talking about circuits of power etc. This looks at a crossing over from an aspect which seems more Teaching related to another (generally research related)
C~NotBelonging generally (R2orR3)	COMMUNITY: when someone should belong to a community e.g. of members in a discipline but they don't feel they do. i.e they feel like they don't fit in.
C~Other	COMMUNITY: When the individual belongs to a different community not specifically related to the discipline, teaching or research e.g. part of community service community, professional practice community, university admin function community etc.
C~Peripheral participation	COMMUNITY-CoP (Wenger): Legitimate Peripheral participation. When a person is operating on the edge/ fringes of a community. A person may be on the fringe as they attempt to make their way into a community and thus slowly becoming involved OR a person may choose to remain on the periphery; they may be playing a boundary crossing function or may have no interest to become more involved (" dipping their toes in the water to try something out…")
C~Profession_Discipline (links to R2)	Students and/ or teachers clearly linking into a professional, discipline-based Community of Practice (Wenger).

C~Research (links to R2 R3)	COMMUNITY: A member of a research-interest based community
C~Teaching links to (R2_R3)	COMMUNITY: A member of a teaching community with a specific focus: This could be based on a content area (discipline/ field), specific project/ grant, module, group of students (Fulltime/PT)(undergrad/ postgrad), using a specific application (Moodle) or pedagogy (constructionism/ pedagogy of the oppressed)etc.
C~Trajectory_Identity	COMMUNITY (Wenger, 2006) learning trajectories; can assume that a teacher could also have a "teaching trajectory" explains the progression of their teaching (via a process of learning). Wenger specifies, inbound (on track to become full members), peripheral (will not necessarily lead to full membership) or boundary (maintaining memberships across community boundaries). Wenger suggests through participation in a multiplicity of contexts the individual constructs their identity.
C~Trust-based links to (R2_R3 or R8_R9)	COMMUNITY which is based on trust rather than on e.g. research, teaching etc. A community based on social ties which bind the group together? This is discussed by Tilly (trust networks) (Krinsky 2013) and also as part of circuits (of power?) by Zelizer
Commitment2ADMIN (R1)	Individual perception of their commitment to academic admin (1 of 4 pillars of academic activity at UKZN)
Commitment2CommunityEngagement (R1)	Individual perception of their commitment to community engagement (1 of 4 pillars of academic activity at UKZN)
Commitment2PU	Individual perception of their commitment to research (1 of 4 pillars of academic activity at UKZN) is specified in terms of Productivity units (PU). PUs are linked to an automatic funding model which links to research artefacts (articles, books etc) and the graduation on M and PhD students. Funding model from the Dept of HE & training (RSA) which UKZN then partially shares directly to the academic's research cost centre (proportional calculation based on contribution to institutional total productivity)
Commitment2TWL - commitment2SC	Teaching Workload (TWL) = workload allocation model (WAM). Sets teaching= 810 hrs/ teacher p.a. Based on the module template submitted to CHE. Predefined UKZN norms are stipulated e.g. for preparation, marking etc. If < teacher feels is required it will impact commitment to (1) SC / innovation in teaching (which is seen to take more time/ effort and/ or (2) may increase use of other tech which is timesaving e.g. online assessment, publishing of documents. Based on flexibility in individuals TWL
Commitment-effort (R1)	(Repenning, 2002) R1 Individual reinforcement process: HE teacher commitment (to social computing innovation) has a + influence on (HE teacher) EFFORT. Reinforcement process so (-)->(-) and (+)->(+)
Content-Role of formal content within discipline teaching	How NB does the teacher rate the formal discipline content in their teaching process. To what extent does the content drive the teacher's practice/ actions? This can also include- what content is the teacher choosing to teach (e.g. may design unusual/ new courses)
Cost2Teacher - commitment (R1)	Personal costs to teacher impacts their commitment , and hence effort e.g. high levels of stress
Culture~Discipline (R2)	Specific norms within an academic discipline. (Becher & Trowler, 2001,23) suggest "sets of taken for granted values, attitudes and ways of behaving" not so much about "sharing" culture as "hammering" each other into shape. (Lamont, 2009,259) "cultural scripts"… " widely available notions that individuals draw on to make sense of reality" Beliefs are embedded into the structures e.g. by the constitution, and operation of committees? A dominant discourse contains particular ideological beliefs (Young,2006p4)
Culture~Elaborated (Variety of cultural systems)	Cultural elaboration (changed cultural system) is seen as part of Morphogenesis (Archer, 1996). The cultural system (CS) when it meets the socio-cultural (S-C) response to it. So it is transformed based on (1)situational logics of the existing CS and (2) agents socio-cultural response s to the contexts. " Cultural elaboration is the future which is forged in the present, hammered out of past inheritance by current innovation" (Archer, 1996,xxvi)

Culture~HE _ general context of site case	Specific norms within Higher Education(national/global). (Becher & Trowler, 2001,23) suggest "sets of taken for granted values, attitudes and ways of behaving" not so much about "sharing" culture as "hammering" each other into shape. (Lamont, 2009,259) "cultural scripts"… " widely available notions that individuals draw on to make sense of reality" A discourse contains particular ideological beliefs (Young,2006p4)
Culture~Morphogenesis (Variety of cultural systems)	STRUCTURES: refers to change in system's structure or state (its form) i.e. a cycle of (structural conditioning-> social interaction->structural elaboration). In CULTURAL field explains the interaction between agency and culture, over time. i.e. (cultural conditioning->socio-cultural interaction->cultural elaboration) (Archer, 1996). In this time is a variable not just the medium for action: culture predates s-c interaction/ interaction before elaboration). Archer=Only 1 cultural system (CS) at a time
Culture~Morphostasis (Variety of cultural systems)	(Archer, 1996) The opposite of morphogenesis (results in elaboration/ change). Negative feedback loops result in cultural reproduction (Morphostasis). Can both operate in different parts of same domain. Structural & cultural processes interact.
Culture~UKZN	Specific norms within an HE organisation (UKZN). (Becher & Trowler, 2001,23) suggest "sets of taken for granted values, attitudes and ways of behaving" not so much about "sharing" culture as "hammering" each other into shape. (Lamont, 2009,259) "cultural scripts"… " widely available notions that individuals draw on to make sense of reality". Cultural scripts particularly relevant at broader HE level according to Lamont. A discourse contains particular ideological beliefs (Young,2006p4)
Discipline effort- individual effort (R2)	Discipline academics effort feeds directly into the effort an individual has to put in.
Discipline-commitment ModeratedByTEACHER experience (Delay) (R2)	Feedback from DISCIPLINE colleagues may not have an immediate impact on commitment/ behaviour as there may be a delay as the teacher believes colleagues are later adopters/ don't see the potential or are sceptical and require more evidence (e.g.)
Discipline-commitment(R2)	(Repenning,2002) R2 Potential Reinforcement via Feedback via Word of mouth/ Resources from own DISCIPLINE academics lead to +HE teacher COMMITMENT to innovation. Reinforcing loop (-)->(-) & (+)->(+) p. 118 introduces "word of mouth" as the variable to drive motivation & diffusion(virtuous loop) demotivation (vicious loop) if no normative/ balancing influence in the process.
DisruptionInstitutional-Results (R1 _R processes_B3)	Student disruptions influence the results teachers experience from their planned interventions/ innovations. A disruption can also be in management, staffing, through a merger etc. Can mean previous arrangements or individual, collective knowledge is lost (Anderson & Lewis, 2014). This does NOT include students reacting negatively to teaching (that is coded under "student"- codes.
DuellingDiscourse (R1)	(Young, 2006 p7) Duelling discourses reflect fundamental differences in normative assumptions applying i.e. alternative perspectives on interactions i.e. in the natural enviro but could apply to an organisation?) competing explanations of a situation. Result in either (1) groups carve out different spheres of authority (2) system is reconstructed on some new basis. (Young 2006p8) Can lead to blocking coalitions OR opportunity hoarding Tilly in (Krinsky,2013)A "dominant discourse" is created by those in power
Effort (individual)-results(R1)	(Repenning, 2002) R1 Individual reinforcement process: (HE teacher) EFFORT has + influence on RESULTS (of social computing). Reinforcing process (-)->(-) and (+)->(+)
Effort grants etc - Resources R1_R8_R9 (R6 R7) NONE CODED	Effort expended (e.g. in detail & integrity of application/ reports generated) individually or with a partner or mentor's input may assist in gaining resources including grant funding from a variety of institutional (discipline through to institutional level) or external mechanisms

Effort-Results ModeratedBySCdesignByTEACHER (Delay) (R1)	Teacher has a responsibility to "moderate" the SC being designed: what is being required of students? where? any potential risks that they need to be taught about? Teacher needs to ensure student online activity is "deliberate" on both the part of the student and in terms of the design effort of the teacher. (Kress, 2010) COMPETENCE maintains the status quo. In comparison Kress speaks of DESIGN as looking to create -focuses on an individuals' realisation of their interest in the world;
Effort-Results ModeratedByTEACHER learning (R1)	The results achieved by a teacher are also delayed based on the amount of learning & skills development a teacher has to acquire in order to produce an effective T&L activity
Emulation_ Commitment ModeratedByTEACHER motivation (Delay) (R5_R1)	The process which results in a teacher emulating a colleague is moderated by the motivation required to stimulate the teacher to overcome the commitment/ effort hurdle in the cycle of individual innovation R1. If the motive is weak or less urgent OR a colleague is not prepared to supply the necessary effort; then there is insufficient motivation for the individual teacher to activate personal commitment or effort.
Event-CR	Critical realism (Bhaskar, 2008) speaks of the empirical EVENT layer: layer 1 (as underpinned by 2 other layers i.e. the Actual layer & generative structures & mechanisms layer) (Mingers, 2004). Tilly (Krinsky & Mische, 2013) stressed the role of STORIES as providing actors, actions, causes & effects from specific perspective (may include specialised knowledge). METAPHOR as signs for meaning making (Kress,2010)(Lakoff & Johnson, 2008)
Metaphor	(Kress,2010, p156) "Analogy is the foundation of metaphor. Hence, every sign, being formed on the basis of likeness and on the principle of analogy…". "All signs are metaphors" p30 Consider "aptness". Apt for whom? to what? Power acts to keep interpretation within certain boundaries based on contexts (what makes X-like??) i.e. apply to specific audiences & purposes. (Fairclough,2003, p11) suggests meaning based on (1)explicitly stated and (2) implied (unsaid). what is assumed? what is silenced (CR Event)
Stories	Critical realism (Bhaskar, 2008) speaks of the empirical EVENT layer: layer 1 (as underpinned by 2 other layers i.e. the Actual layer & generative structures & mechanisms layer) (Mingers, 2004). Tilly (Krinsky & Mische, 2013) stressed the role of STORIES as providing actors, actions, causes & effects from specific perspective (may include specialised knowledge). METAPHOR as signs for meaning making (Kress,2010)(Lakoff & Johnson, 2008)
Exploitation (Resources)- Effort (R1)	Benefits of the relation flow systematically from one actor to the other. One of 4 mechanisms Tilly suggests as representing human practices (or being used in combination to represent human practices): The other 3 being adaptation, opportunity hoarding, & diffusion/ emulation. (Krinsky & Mische, 2013).
External resources - Effort (R7)	External resources (gained through effort & results) helps to reduce the effort required to continue or attempt innovation
HE RoleInSociety-commitment (R1)	Some of the expectations of what students should learn at university (such as computing skills) will influence the level of commitment of the teacher
HowSC_General TEACHING (RQ2 How)	How is social computing used generally in teaching i.e. participant may not have identified a specific level of student or topic being taught.
HowSCotherAcademicFunctions (RQ2 How)	How is SC used in other parts of "academic practice" such as community service, professional practice (accountants, doctors, engineers, psychologists etc). IN ADDITION: Any generic comment which could relate to more than 1 aspect of academic life e.g. teaching and research is coded here
HowSCpostgrad (RQ2 How)	How is social computing used in postgrad teaching? This also links to CoP (Lave & Wenger, 1991) Situated learning i.e. "doing", as well as a link to TPACK's (Mishra & Koehler 2006) "pedagogy components (Tech, Pedagogy, content…)
HowSCresearch (RQ2 How)	How is social computing used in research

HowSCsupervision (RQ2 How)	How is social computing used in supervision? This also links to CoP (Lave & Wenger, 1991) Situated learning i.e. “doing”, as well as a link to TPACK’s (Mishra & Koehler 2006) “pedagogy components (Tech, Pedagogy, content…)
HowSCundergrad (RQ2 How)	How is social computing used in undergrad teaching? This also links to CoP (Lave & Wenger, 1991) Situated learning i.e. “doing”, as well as a link to TPACK’s (Mishra & Koehler 2006) “pedagogy components (Tech, Pedagogy, content…)
Identity- Nature	Gee (2000,100-101) 1 of 4: Nature identity. We are a certain way because of our natures. The process is a state of being developed from- Power (force) received from (nature) (Marginson, 2008)agree with Sen -plurality of identity
Identity- teacher relationship with Tech	The teacher’s use of any technology is also linked to their relationship with; or how they identify with technology (social computing included). Are they technophobic? a technophile? Use social computing in their personal life? etc. (Marginson, 2008)agree with Sen -plurality of identity
Identity_TeacherAsLearner	Teacher feels s/he is also needing to continually learn and has a growth mindset. Teacher will try and experiment with things. Take a beta approach- test things out. In addition, the teacher may express this as being a reflective (or reflexive?) practitioner. Perhaps this teacher “growth” mindset impacts their view of the learning process? and hence how they view students & student learning? (Marginson, 2008)agree with Sen -plurality of identity
Identity-A-affinity- Coded at Community nodes	Gee (2000,100-101) 4 of 4: Affinity identity. We are who we are because of the experiences we have had with certain affinity groups: Power (the practice) received from (‘affinity’ groups). People in an affinity group “share allegiance to, access to, and participation in specific practices that provide each of the group’s members the requisite expereinces.”p105 You must actively choose to join an affinity group- cannot be forced to join. (Marginson, 2008)agree with Sen -plurality of identity
IdentityConstruction	IDENTITY: Gee(2000,99) “ Being recognised as a certain “kind of person”, in a given context can change from moment to moment in different contexts-be ambiguous/unstable. (Marginson, 2008, 279)agree with Sen -plurality of identity-> “the project of self-construction is never finished”. (Benwell & Stokoe, 2006) deal with performativity of identity and a ‘constructed certitude” as a means of “developing a clear, unified sense of self by ignoring, excluding ambiguity or complexity” (Benwell & Stokoe, 2006,23)
Identity-Discourse	Gee (2000,100-101) 3 of 4 = Discourse identity. We are who we are because of what we are recognised as having achieved The process is recognised in the individual trait. Power (discourse/ dialogue) received from (“rational” individuals). These identities can be sustained through discourse/ dialogue without being officially, institutionally sanctioned. (Marginson, 2008)agree with Sen -plurality of identity
Identity-Institution	Gee (2000,100-101) 4 of 4: Institutional identity. We are what we are because of the positions we occupy in society. The process is via a position authorised by- Power (authorities) received from (within institutions). (Marginson, 2008)agree with Sen -plurality of identity
IndependentColleague - commitment (R10)	The involvement of an independent colleague on a module (i.e. someone who is not operating in the role of mentor/ mentee or as a collaborative teaching partner) could have a +ve, neutral, or -ve impact on the teaching process. They could be within the discipline or outside. An independent colleague may / may not impact teacher commitment.
IndependentColleague - effort (R10)	The involvement of an independent colleague on a module (i.e. someone who is not operating in the role of mentor/ mentee or as a collaborative teaching partner) could have a +ve, neutral, or -ve impact on the teaching process. They could be within the discipline or outside. An independent colleague may / may not impact teacher effort (could e.g. offer additional resources)
IndependentColleague - results (R10)	The involvement of an independent colleague on a module (i.e. someone who is not operating in the role of mentor/ mentee or as a collaborative teaching partner) could have a +ve, neutral, or -ve impact on the teaching

	process. They could be within the discipline or outside. An independent colleague may / may not impact teacher results.
InfluenceFT (R1)	The influence, fulltime teaching responsibilities, has on the use of social computing in teaching
InfluencePT (R1)	The influence, part-time teaching responsibilities, has on the use of social computing in teaching
Institutional normative pressure (B Loops)-general motivation of academics	General comment about how the institution approaches motivating staff to perform in a specific way. NOT specifically referring to teaching , research etc
InteractOnline=Reality	The interaction online with students is similar to the interaction face-to-face (in real life lecture)
InteractOnlineX=Reality	The interaction online with students is different to the interaction face-to-face (in real life lecture)
Mentor resources-effort required (R9)	Mentor resources (other than effort, commitment, results e.g. money, software, hardware, staff DIRECTLY impact individual effort (i.e. NOT via motivation, commitment or effort)
Mentor-commitment (R9)	Mentor commitment DIRECTLY impacts individual commitment
Mentor-effort required(R9)	Mentor effort DIRECTLY impact individual effort (i.e. NOT via motivation, commitment). Tech steward term used by(Cochrane 2012) Pedagogical and tech support for a CoP. However, in this context it is used for any Tech-champion who stimulates colleagues to use; and assists them in using the tech.
Mentor-results (R9)	Mentor results DIRECTLY impact individual results (i.e. NOT via motivation, commitment or effort)
MngReactionPU-commitment (B2)	(Repenning, 2002) Balancing/ normative process for Research. Level of commitment is compared to the managers' commitment goal. This indicates the commitment gap (expected-achieved) and results in the normative pressure (Management reaction) to teacher; which influences the commitment level. In research the metric appears to be the PU (productivity unit) which is assigned to an artefact of research e.g. publication. Direct, appropriate metric of the required output from research process.
MngReactionTEACHING-commitment (B1)	Management reaction to teaching practice (particularly use of social computing or a suggested innovative technology tool like Moodle) will influence the commitment to the practice. This is a normative or balancing loop; where the commitment to the activity is weighed against the expected goal (normative gap).
OpportunityHoarding (Resources) NOT EVIDENT	Benefits are denied to "outsiders". One of 4 mechanisms Tilly suggests as representing human practices (or being used in combination to represent human practices): The other 3 being adaptation, exploitation, & diffusion/ emulation. (Krinsky & Mische, 2013).
Other Academics effort- individual effort (R3)	Other academics (outside the discipline) effort feeds directly into the effort an individual has to put in. May be for general academic aspects e.g. plagiarism, aspects of research-etc
Other-commitment ModeratedByTEACHER experience (Delay) (R3)	Feedback from OTHER colleagues may not have an immediate impact on commitment/ behaviour as there may be a delay as the teacher believes OTHER colleagues are later adopters/ don't see the potential or are sceptical and require more evidence (e.g.)
Other-commitment(R3)	(Repenning,2002) R2 Potential Reinforcement via: Feedback via WordOfMouth/ Resources from OTHER academics lead to +HE teacher COMMITMENT to innovation. Reinforcing loop (-)->(-) & (+)->(+) p. 118 introduces "word of mouth" as the variable to drive motivation & diffusion(virtuous loop) demotivation (vicious loop) if no normative/ balancing influence in the process.
Partner - Result (R8)	Partner results DIRECTLY impact individual results (i.e. NOT via motivation, commitment or effort)
Partner- effort (R8)	Partner effort DIRECTLY impact individual effort (i.e. NOT via motivation, commitment). "Partner" term may be used loosely. This may also refer to a colleague who has a very similar pedagogy and hence useful materials/ input etc. which reduce the required effort.
Partner-commitment (R8)	Partner commitment DIRECTLY impact individual commitment

Pedagogy~Student oriented	Pedagogy employed by teacher could be student centred- (andragogy) or student- directed (heutagogy) (Cochrane et al., 2012). Most of these quotes were coded into HowSC… ;Student empowered…; and effort-results. Remainder retained here. Have not discriminated between andragogy & heutagogy.
Pedagogy~Teacher centred _reflected as UKZN culture	Bernstein (1996) "recontextualising" function: select, relocate, refocus subject matter for transmission. Pedagogy -> 2 discourses= instructional d.(specialist content) + regulative d. (social order, relations & identity in the learning space). Recontextualising rules: CLASSIFICATION power relations between agents, discourses, practices FRAMING control of instruction i.t.o. selection, sequence, pacing, evaluation etc. Pedagogy includes values, beliefs, theories, assumptions underpin teaching(Kinichin, 2012)
PM-MngReaction (B1 & B2)	Performance management process results feed into the managements' reaction to teachers in terms of TWL and PU in particular
Power~Individual-Episodic (R1)	(Silva, 2007,p177) Episodic power is when A makes B do something they otherwise wouldn't. Can also be called "power over" or "causal power". Depends on relationship between 2; A creates obligatory passage point (OPP) for B. B may resist this power play. Resisting using an IS or technology can be a symptom of this dynamic.
Power~OwnActions (R1)	Individual academic freedom, exercising own agency
Power~PA-Who is running it	(Maton, 2005). Positional autonomy. Different to personal positional power e.g. by the position the person holds in the organisation. This is the historical allegiance/ training/ background of the people who are running the organisation, and the implications for the academics. e.g. If the PA+ then management are academics who are understand what the individuals are trying to achieve. If they are business people, politicians, etc they may bring those dispositions to the organisation and their approach to man
Power~Positional-social integration	(Silva, 2007) Integrating power into the social fabric of an organisation will result in positional power being used i.e. A manager in relation to a subordinate; when they give an instruction they will have legitimacy (and be listened to) based on their position in the organisation and will probably have access to more/ different resources.
Power~SystemicIntegration-RA-What rules govern (B3 perhaps)	(Silva, 2007) speaks of the fact that at a system level specific interests will be facilitated or promoted e.g. economic, political etc. Silva (2007) suggests the system prescribes how things should be done & how behaviour will be disciplined. This seems= Maton(2005) Relational Autonomy (RA) i.e. What rules are being employed? e.g. in HE are academic markers of success e.g. academic excellence being used (RA+) or is financial gain? e.g (external) being imposed i.e choice/ agency removed from academic (RA-)
Practice~ResearchNotSC (R1)	Academic's practice as a researcher @ UKZN mentioned BUT DOES NOT involve SC
Practice~TeachingNotSC (R1)	The academic's teaching practice mentioned BUT DOES NOT involve SC. This also links to CoP (Lave & Wenger, 1991) Situated learning i.e. "doing", as well as a link to TPACK's (Mishra & Koehler 2006) "pedagogy components (Tech, Pedagogy, content…)
R1 Individual Reinforcement	(Repenning, 2002) R1 Individual reinforcement process: (HE teacher) EFFORT has a + influence on RESULTS (use of social computing)/ RESULTS (use of social computing has a + influence on HE teacher COMMITMENT to social computing innovation/ HE teacher COMMITMENT to social computing innovation has a +ve influence on (HE teacher) EFFORT. R1=influence of direct experience.
R10 IndependentColleague reinforcement	The involvement of an independent colleague on a module (i.e. someone who is not operating in the role of mentor/ mentee or as a collaborative teaching partner) could have a +ve, neutral, or -ve impact on the teaching process. An independent colleague may / may not impact teacher commitment, effort (could e.g. offer additional resources) or results.
R2 DISCIPLINE_professionColleagues reinforcement	(Repenning,2002) R2 INDIVIDUAL Reinforcement via DISCIPLINE colleagues: HE teacher RESULTS influence + Effort-Result OBSERVATION/ Feedback via WordOfMouth (or resources/ recognition)

	from DISCIPLINE academics lead to +HE teacher COMMITMENT to innovation. Reinforcing loop (-)->(-) & (+)->(+) p. 118 introduces "word of mouth" as the variable to drive motivation & diffusion(virtuous loop) demotivation (vicious loop) if no normative/ balancing influence in the process.
R3 OTHERColleagues reinforcement	(Repenning,2002) R2 INDIVIDUAL Reinforcement via OTHER colleagues: HE teacher RESULTS influence + Effort-Result OBSERVATION/ Feedback via WordOfMouth (or resources/recognition) from OTHER academics lead to +HE teacher COMMITMENT to innovation. Reinforcing loop (-)->(-) & (+)->(+) p. 118 introduces "word of mouth" as the variable to drive motivation & diffusion(virtuous loop) demotivation (vicious loop) if no normative/ balancing influence in the process.
R4 STUDENTS reinforcement	(Link to Tilly (Krinsky,2013) Emulation/ diffusion mechanism. (Repenning,2002) R2 INDIVIDUAL Reinforcement via STUDENT feedback: HE teacher RESULTS influence + Effort-Result OBSERVATION/ Feedback via WordOfMouth (resources/recognition?) from STUDENTS lead to +HE teacher COMMITMENT to innovation. Reinforcing loop (-)->(-) & (+)->(+) p. 118 introduces "word of mouth" as the variable to drive motivation & diffusion(virtuous loop) demotivation (vicious loop) if no normative/ balancing influence in the process.
R5 Emulation_Diffusion2otherTeachers (-transaction cost) REVISIT not a reinforcement	When action is modelled on the action of another. Minimises transaction costs. One of 4 mechanisms Tilly suggests: The other 3 being adaptation, opportunity hoarding & exploitation. (Krinsky & Mische, 2013). Repenning (2002) R2 diffusion of innovation is via the emulation of the innovation by colleagues in the organisation-via other colleagues, own discipline or stimulus by students (Word of mouth & use in teaching/learning)
R6 Institutional Resource reinforcement	Institutional mechanisms to provide support for T&L innovation in terms of time (lecturer relief), support of staff & students technically or in terms of monitoring, or software, hardware, access infrastructure
R7 External Resource reinforcement	External funding via international or local agencies.
R8 Partner (trust based) Mutual reinforcement	The sharing of all aspects of a project can assist in providing additional motivation to improve commitment, provide shared input of skills for reducing transaction costs and actually assist with shared effort required and provide resources from shared stock. Joint effort improves likelihood of success in terms of results and in terms of accessing resources.
R9 Mentor (trust based) reinforcement	The input of a mentor can assist in providing additional motivation to improve commitment, provide input of skills for reducing transaction costs and/ or actually assist with effort required and/ or provide resources from personal stock.
RegulativeDiscourse _incl in other nodes	Coded within "How SC used" & "Practice.." (Bernstein) The regulative discourse operates alongside the instructional discourse and is the dominant discourse. It consists of a complex mix of instructions and rules which govern how students are expected to behave (explicit or implicit). The regulative discourse consists of the " realisation rules" learnt through the social and moral order of the institution i.e. Social expectations of the relations and identities expected in a learning space (Jump, 2011).
Result - Resources (R1_R6_R7_R8_R9)	Results achieved individually or with a partner or mentor's input may assist in gaining resources including grant funding from a variety of institutional (discipline through to institutional level) or external mechanisms
Results-commitment(R1)	(Repenning, 2002) R1 Individual reinforcement process: RESULTS (of social computing) has impact on HE teacher COMMITMENT to innovation (social computing). Reinforcing relationship (-)->(-) and (+)->(+)
Results-Discipline(R2)	(Repenning,2002) R2 Potential Reinforcement OR Emulation/Diffusion via: HE teacher RESULTS lead to + observation of effort-result link by own DISCIPLINE academics. Reinforcing loop (-)->(-) & (+)->(+)
Results-Other(R3)	(Repenning,2002) R2 Potential Reinforcement OR Emulation/Diffusion via HE teacher RESULTS lead to + observation of effort-result link by

	OTHER academics (not in same discipline). Reinforcing loop (-)->(-) & (+)->(+)
Student Access to Resources-Results (R4)	If students lack access to computers or connectivity/ bandwidth this can derail their attempt to participate & influence the results
Student Results-commitment ModeratedByTEACHER experience (Delay) (R1_R4)	A teacher may not be overly influenced by negative feedback if e.g. prior groups responded positively; an initial lukewarm response is anticipated; this is their first exposure and hence the approach is foreign. Could be seen as teacher "stickability" is this due to nature, experience or both?
Student_COMMITMENT_EFFORT-Results (R4)	Student motivation(COMMITMENT) impacts participation (EFFORT) and thus Results. If students are not being assessed or can see no vested interest, then few may take up the opportunity. For part time students; competing demands on their time, families, work etc. may mean they only do the compulsory not the elective work (satisficing approach). Students expect/prefer instructivist approach (Benwell,2006, 127-8)(Deslauriers et al, 2019)
StudentReaction - MngReactionTeaching Innovation (R4)	Instead of students responding to the teacher (or someone under her authority e.g. tutor, PGA, teaching assistant) they go directly to the management e.g. The Head of School/ Dean of the appropriate School @ UKZN.
Students FeelEmpowered- Students COMMITMENT (R4)	If students feel empowered it may increase their motivation and commitment to the task which will lead to + results
StudentSCexperience-Results (Delay) (R4)	Students might not initially get it when exposed to a different pedagogy and social computing; but overtime, with repeated exposures, they are more likely to appreciate it, and participate. They have to learn the new pedagogy and learn to trust how it is being practiced (i.e. things like alignment between class interactions. In some cases coded to include where colleagues were the "students".
StudentsEmpowered - commitment (R1)	If teacher feels students are being empowered (if this is their aim) then it can + commitment. 24/8/2019 Focus on students being empowered because they have a voice, are able to create and contribute to discussion etc?? Need to check this is not about being empowered because they now know how to use tech (different nodes available for that)
StudentTech_ Competency -Student CommitmentEffort (Delay) (R4)	Student tech competency impacts student motivation and effort they are prepared to expend. (Kress, 2010) COMPETENCE maintains the status quo. Leaves norms unchallenged. In comparison Kress speaks of DESIGN as looking to create -focuses on an individuals' realisation of their interest in the world; at least partial, equitable participation in the making of meaning (e.g. by s-c). CRITIQUE looks backward/ focus on superior power- how past formed the present. Design requires competence & critique.
StudentTech_ Competency -Teacher Effort (R1)	Student tech competency impacts effort teacher has to put in. (Kress, 2010) COMPETENCE maintains the status quo. Leaves norms unchallenged. In comparison Kress speaks of DESIGN as looking to create -focuses on an individuals' realisation of their interest in the world; at least partial, equitable participation in the making of meaning (e.g. by s-c). CRITIQUE looks backward/ focus on superior power- how past formed the present. Design requires competence & critique.
Student-WoM-commitment(R4)	(Repenning,2002)R2 Potential Reinforcement via: Feedback via WordOfMouth (??? resources) from STUDENTS lead to +HE teacher COMMITMENT to innovation. Reinforcing loop (-)->(-) & (+)->(+) p. 118 introduces "word of mouth" as the variable to drive motivation & diffusion(virtuous loop) demotivation (vicious loop) if no normative/ balancing influence in the process. Focused on what students SAID-rather than inferred by teacher
TaskFit2SC-effort (R1)	The nature of the task and how well the social computing is able to represent the functionality of the task (Task-technology fit theory (Goodhue & Thompson, 1995)) will impact the amount of effort the teacher has to put into the implementation.
TechSupport (general)-effort (R1)	Tech support (in general- not specifically from UKZN) for a teacher and/ or student can help reduce the effort required to achieve a specific result. Tech steward term used by(Cochrane 2012) Pedagogical and tech

	support for a CoP. However, in this context it is used for any Tech-champion who stimulates colleagues to use; and assists them in using the tech.
Time-EFFORT involved (R1)	Amount of time using SC requires. Additional time provided to a teacher, for teaching, can either be in terms of physically being allowed to assign additional time to achieve an aspect of teaching tasks OR may be in terms of funding to provide a replacement teacher (lecturer relief). This can help reduce the effort required to achieve a specific result because more time is available in which to achieve the goal.
UKZN Money-effort (R6 R7 R9)	Financial injection from UKZN structure (College/ School/ UTLO) for teaching project allows teacher to gain additional time, support staff, infrastructure, access to tech and bandwidth. Excludes staffing, tech support & training (coded separately)
UKZN Staffing-Effort (R6)	Institutional staff resources; either those provided by default or gained through effort & results, helps to reduce the effort required to continue or attempt innovation. It may also contain comments on other resources such as venues. Excludes tech support, training & money (coded separately)
UKZN Training-Effort (R6)	Institutional training resources; either those provided by default or gained through effort & results, helps to reduce the effort required to continue or attempt innovation. Excludes staffing, tech support & money (coded separately)
WhatIsSC (RQ1 What)	What does the teacher see social computing as being?
WhatSCisUsed (RQ1 What)	what social computing is being used by the teacher?
Why SC used in Other ways (RQ3 Why)	Why is social computing used in other ways?
WhyOtherTechUsed (RQ3 Why)	Why is other tech (not social computing) used?
WhySC NOT usedBy_STUDENTS (RQ3 Why)	reasons why social computing is not used by teachers at times, or in specific contexts
WhySC NOT usedBy_TEACHERS (RQ3 Why)	reasons why social computing is not used by teachers at times, or in specific contexts
WhyStudentUseSC (RQ3 Why)	Reasons for social computing use that benefit the student
WhyTeacherUseSC (RQ3 Why)	Reasons for social computing use that benefit the teacher

Appendix H. List of reinforcing system loops

#	Reinforcement Loops: Description	Figure
R1	Individual teacher's use of SC (Commitment-Effort-Result)	Figure 14
R1.1	Another individual teacher's use of SC reinforcement loop	Figure 41
R2	Discipline/ professional colleagues reinforcement of R1	Figure 25
R3	"Other" colleagues reinforcement of R1	Figure 26
R4	Student reinforcement of R1	Figure 22
R5	Teacher emulation of R1	Figure 27
R6	Institutional (UKZN) reinforcement of R1	Figure 28
R7	External grant funding reinforcement of R1	(as for R6)
R8	Partner (Mutual) reinforcement of R1	Figure 23
R9	Mentorship reinforcement of R1	Figure 24
R10	Independent co-teacher negative reinforcement of R1	Figure 30
R11	Teacher technology skill deficit reinforcement loop (Shifting the burden of a low level of SC implementation)	Figure 39
R12	Student skill/ knowledge deficit reinforcement loop (Shifting the burden of lack of feedback to students)	Figure 40

Appendix I. List of balancing (normative) system loops

#	Balancing (normative) Loops: Description	Figure
B1	Teaching workload (TWL) normative pressure from management	Figure 31
B2	Research productivity (PU) normative pressure from management	Figure 31
B3	Teaching innovation (TI) normative pressure from management	Figure 31
B4	Pedagogy review, normative pressure on SC implementation gap (Drifting goals)	Figure 33
B5	Compliance seeking, normative pressure on SC implementation gap (Drifting goals)	Figure 33
B6	Assist teacher, normative pressure on low level of SC implementation (Shifting the burden)	Figure 39
B7	Train teacher, normative pressure on low level of SC implementation (Shifting the burden)	Figure 39
B8	Teacher-centred pedagogy, normative pressure on lack of feedback to students (Shifting the burden)	Figure 40
B9	Core financial support, normative pressure on lack of feedback to students (Shifting the burden)	Figure 40