

ICT INTEGRATION IN THE TEACHING OF FET GEOGRAPHY IN JOHANNESBURG EAST.

A research report presented to the Faculty of Humanities (School of Education)

By

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ABSTRACT

The dawn of information and communication technology (ICT) has been debated both locally and internationally by both academics and politicians. Governments in Africa are investing billions of dollars in an attempt to recap the perceived benefits from such technology. This research is an attempt to find out to what extent are geography teachers integrating ICTs in their teaching. The research found that there is a discrepancy between what politicians say and the realities in the classroom. While the government had moved with great speed in procuring electronic gadgets for schools, not the same has occurred in preparing both the teachers and learners to function in the new dispensation. This discrepancy has compromised the degree of ICT integration in the teaching of geography at high school level.

Results of this investigation revealed that ICTs have a lot to contribute to the teaching of geography. The power of the videos, coloured pictures and the internet revealed the immense power of audio-visuals in bringing real world examples into the classroom. However, to a large extent the value of ICTs hinged on a well-thought and prepared pedagogy without which, ICTs can be a serious disruption to learning.

Since the use of ICTs is still at its infancy in the designated 'pilot' schools, a lot is still to be done to allow a paradigm shift from hard copy textbooks-based classroom to a 'paperless' full ICT 21st century class. Challenges to full ICT integration are numerous but with more training and coaching, it is envisaged that a new order will soon materialise in Gauteng schools.

With funding no longer much of a problem in the full ICT schools, a new mind-set and pedagogy is needed to ensure full integration of ICTs in the teaching of Geography. Embracing the culture of ICTs will probably produce envisaged scientists to face the new world order of internet and other e-learning socio economic environments.

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Thank you all.

DECLARATION

I, NEVER NCUBE, declare that this research report is my own unaided work. It is submitted for the degree of Masters of Education at the university of Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination to any other university.

Signature: N. Ncube

Date: 15 February, 2018.

DEDICATION

To my mother who has never doubted my abilities and who has always been an inspiration to me, this is specially for you.

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Abbreviations used

ATP – Annual Teaching Plan

CAPS – Curriculum and Assessment Policy Statement

CMS – Content Management System

FET – Further Educational and Training

GDE – Gauteng Department of Education

ICT – Information and Communication Technology

MGSL – Matthew Goniwe School of Leadership

VLE – Virtual Learning Environment

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CHAPTER ONE: BACKGROUND AND OVERVIEW OF THE STUDY

1.1. Background

The ubiquitous use of computers in various sectors of the economy has triggered a belief that computers are the tools that can impact positively on various spheres of life

by making the performance of tasks easier. The use of Information and Communication Technology (ICT) in education has greatly increased with the use of digital technology in various spheres of the economy. In education in particular, there is a widely held belief that the use of computers will improve performance by learners at school level, as is evident in the Gauteng MEC Panyaza Lesufi's statement "Gauteng has a vision to be a top performer on par with developed countries by introducing "paperless classrooms" ... to address teaching quality, learner engagement and school administration." (Lesufi, 2016, p. 9). With changes in technology and the increased availability of teaching technological tools, ways of teaching are also expected to change to meet the new challenges in the way of modern life. Furthermore, today's children are said to belong to the digital era and as such the teaching methods should also reflect these changes in the digital socio-economic environment in which they belong (Prensy, 2001). John Dewey, a renowned educational theorist said "if we teach today's students as we taught yesterday's, we rob them of tomorrow" (cited in Pilgrim, Bledsoe and Reily, 2012, p 16).

Technological advancements have also influenced disciplines, in many ways, for instance, in geography, Geographical Information Systems (GIS), satellite images, and cartography have changed how we do Geography in particular. Collection of

weather data which is essential for early warning systems has evolved so fast such that it's now easier to report weather accurately within a short period of time. Satellites are located in almost every part possible to collect and report data on what is happening on the earth's surface with a high degree of accuracy. Olson (1997, p 571) argues that "printing, photography, aircraft, satellites, and plastics have all major influences on the process of map making...and geographic information". The use of geographical position systems (GPS) is no longer the preserve of the few developed countries because of technological improvements that have lowered the costs and ensured accessibility and affordability to more people.

The technological advancements mentioned above and digital methods of collecting geographical data such as remote sensing, mapping, and satellite images have necessitated engagement with various forms of digital technology when teaching and learning the subject content. For example, the use of satellite images of weather systems in the digital format in which that information was obtained could assist a teacher in explaining weather systems. The nature of the subject and the way data is collected demands that concepts should be taught using various ICT tools such as videos, images, simulations and pictures.

The use of digital technology in geographical data gathering, as well as the Geography

Curriculum and Policy Statement (CAPS) document's (Geography CAPS The FET Subject Policy Document, (Department of Education, 2012, p. 5-8) emphasis on the use of ICT in education has placed a huge demand on Geography teachers to use ICT

in the teaching of geography. It calls for the geography teachers to be at the forefront in promoting the use of new technologies which even saw the introduction of the new section in the Geography syllabus called Geographical Information Systems (GIS) (Geography FET CAPS document, 2012, p. 8). Furthermore, the White Paper on eLearning (2004, p, 13) demands that ICT should be integrated into the teaching and learning in the classroom. In Geography, in particular, it is assumed that the geographical concepts can be taught better with the good use of digital media to help learners understand abstract concepts. According to studies cited by Yadav (2013) learners perform better in geography where multimedia has been used hence the need for teachers to integrate ICT in the teaching of geography. However, Clark (1983) believes that technology is not the panacea to all teaching problems. He argues that it is the teacher's pedagogy that makes the difference in the classroom rather than the multiplicity of multimedia in the classroom. But another author Kozma (1991) insists that good pedagogy is enhanced by the planned and effective use of various forms of digital technology available to the teacher.

Rice and Wilson (1999) also concurred that the use of multimedia improved results in geography and that both the teacher and the students are actively involved in the construction of knowledge. They go on to emphasize the central role played by the teacher's pedagogy and they agree with Clark (1994) that it is not technology alone that makes a difference but the way the teacher engage that technology in teaching to simplify concepts. While technology plays a role in the teaching and learning process, it is the teacher's pedagogical value that actually makes a great difference. The

emphasis is not only on technology making the difference but the way that technology is used to help the learning and teaching process.

The teacher is central to the effective use of ICT in geography, since the teacher should have the skills, knowledge and willingness to integrate ICT in their teaching. Further, the teacher has to determine the relevance and pedagogical value of the ICT tool to be used (Rice and Wilson, 1999). Even with the use of digital technologies, the choices made by teachers regarding which ICTs are to be used, and how to use them will determine to a large degree the success of the lesson; poorly planned and chosen technological tools may derail the whole lesson.

Building on Rice and Wilson's (1999) discussion, this study will investigate the ways in which geography teachers in Johannesburg east integrate ICT in the teaching of geography, and the manner in which their integration of ICT's impacts on their planning and pedagogical practice in their classroom. It is a central assumption in this study that the teacher's pedagogical practices are important in integrating ICT in the teaching of geography. ICTs just brought in classroom like what the Gauteng MEC Panyaza Lesufi (2015) seem to suggest, will not deliver the expected results without effective planning and integration from the teacher.

1.2 Aim

The aim of this study is to explore and describe to what extent Geography teachers integrate ICTs in the teaching of Geography in Johannesburg East schools. Therefore, the objectives of the study are

- To find out which ICTs are available to teachers and to what extent do they use them.

- To observe the frequency at which teachers use ICTs in the teaching of Geography in the classroom.
- To identify challenges and solutions faced by teachers in ICT integration and methods of dealing with challenges faced.
- To assess to what extent ICTs influence the teacher's planning in preparation for the classroom lessons.
- To see how the use of ICTs influence the teacher's pedagogy in the classroom.
- To find out whether the use of ICTs improve the pass rate in the classroom.

1.3 Research questions

This study is going to be guided by the main research question and sub-questions below.

1.3.1 Main Research Question

In what ways are geography teachers in Johannesburg East integrating ICTs in the teaching of geography in the classroom to improve learner involvement?

1.3.2 Research Sub-questions

- (a) What ICTs are the teachers using to ensure learner participation?
- (b) How does the use of ICTs influence the teachers' planning for the learning of geography?
- (c) How does the use of ICTs affect the geography teacher's pedagogical practice in the classroom for effective learner participation?
- (d) Do ICTs really improve the learner pass rate?

(e) In what ways are teachers using ICTs in promoting knowledge construction by the learners.

1.4 Significance of the study

The debates on the integration of ITC in the classroom, as well as the South African government's drive towards ICT integration, as well as the use of ICT in gathering geographical data have motivated my study. Furthermore, the accelerated placement of computers into schools without much regard for teachers who are expected to use them in teaching and learning has also greatly encouraged me to undertake this research project. It is this seemingly blind value ascribed to of the use of ICTs as teaching tools that has triggered my interest to investigate to what extent are geography teachers integrating ICT in their teaching of geography, and how their teaching practices have or have not changed as a result.

This study will contribute to an understanding of how ICTs can be integrated in the teaching of Geography. The findings are likely to help Geography teachers to re-think their methodology in the teaching of geography in light of the abundance and availability of ICT in both the schools and the broader community.

The study is particularly significant for the geography teachers in Johannesburg East because it will reveal how teachers from that district integrate ICT in the teaching of geography. It is anticipated that the study will showcase some good practices to help geography teachers come up with strategies that will enhance teacher efficiency in the use of ICT in their teaching, as well as a critical reflection on poor integration of ICTs.

Furthermore, the study will provide some meaningful information about issues that need urgent attention in the implementation of ICT in education. School administrators and geography subject heads of departments (HODs) will have insight into what technologies are needed to improve the quality of teaching in the geography classroom. This may contribute to alleviating the problem of wasteful expenditure where irrelevant technologies are ordered for the sake of buying without taking into account the pedagogical value of the digital items needed for effective instruction. Knowledge gained from this research may also help decision makers in schools to make meaningful decisions as to what ICTs to invest in. Currently, a lot of digital materials are provided by Matthew Goniwe School of Leadership but some are gathering dust in schools because some teachers don't know how to integrate it in their teaching. Finally, the study will also challenge other practising teachers to do

more research which will contribute to the wealth of ideas in ICT education in the teaching of geography.

1.5 Conceptual framework

The theories of learning will inform the researcher in which ways ICTs can be integrated in the teaching of Geography. Richard (2015, p.1) defines learning theories as “conceptual frameworks describing how information is absorbed, processed and retained during learning.” The way information or knowledge is acquired and stored in the brain has given rise to various theories that emphasise one aspect of the process of cognition over the other processes. Learning theories act as a lens through which one sees an educator interacting with students in the process of learning. These lenses enable researchers to interpret how a teacher practices as a professional in the process of learning.

The constructivist approach to teaching geography formed the conceptual framework of this research. This approach places the student engagement with the material being learnt in the centre of the learning process. As such, the efficacy of the teacher’s pedagogy is measured or evaluated according to the extent to which learners are engaged in the learning process and are therefore able to understand the subject matter (Richard, 2015). In the case of Geography, learners need to be actively involved in the learning process as opposed to the traditional lecture method where learners are just passive expecting the teacher to spoon feed them with knowledge. Constructivism is grounded in Lev Vygotsky’s (1986) theory of social constructivism,

in which he argues that the role of the teacher is to help the learner acquire knowledge and skills which it would be difficult for the learner to acquire without the help of teacher.

According to Cole (1992) constructivism requires a teacher who acts as a facilitator “who’s main function is to help students become active participants in their learning and make meaningful connections between prior knowledge, new knowledge, and the process involved in learning” (Rice and Wilson, 1999, p. 29). In Geography it is assumed that digital technology support constructivist learning through student engagement and collaboration.

Part of the learning process requires “objectification” of knowledge. Objectifying knowledge involves making abstract concepts concrete so that it is easier for the learner to understand what is being taught. For example, digital illustrations used in the Geography classroom appear closer to reality and the teacher uses this to help learners learn better. Manovitch (2011. p.34) while cautioning against passive consumption of technology without active learning, argues that digital technology “objectifies” concepts and that it is the teacher’s skill that ensures the objectification of reality through the multimedia hence the importance of the teachers’ skills in using ICTs. Although some learners still may find it difficult to comprehend the concepts even with digital examples, the teacher’s teaching skills should also cater for such gaps that may occur in the learning process when using ICTs. For this collaboration to happen the teacher plays a central role and is key to guiding learners through constructive learning.

Various tools are now available that aid constructivist learning, e.g. simulation games, videos, web surfing, internet, social networks, online tasks, etc. Yadav (2013, p.3) went on to say that when using multimedia “learners can be provided sufficient motivation to learn with sustained attention and interest and active involvement in task of learning’. The way the teacher integrates technology plays an important role in whether learners will benefit or not. Though the use of multimedia, learning becomes a form of play and Geography becomes real, interesting, enjoyable and meaningful and both the teacher and the learner are involved in the creation of knowledge.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Chapter 2 provides a review of relevant literature on the integration of ICT in the teaching of Geography. The main question that this literature review addresses how do geography teachers integrate ICT in their pedagogy that help improve the quality of learning. The very nature of Geography teaching requires a lot of audio-visual learning aids and this chapter interests itself more into seeing how Geography teachers try to integrate ICTs in place instead of traditional audio-visual learning aids of the '70s and '80s in the teaching of Geography.

The geography teacher is expected to bring practical examples, provide audio-visual materials, and very important, close the gap between the learner knowledge of the world and the examples expected in class. Some concepts in Geography are so abstract and beyond the cognition of many learners and this calls for a sensitive teacher who will make these difficult concepts simpler by bringing teaching and learning aids that simulate reality. According to Van de Schee (2003) it is important that audio-visual learning aids are part and parcel of the geography lesson and that it is the duty of the teacher to use his/her pedagogical skills to provide these learning aids.

2.2 What is ICT in education?

According to Rouse (2007, p. 1) ICT is seen as

an umbrella term that includes any communication device or application, encompassing radio, TV, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as video conferencing and distance learning.

Rouse's definition highlights the three aspects of ICT, namely: information, technology, and communication technology. These three parts of ICT are intertwined and touches all aspects of technology that can be used in the geography classroom. ICT therefore includes both the technological hardware and the skills needed to operate without demeaning the environment in which it is used. Emphasizing one at the expense of others is untenable because like a three legged pot one cannot stand independent of others. This has been one of the challenges particularly in developing countries where the provision of computers is seen as an end in itself and not as a means to an end as if the computers are going to operate themselves.

According to the South African Department of Education (2003, p. 8) ICT can be defined as

a combination of networks, hardware and software as well as the means of communication, collaboration and engagement that enables the processing, management and exchange of data, as well as information and knowledge.

The Department of Education (2003, p. 8) goes on to give examples of essential parts that make up ICT. Hardware includes equipment such as computers, laptops, DCs, DVDs, scanner, digital cameras and interactive whiteboards, while software includes operating systems, stored or loaded into the equipment to perform certain tasks. By media is meant the materials that contain data such as DVD, CD, hard disks, USB, flash drives, and SD memory cards. Lastly, the services are a combination of hardware, software and people that enable users to do more through the use of internet and other web-based activities.

Kennewell (2004, p. 4) goes on even to include mobile phones, calculators and tablets as part of ICT. He goes further to highlight that these gadgets have a massive power

and storage capacity to store data compared to their size through the use of digital technology. Kenenwell (2004, p. 6) concludes by giving a comprehensive and full lot of what comprises ICT resources in education. This list includes: computers, Calculator, CAD (computer assisted design, DVD, CD, TV, Radios, Data projectors, Database, Printing, Digital video camera, Digital camera, Laptops, Cell phones, DVD players, Play stations, VLE (Virtual Learning Environment), Video games, Graphic organiser, Digital encyclopaedia, Message texting, E-commerce, E-commerce, Email, Internet, Intranet, GPS (Global Position System), PDA (Personal Data Assistant) and World Wide Web (WWW). Despite different definitions one could ascribe to these concepts, they together and collectively define ICTs in education.

Although the list above seem exhaustive, modern technology has introduced some more technological devices and methodologies never experienced or seen before. Some of them are newer versions of the same gadgets listed above, for instance smart phones, phablets, tablets, iPods and iPads. Furthermore, the analogue TVs, analogue radio and VCR are seemingly making way for new and advanced technological devices and new digital modern ways of doing things. It should also be noted that the speed of the digitalizing that the 21st century has seen has rendered many gadgets obsolete. In fact, the popularity and advancements of tablets and smart phones have rendered computers archaic especially with teenagers who spend most of their time on cell phones than on computers. Most smart phones can do and even do better some of the main core functions of the computer hence a shift into what comprise and what doesn't comprise computers.

Lastly, the definition of Overhead Projectors (OHP) has also drawn a lot of debate, a debate which this paper cannot be drawn to. But for the purposes of this research,

OHPs and together with the chalk and duster will not be considered part of the ICTs in education despite their wide usage.

2.3 ICTs in education and theories of Learning: Constructivism

Constructivism rests on the premise that in the process of learning, the learner leans heavily on his/her interaction and dynamic response to the world. According to Davis, Sumara and Kapler (2000, p. 65) constructivist forms of learning are understood as “a process of maintaining an adequate fit with one’s ever changing circumstances as opposed to assembling an internal model of an external world”. The ability to shift thinking in response to the environment puts the learner in the centre of the learning process and learning is no longer seen as taking or absorbing things but as a process of adaptation with one’s changing circumstances. This shift in the teaching of Geography will see a teacher using technology to empower learners to be involved in knowledge creation rather than being absorbers of the knowledge given by the teacher. The integration of ICT in geography lessons should be imbedded in the teacher’s planning and execution of the lesson taking into account the learner’s cultural and contextual factors.

Davis et al (2000, p. 67) highlighted that cognition is “a collective, embedded in, enabled by, and constrained by the social phenomenon of language caught up in layers of history and tradition”. This view is also promoted by Vygotsky (1934) who dedicated a whole book to the central role of speech and language as provided by an individual’s social background and environment. Vygotsky (1934, p.284) wrote that “thinking and speech are key to understanding the nature of human consciousness”. This emphasizes the special role played by social history and tradition in

constructivism. Cognition extends to where learners are involved in small groups in the creation of knowledge and understanding. In constructivist methods of teaching, learners work in groups engaging with learning materials through the assistance of the teacher to build understanding and draw shared conclusions.

ITC tools become handy in the constructivist approach to teaching by providing learners with materials that stimulate their thinking faculties. Critical thinking is at the centre of constructivist approach to the teaching of Geography. (Cooper, 1983, p. 10) The use of ICTs will promote this discovery method of teaching depending on how the teacher engages the learners with the technology available. Simulation games have also been used to force the learners to think out the answer than just waiting to be spoon-fed by the teacher. It should be noted that ICTs on their own do not produce miracles and the role of the teacher cannot be overemphasized if learners are to reap maximum benefits from ICTs. Glorifying ICTs as an end in themselves leaving behind the special role of the teacher can be suicidal.

Cooper (1993, p. 12) argues that a “relationship exists between instructional theory and its dependent technologies and is suggested that implementation of designed instruction is grounded in theory”. Geography is a subject that will benefit from the constructivist approach to learning which calls for active and meaningful learner participation, ICT, therefore may help to achieve this approach.

In this literature review I would like to stress that the mere presence of ICTs will not guarantee what constructivist approaches to learning are. Cooper (1993) also

mentions that even in behaviourism and cognitivism, technology has been used extensively especially in Skinner's programmed instruction (PI). But Golub (1983) criticises the use of computers in a behaviourist manner of behaviour modelling because the learner is turned into a 'passive bystander' (Cooper, 1983 p. 13). Golub's point is critical in this study because it is not only the availability of technology in the classroom but how Geography teachers integrate it in their teaching of the subject. Lamos (cited in Cooper, 1991, p.14) has highlighted the use of computer assisted instruction (CAI) as promoting individual learning and long-term memory but he still emphasises the role of the teacher in making sure that the learners benefit. This cognitive approach saw an improved use of technology to promote thinking rather than to model learners. As a result, many computer programmes were developed that encouraged the stimulation of the brain, e.g. computer-managed instruction (CMI) that has been used widely in the teaching of Geography in New Zealand.

The cognitivist approach to using computers in teaching was also criticized because it did not provide deep and authentic learning. Borne (1990) cited in Cooper (1993, p. 16) accused this approach as being rather too 'technocentric' and a superficial way of learning. Lack of satisfaction about behavioural and cognitivist lens of using ICT, gave rise to constructivism which gave more emphasis on how the learners engaged with ICT to create knowledge. The role of the teacher still remained critical because the teacher decides and provides which ICTs are to be made available for the learners.

Constructivism places a lot of emphasis on the social environment and the cultural context in which the learner is found. The shift from cognitivism to constructivism saw a significant expansion of the dimensions of the learning environment setting "where

the limits are expressed in terms of the desire and goals of the learner and not the designs of the instructor” (Cooper, 1993, p. 18). This is important to this study because the contextual factors will determine the way the teacher integrates ICTs in the teaching of Geography in the classroom. It should also be understood that constructivism as a theory can be better understood in conjunction with other theories such as behaviourism and cognitivism. Laurillard (2012, p.51) suggests that each theorist focus more on a particular aspect of learning, but the idea of a “synergy in our understanding of learning can succeed if we treat the contrasting theories as complimentary rather than oppositional, where each offer a different kind of insight into what is to learn”. In the classroom, this synergy of various contrasting theories has a great impact on how teachers integrate ICTs in the classroom. While constructivism is the main conceptual framework in this study, I’m also aware that other theories of learning can also help understand how teachers integrate ICTs in the teaching of Geography in the classroom.

The teacher’s role using ICT is to what Vygotsky (1978) called scaffolding the learners to higher levels of cognitive processes which a learner will struggle to reach on his/her own. The concept of the Zone of Proximal Development (ZPD) puts the teacher in a special position in the learning process. The ZPD is defined as “the distance between a child’s actual development level as determined by independent problem solving and the higher level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (Vygotsky (1978) cited in Wiegand, 2003, p. 235). Wiegand (2003) puts the teacher in a special position in the learning process and makes the role played by the teacher to be indispensable in learning. In fact, Applefield et al (2000) actually caution on the dangers of what they

dubbed the myths of constructivism. These include the myths that there is no focus or clear goals on what is to be learnt. Another myth that teachers need to guard against include that learners are left alone to do as they want without the teacher's interference and that there is an absence of structure and that teachers' explanation is less important. The teacher provides, simplifies, explores, decides and clarifies which technologies can be and should be used in the geography classroom and this forms part of the teacher's central job of preparation and planning for the lesson. This removes the notion that ICT on its own can make a difference in the teaching and learning process but it is how the teacher integrates ICT in the teaching of geography that makes the difference.

In fact, Laurillard (2002) argues that knowledge construction happens when the teacher uses ICTs to enhance teacher-learner interaction. She actually quotes John Derry who wrote that "effective teachers must know how to get students actively engaged in learning activities that appropriate for the desired outcomes" (Laurillard, 2012, p. 45). In conclusion, ICTs can play a special role in the teaching approach that is learner-centred and constructivist depending on how the teacher have used them to engage learners. The role of the teacher is to act as a midwife in the production and creation of knowledge by integrating the relevant and appropriate technologies in teaching. The teachers' activities will determine to a large extent how successful ICTs are in promoting the learning of Geography in the classroom. This puts the teacher's pedagogy in the centre of effective and efficient use of ICTs to promote learning.

2.4 ICT in OBE and CAPS

The introduction of Outcomes Based Education (OBE) and Curriculum and Assessment Policy Statement (CAPS) with emphasis on child-centred approach to teaching and learning necessitated a paradigm shift in the teaching of geography. This saw a move from the traditional approaches of teaching that were teacher-centred to a more learner centred approach where discovery learning, problem solving and critical thinking were the main focus of the syllabus (National Curriculum Statement grades 10-12 (general), Geography, 2003, p.2). The National Curriculum Statement (NCS) (2003, p. 2) stated that the aim of OBE was to encourage “a learner-centred and activity-based approach to education”. While this may sound good it is still to be investigated to what extent are Geography teachers implementing this promising approach. From the NCS document one could conclude that the success of the new curriculum hinged on the envisaged teacher who would be able to move from a traditional teacher-centred approach to learning to a learner-centred approach where the learner became the centre of teaching and learning.

Not only was there to be a change in the way of viewing a teacher, but also in the way the new teacher was to teach. For Geography the key to teaching and learning methodology was to “learn by doing, as they engage in fieldwork and access data and information from various sources” (NCS, geography, 2003, p.12). The emphasis on learning by doing and for learners to engage with various sources including fieldwork was rooted in constructivist theories. The fact that learners were to access data through the internet instead of relying on the teacher and the textbook for information made ICTs to be indispensable for an aspiring Geography student. The teaching of Geography was to be thematic, systematic and issues-based thereby putting ICT in

the centre of the envisaged pedagogy. The research assignments for grades 10 to 12 which were heavily weighted in the final school based assessment tasks (SBAs) forced many learners to use digital tools of one form or another ranging from printers, internet, computers, laptops, smart phones, and so on. The role of the teacher in guiding learners to go to the right place in the internet made the ICT skills of the teacher to be essential in the integration of ICT in teaching and learning of Geography. The Department of Education also sent many teachers to various computer short-term courses so as to enable to function in a computer based environment

To achieve the learning outcomes proposed in the NCS curriculum, the envisaged constructivist teacher was to ensure that ICT was to be used as a tool to facilitate critical thinking and accommodate the new forms of learning that had a global flavour. In the OBE approach to learning, the teacher's role was to facilitate learning while the classroom became a workstation for ICT supported collaborative learning with the learners doing most of the work. According to Van der Westhuizen et al (2012, p. 190), the OBE curriculum was based on "learner-centred teaching approach based on the social constructivist theory". They went onto highlight that a "learner centred teaching approach of OBE is viable in an ICT learning environment" (Van der Westhuizen et al, 2012, p.190).

Even when the CAPS syllabus was introduced in 2012, it maintained the same OBE learner-centred teaching approach in geography. The CAPS document actually stated that its aim was to "promote the use of new technologies, such as information communication technology (ICT) and geographical information system (GIS) (CAPS, Geography, 2012, p.11). Thus collaborative learning was put in the centre of teaching

and learning. Like the NSC before it, the CAPS document also emphasized the central role played by critical thinking and active learner participation in the learning process. This approach called for the teacher to realign the teaching of Geography with a constructivist learner centred approach paradigm.

2.5 Pedagogical value of ICT in geography

I have established that the way the teacher engages with the learners using ICTs is crucial if the ICT's are to make any difference in learning. Researches carried out by Sharpe (2000), Van de Schee (2003), Agnew and Elton (1998) cited in Van de Westhuizen et al (2012, p.4) also found that "the interactive, user-centred and open structure of new ICTs, particularly the internet ... are ideal for the creation of constructivist learning environment". Van de Schee (2003) actually concluded that traditional lecture methods in geography must be replaced by learner-centred, collaborative, and critical thinking learning.

Van de Schee (2003) is emphatic to demand that the integration of ICT in geography calls for a total change in the way of teaching and learning. This argument is reinforced by Sharp (2000) who has asserted that the use of ICT in geography planning has necessitated a shift from a behaviourist to a constructivist approach to teaching.

Because of this paradigm shift, Gillespie (1998) (cited in Van der Westhuizen, 201, p. 192) found it necessary to produce a table that shows a shift from traditional learning to a new paradigm in geography teaching.

Traditional approaches to instruction	The new paradigm
1. Teacher oriented didactic teaching	1. Learner-centred student exploration
2. Short blocks of instruction on a single subject	2. Extended blocks of multi-disciplinary instruction.
3. Passive or one-way modes of instruction	3. Active and interactive modes of instruction
4. Individual, competitive work	4. Collaborative, cooperative work
5. Educator as a knowledge dispenser	5. Educator as a facilitator or guide
6. Ability grouping	6. Heterogeneous grouping
7. Assessment of knowledge, specific skills	7. Performance-based assessment.

Table 1: The shift from traditional learning to a new paradigm in geography teaching.

Table 1 above is very important in differentiating between an ICT teacher who is constructivist in approach and a traditional teacher who is a behaviourist. But Van de Schee (2003) cautions that ICT is not everything in geography but a tool to be used by the teacher to achieve stated objectives. He argues that too much ICT may lead to geography being pushed aside and over-concentration on ICTs per se. Van de Schee

(2003) also puts the role of the teacher in the core of learning in organising, directing, providing and choosing the appropriate multimedia to be used.

2.6 Nature of the 21st digital child

It will be interesting to see how teachers interact with these learners who are said to be more exposed to digital technology than before. The basis of the argument is that 'today's students are not the same as those in past; they have been born into a digital age where technology forms an integral part of their lives' (Yong, Gates and Harrison, 2016, p. 46). Today's children consume a lot of digital technology ranging from radios, TV, video games, smart phones, iPad, tablets. Most of the time the students are often on social media such as whatsapp, Facebook, instagram and twitter. A study carried out by the Kaizer Family Foundation in 2010 (cited in Ahuja, 2013, 2) found that teenagers spend an average of 7.5 hours a day consuming digital data in the form of TV, video games, digital music, surfing the web and using mobile devices (such as iPads, iPod, phablets, tablets and smart phones. Prensky (2001) referred to them as 'digital natives', a term that have gained more usage and created a lot of debate around it. Prensky (2001, p. 1) argues that our students have changed radically and that they are no longer the children our education system was designed to teach. He wrote that

Today's students have spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones and all the other toys and tools of the digital age. Today's average college graduate has spent less than 5,000 hours of their lives reading, but over 10,000 hours playing video games (not to mention 20,000 hours watching TV). Computer games, email, the internet, cell phones and instant messaging are parts of their lives (Prensky, 2001, p.1).

Prensky went on to refer to this generation as the 'native speakers' of the digital language of the internet, video games and computers. He referred to those born in the 1980s but have an interest in technology as 'digital immigrants' (Prensky, 2001, p. 2). He concluded that 'our digital immigrant instructors, who speak an outdated language (that of pre-digital age), are struggling to teach a population that speaks an entire new language' (Prensky, 2001, p. 2).

However, Prensky (2001) seems to have not factored in the concept of social class and his arguments would apply more on the developed countries. Yong et al (2016) went on to quote studies carried out in Malaysia to question the evidence of the existence of digital natives. They concluded that in the developing world issues of affordances are still to be addressed especially taking into account lack of computers and internet connections in some parts of the developing countries.

The concept of digital natives will apply more in the developed western world than in South Africa. If ever it is applied to the South African situation, it may apply more to private high fee paying schools and excluding many former model C schools. These are students from families who are far higher in the socio-economic class system. The excitement on technologies per se to the extent of using it wrongly in the classroom is evidence that these township children are far from being described as digital natives. In South Africa there are some areas such as in the Limpopo and Eastern Cape provinces where internet connection is very slow if not non-existent and where computers are still scarce.

Even if we are to call them digital natives or the Google generation or whatever, does this make them more intelligent or smarter than the yester children? Bolstad et al

(2006) are of the opinion that digitalization and its associated marketing and entertainment has contributed little in the ability of young people to think and learn. In fact, they argue that too much technologies and associated marketing and entertainment has negatively affected the young people to mind and the ability to learn. Wallis (2006) went on to quote a picture in an American Magazine the Times showing a young person with hands on the iPad and earphones connected to his ears while a swirl of electronic gadgets orbited his head. The headlines asked the question: ARE KIDS TOO WIRED FOR THEIR OWN.

Fortunately, or unfortunately, these are common scenes in many township schools and streets. Some learners can't even hear cars hooting on the streets or teachers screaming end of break instructions because their ears, eyes and mind are glued to their headphones of their cell phones.

Bolstad et al (2006) have argued that its misinformation held by adults and education officials to hold that digital technologies make young people to be savvier, smarter, and more intelligent. This misinformation has been peddled on numerous occasions in both the print and audio visual media by the MEC for Education Panyaza Lesufi who has pointed out that ICTs are introduced particular to township schools to improve quality of education especially the pass rate. Emphasizing the harmful effects Bolstad et al (2006, p.14) argued that

For every book, magazine cover, or headline that cautions about the risks that digital technologies cause for young people's health, development and education, there is a writer seeking to convey the opposite.

Despite the challenges facing South African learners of working and middle class origins, this study will be very much interested in the ways the Geography teachers in Johannesburg East engages these learners in class using digital technology.

Constructivism calls for learner active participation and this even includes choosing a media that will motivate and inspire them. In her unpublished doctoral thesis Ndlovu (2015) talked about interactive teacher practices as part of constructivism. Ndlovu (2015) defined an interactive approach as one in which both the learner and the teacher could 'navigate and select content at will' (Ndlovu, 2015, p. 31). More so even if the learners are given a chance to select the media for their learning, the role of the teacher in guiding these learners is very important. Teacher's guidance is very important because at times learners may chose digital media that may actually derail effective learning. Furthermore, some digital media may actually be irrelevant for the topic under discussion hence the special role of the teacher in guiding learners on the appropriate and relevant media. Laurillard (2002, p. 110) actually cautions that there is a danger of learners going through resources without reflection or adaptation. That's when the expert knowledge of the teacher comes in to guide learners through the productive process of using interactive media in the teaching of geography. She wrote 'without a clear personal goal, students will tend to iterate through the resources without either reflection or adaptation' (Laurillard, 2002, p.110)

2.7 ICT and the learner

This section of literature review looks at how much learners are exposure to digital gadgets both at school and after school in Johannesburg area relate with the teacher in the classroom. Thiyane (2010, p. 406) argues that whether for right or wrong reasons urban students possess digital devices of one form or another even at school.

Thiyane (2010) has actually cited Gauteng as one of the provinces with the highest number of learners in possession of expensive digital devices like tablets, smart phones and video games. He mentioned that there is a lot of technological efficacy and anxiety because students are just too excited about digital technology to the extent that some of them are even diverted from focusing on their school work. He argued that these winds of change in South African schools demand a teacher who is proactive in using technology to avoid a mismatch in the language used in the classroom and the language used at home. Laurillard (2002) concurred when she wrote that the teacher's guidance is essential to help students to use digital technology in a productive manner.

Van der Schee (2003, p. 209) in particular have argued that ICT opens new frontiers in the teaching and learning of geography particularly when used wisely by the teacher to understand challenging concepts. According to Van der Schee (2003, p. 211), learners' access to rich up- to date information is immediate and this helps the learner to engage with the teacher and the geography subject content on their own on condition that the teacher has directed them to the right sources. On their own, learners may find themselves playing in social media or with video games and even visiting porn sites which are illegal.

In conclusion, this debate has shown that learners in Johannesburg have access to technological gadgets but that the teacher is still needed to guide these learners on how best these technologies can be put into good use. This takes us to the Clark Kozma debate that also argues that technology alone cannot produce better results but that the way the teacher uses these technologies is what makes the difference.

2.8 Kozma - Clark Debate

The work of Clark (1994) deserve special attention in this literature review because of the radical stance he has taken on the role of technology in education. I will refer to his writing as forming the basis of the Kozma- Clark debate. In a nutshell, while Kozma posits that media plays an important role in learning, Clark argues that media does not influence learning or motivation of learners. Quoting researches carried by Lumsdaine (1963), Micklle (1968) and Schraman (1979) Clark (1994, p. 21) concluded that there is no relationship between the students' performance and the use of technology.

Clark (1994, p. 22) went on to make a claim that "there were no learning benefits possible" from the use of various media in teaching and learning. In fact, he argued that the argument on whether media helps learning is a waste of effort and deserves no attention at all. While agreeing that his claims intended to stimulate debate, Clark continued to justify his claims declaring that media are "mere vehicles that deliver instructions but do not influence student achievement any more than the truck that delivers our groceries causes change on our nutrition" (Clark (1983) cited in Clark, 199, p. 22). This claim is thought provoking especially taking into account the convincing argument put forward by Kozma who has found a strong correlation ship between the use of media and student achievement and motivation. Without dismissing Kozma's assertions, some parents have strongly supported Clarke's argument and still believe strongly that yester education was of better quality compared to today's computerised education. They have simple attacked the use of calculators as not producing strong minds like it was before when learners were

subjected to mental gymnastics. The easiness in arriving at the answer using digital shot-cuts are seen as not challenging enough for mental growth in the long run.

While quoting the works of Solomon (1979) and others, Clark agreed that there were elements in some media that influenced learning and the development of “cognitive processes’ (Clark, 1994, p. 22). On this point I agree with Clark (1994), that it is not just media left alone in the classroom but to look for those special attributes in media that promote the expected development of necessary “cognitive processes”. Also needing special mention in Clark’s argument is that the choice of media plays an important role in instruction and that an economic form of media should be chosen as long as it will achieve the expected outcomes.

In his replaceability test, Clark emphasized that media should not be treated as having intrinsic value in itself but that it has instructional value depending on the way it is used. This argument is of great interest in this research project because I wanted to see how teachers integrate ICTs in the teaching of Geography. I also found a lot of interesting points in that there is some media that is more efficient for certain learners, learning goals and tasks than others. It’s not one size fits all but that one has identified appropriate media for a specific set of learners and tasks to be accomplished. He argues that this “allows the discussion and our mental set as theorists, to shift from media attributes as caused in learning to media attributes as caused in the cost - effectiveness of learning” (Clark, 1994, p. 22). This argument I find very essential in understanding the role of media in learning in that media is not an end in itself but a means to an end. If this approach of seeing media as a way of promoting certain

instructional goals, then geography teachers are likely to get it right with the effective and efficient use of media.

Clark (1994) emphasises instructional methods rather than on the variety of media available for the teacher. So according to Clark (1994) the teachers' pedagogy is central to achieving instructional goals than the availability of multiple digital resources that may not even be relevant to the topic under to be taught. He defined an instructional method as "any way to shape information that activates, supplants or compensates for the cognitive processes necessary for achievement or motivation" (Clark, 1994, p. 23). This definition is more of the definition of pedagogy which is more central to Clark's argument because to him it is pedagogy that helps student learn rather than technology. As a result, technology comes in as another way to help instructional methods deliver the content the learner has to know in class.

Clark asserts that instructional method is grounded on sound psychological and social psychological research whereas technology is a product of invention and discovery independent of sound learning theory. This therefore presupposes that in the teacher's planning, the pedagogy should be influenced by learning theory and not by media to be used. The methodology where a teacher looks at the media available and plans the lesson around the media needs to be reassessed because the media controls the teacher and not the way round. Media will come in to help execute the teachers lesson plan instead of the lesson plan being influenced by the media.

The writings and claims made by Clark (1994) have been strongly refuted by Kozma who believes that media has a special role to play instruction. He refuted Clark's claims on the grounds that he did not understand the relationship between learning and media and that failure to do so "may find ourselves on the side-lines of our own game" (Kozma, 1994, p. 7). Kozma (1994) attributes failure to understand the role of media in learning to theories and research grounded in the behavioural theories of learning. Such rooting on behaviourism missed the underlying structure in which media is imbedded in constructivist learning. This Clark's metaphor of the delivery truck is nothing more of stimuli – response approach to learning which is devoid of understanding the underlying structure of cognition.

Kozma (1994, p. 8) makes it clear that learning is not just delivery but an active, constructive, cognitive and social process where both the teacher and the learner are actively and not passively involved through media to influence learning. Knowledge is not "delivered" but created by the interaction between social, cognitive, media and physical environment by both the learner and the teacher in a reciprocal manner using media as some of the resources at their disposal. For instance, Kozma (1994) gives an example of how computers can give and create representations of objects in motion and that students can interact with media through the use of joysticks. He quotes a study that showed that videos have the capability to present complex, dynamic social contexts which help learners to construct and understand complex, rich and dynamic mental models of the geography reality. The mental models created mental structures which are important in cognitive development which become part of the learner's long-term memory.

Kozma makes a powerful claim that computers and videos in the lessons help internalize the content of the subject matter being taught. In other words, the computers and videos are an enhanced form of learning aids necessary for effective pedagogy. In this study I will be interested in seeing how teachers in Johannesburg East engages learners in this regard. While acknowledging Clark's reservations, Kozma (1994, p.16) went on to caution that "it is the selection of the method, not the medium that is of practical importance for learning. In conclusion, Kozma (1994, p.18) strikes a balance between Clark's claims and his when he cautions that we should move away from "do media influence learning"? to "in what ways can we use the capabilities of media to influence learning for particular students, tasks, and situations"? This conclusion is key to understanding the role of media in learning and teaching. I will also concur and conclude by saying that media may not have intrinsic value in itself in teaching but that it is how media is used that makes it valuable to the process of teaching and learning. In constructivism, the media help the learner to participate in a teacher modulated learning environment to understand concepts through the use of critical thinking skills. The classroom setup by the teacher on the way media is used will to a large extent determine the success of the envisaged learning outcomes.

In her unpublished doctoral thesis, Ndlovu (2015) after studying seven South African townships schools, concluded that it is the pedagogy rather than media that matters most in ICT integration. While accepting that ICTs are necessary in teaching as a tool to improve learning, she claimed that the role of the instructional method used by the teacher is still very important in learning. Ndlovu (2015) lamented the glorification of ICTs as if left alone they will improve performance in the classroom. Her argument is

that appropriate ICTs should be used by the teacher to influence learning. A thorough research and planning by the teacher on how ICTs are to be used is very important to achieve stated lesson objectives because poorly planned use of ICTs may create serious problems in the Geography classroom.

Borrowing from the works of Laurillard (2002), Ndlovu also used the concepts of interactive media, adaptive media, narrative media, communicative media and productive media extensively to explain different ways in which teachers engage with media in the classroom. This showed that teachers can use media differently in the classroom and that there is no definitive way of using media.

Ndlovu (2015, p.276) highlighted the need of coherence in the light of prevailing affordances in schools and the applicable policy statements. This will ultimately emerge as a positive balance between expounded practices (education policies) and enacted practices (by teachers). In conclusion Ndlovu (2015, p.292) like Kozma (1994) before her cautioned that as “long as the programme continue to present ICTs as separate entities in the pedagogical ensemble, teachers will continue to under-utilize these powerful technologies to enhance teaching and learning”. So it is very important for Geography teachers to use ICTs in their teaching and use them as part of their pedagogy.

However, drawing closer to the South African classroom the question can still be asked: Do ICTs improve the pass rate? Some researchers such as Macho (2005) and Cuban (2002), Tranwell (2008) and Khine and Fisher (2003) have found no evidence that ICTs improve student learning. Macho (2006) in his study carried out in New Zealand find out that its parental involvement than the availability of ICTs at home that

makes the difference. He mentioned that there is a strong correlation ship between students' achievement and the qualifications held by their parents.

Some researchers see the buying of expensive computers, laptops, tablets and smartboards as wasteful expenditure by the governments in the developing world. For instance, Tranwell (2008) has cautioned that governments have put to waste billions of dollars buying computers and software with minimal returns on education. He argued that these digital gadgets are a status symbol rather than effective and necessary tools for learning. This idea to look “cool” and belong is fuelled by advertisements that play on the parents' fears by showing and proposing that their digital technologies that will solve learner problems. Digital expos have mushroomed all over the country targeting fragile and desperate parents and politicians to buy their programmes, hardware and software to supposedly improve the pass rate.

Cuban (2002) also saw ICTs as a waste of limited financial resources for already struggling developing countries. He posited that there was no conclusive evidence that show gains in academic achievement as a result of introduction of ICTs. Instead he concluded that “computers have changed classroom much, and they have hardly changed pedagogy”. In fact, ICTs have just reinforced the old pedagogies because same teachers have continued to teacher the same way even in a classroom full of ICTs. Most probably the change of old teachers and replacing them with new teachers with ICT pedagogy could help change the situation. Cuban (2002, p.1) concurred with Tranwell (2008) that

There is no clear, commanding body of evidence that sustained use of multimedia machines, word processing, spreadsheets and other popular applications have any impact on academic achievement.

2.9 TPACK Model

Lastly, this literature review will now look at the much discussed Technological Pedagogical and Content Knowledge Model (TPACK). This literature review will be incomplete without looking at the TPACK model especially Shulman (1986)'s contribution on the expected role of the teacher. The way the teacher engages learners in the classroom will exhibit some main elements of the TPACK model. This model is reviewed because of its important contribution in the integration of ICT in the teaching of Geography. Based on the works of Koehler and Mishra (2008) and also borrowing from Shulman (1986), the TPACK is a pedagogical framework to understand the different but related kinds of knowledge needed by the teacher for the effective and efficient pedagogical practice in a technologically enhanced learning environment. It argues that the introduction and effective use of ICT in the geography classroom, requires teacher's understanding and negotiating the relationships between these three major components, namely, pedagogy, technology, and content.

In order to integrate ICT in the geography classroom effectively, there has to be technological knowledge, content knowledge and pedagogical knowledge. According to Mishra and Koehler (2006, p.1029) the TPACK model is "the basis of good teaching with technology and requires an understanding of the representation of concepts using technologies, pedagogical techniques that utilize technologies in a constructive way to teach content, knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems students face".

The models below summarises the key concepts of the TPACK model.

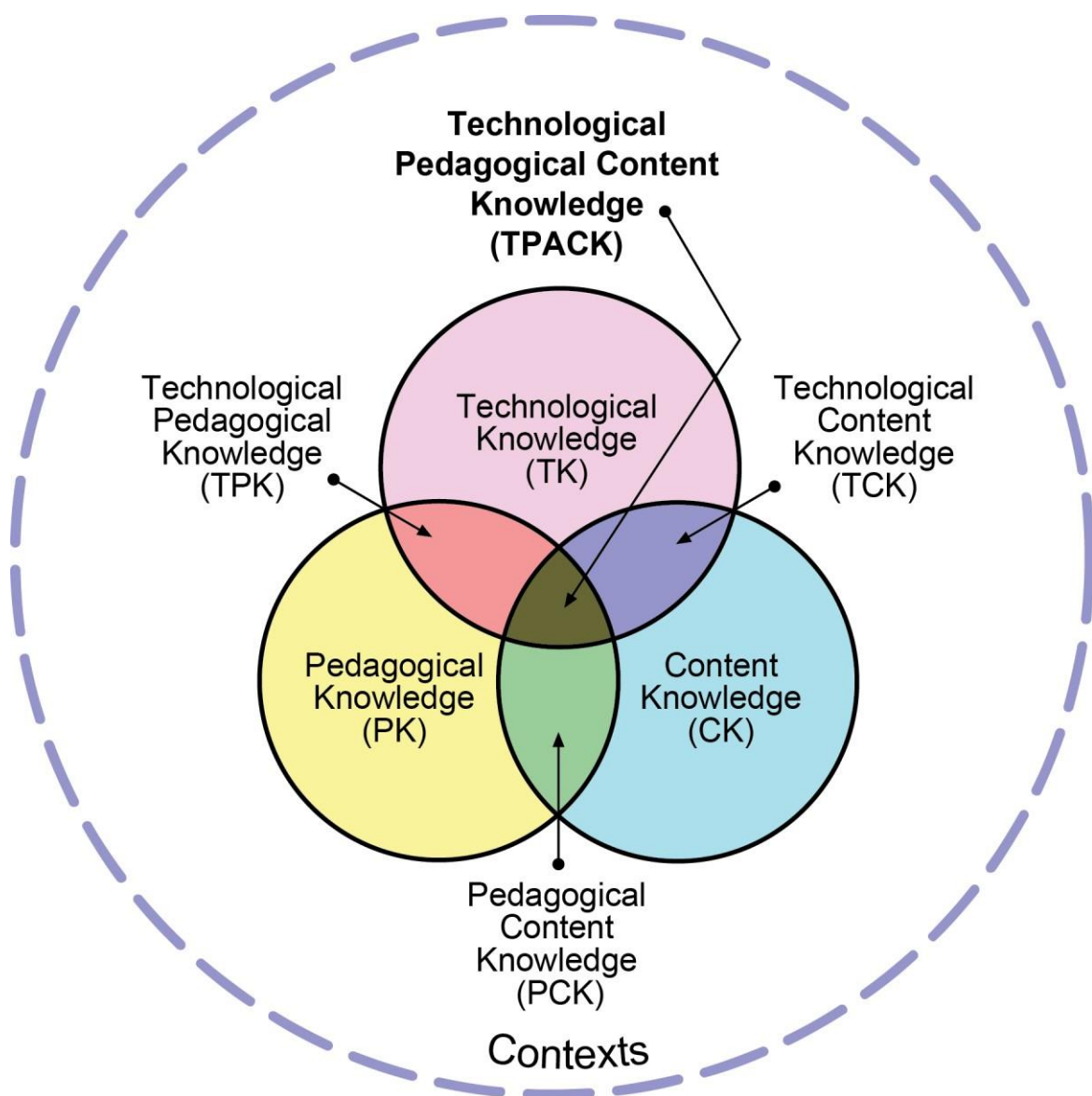
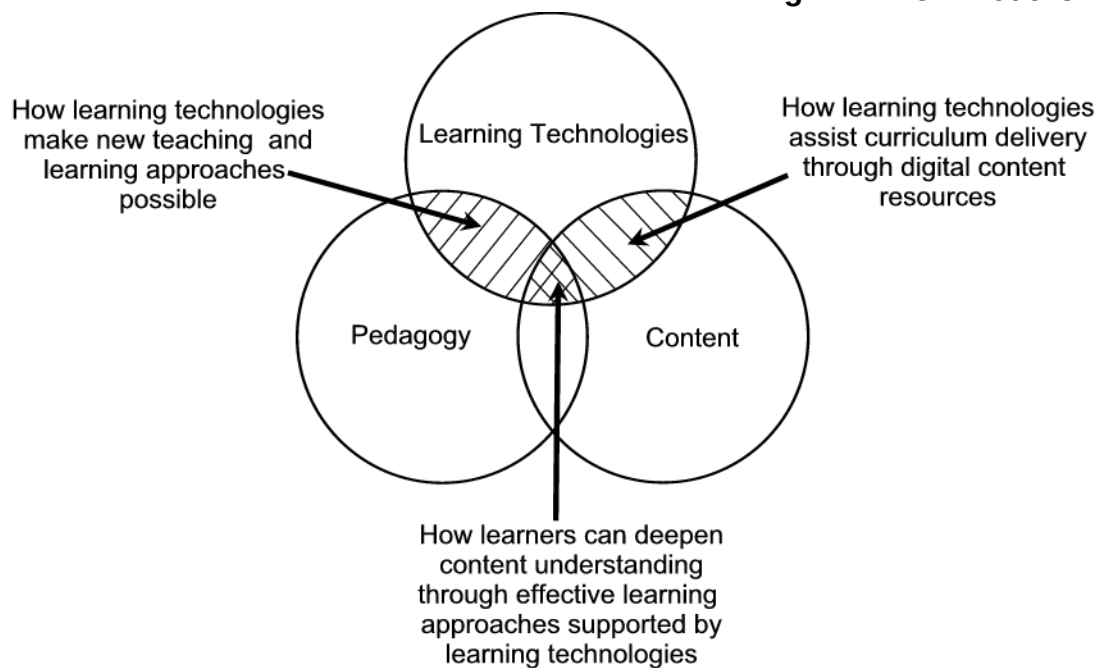


Fig 1. TPACK Model.

Fig.2. TPACK model simplified.



The works of Shulman (1987) greatly influenced the TPACK model when he first introduced the concept of pedagogical content knowledge (PCK). Shulman (2004) has emphasised the pivotal role played by the teacher content knowledge and teacher pedagogical knowledge in effective teaching. Shulman (2004, p.201) defined content knowledge as “the amount of and organisation of knowledge per se in the mind of the teacher”. The geography teacher with more content knowledge is able to go beyond geography knowledge and facts and understands the structure of the subject matter. Over and above content knowledge, the teacher should also have the pedagogical knowledge, i.e., the ability to teach what they know. He therefore defined pedagogical

content knowledge as “an understanding of what makes the learning of specific topics easy or difficult: the conceptions and preconceptions that students of different backgrounds bring with them to the learning ...” (Shulman, 2004, p.203). Building from Shulman (1987) pedagogical content knowledge (PCK), Mishra and Koehler then developed their TPACK model which went on further to include technological content knowledge (TCK) to enhance the teacher’s capabilities in the integration of technology in the classroom.

This is actual the backbone of the ability of the teacher to teach and which is the cornerstone for the effective implementation of ICT in teaching of Geography.

Ndlovu (2015) sees the ability of the teacher to teach being central to the effective implementation of ICTs in the classroom. She argues that ICTs are no remedy to poor pedagogical practices of the teacher and that ICTs will work better if they are integrated into good teaching practices. Ndlovu actually observed a geography teacher teaching using ICT to substantiate her argument.

2.10 Conclusion

In conclusion of this literature review, the contributions of various authorities have been highlighted. It was found that the success of ICTs in the teaching of geography hinges on the teacher who is an expert and a catalyst of learning. Particularly in the Kozma-Clark debate, it was found that technology left alone without the expertise of a teacher will not improve the quality of learning. The position that ICTs will improve the quality of education and pass rates was challenged by various researchers who in fact found no correlation ship between the introduction of ICTs and the quality of education and pass rates. The digital natives’ argument was also dismissed as a myth instead; ICTs

were seen as a distraction to learning because learners find themselves surrounded by too many digital technologies at their disposal. In fact, it is the geography teacher's TPACK that is necessary to ensure maximum benefits from the introduction of ICTs in the classroom. The TPACK model was found to be one of the models that can be used to look at the ways in which Geography teachers integrate ICT in the teaching of Geography in the classroom. Ndlovu (2015, p.292) actually mentions that it is a delusion to think that it is technology that enhances learning but instead the effective use of technology by the teacher in the classroom.

The special role played by ICTs cannot be under-estimated according to the writings of Yadav, Van der Westhuizen and Olson. These authors demonstrated how productive the use of technology could be in the Geography lesson if well integrated. As this study goes on to look into the ways Geography teachers integrate ICTs in the teaching of Geography, Ndlovu (2015, p.292)'s conclusion should be noted that "as long as the programmes continue to present ICTs as separate entities in the pedagogical ensemble, teachers will continue to under-utilize these powerful technologies to enhance teaching and learning".

The following chapter looks at the methodology to be used in this study on how Geography teachers integrate ICTs in their teaching of the subject. In a nutshell this study will use a qualitative approach where both interviews and classroom observations are to be employed.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

In this chapter I have discussed the methodology used in this research project under the following sub-headings: qualitative research design, target population, sampling strategy, research methods, and research instruments and data collection procedures. The purpose of this chapter was to explain the manner in which I investigated the ICT integration in the teaching of geography in selected Johannesburg East schools.

3.2 Qualitative Research Design

This research utilized a qualitative research design. According to Bell (2005) the purpose of a qualitative approach is for the researcher to understand and gain insight into the respondents' perspectives. Ary et. al. (2010, p.22) concur suggesting that qualitative research "focuses on understanding social phenomena from the perspective of the human participants in natural settings". Qualitative research enables human thinking and reasons for doing something to be matched and understood. Various human qualities that may be difficult to quantify can be studied better using the qualitative research method. That is why in order to understand in which ways are Geography educators integrating technology in the classroom, a qualitative research design was appropriate.

3.3 Research Sampling Strategy

Sampling is central in research to narrow the scope of the study and for obtaining authentic results. In this study, I have used purposive sampling. A purposeful sample is defined by MacMillan (1996, p.94) as a sampling strategy whereby the "the researcher selects particular elements from the population that will be representative or informative about the topic". In my research, I purposively selected teachers of FET phase Geography who are required to integrate ICTs in their teaching. These teachers are teaching in Johannesburg East so called 'paperless schools' that have been provided with smartboards and tablets by the Gauteng government Department of Education. The reason why Johannesburg East schools has been chosen is because this is where a number of Pilot schools exist in close proximity to each other which means less traveling from one school to another. Out of the six ICT high schools in Johannesburg East I have used three schools for this research purpose. All these three schools have similar characteristics and are all government funded public schools. Furthermore, comparing schools in the same district resulted in a deeper and thorough study of the issue under investigation.

Thus the target population was Grade 10 -12 Geography teachers who are currently teaching geography at the ICT pilot schools in Johannesburg East. Pilot schools are those schools in Johannesburg East that have been identified by the Gauteng government to be the first to introduce the use of ICTs in teaching and learning. Such schools have been provided with computers, laptops, data projectors, whiteboards, smartboards and all sorts digital gadgets to be used in e-learning in the classrooms by the teachers. Even learners have been provided with tablets as part of the eLearning project. Three schools used in the research were selected because they are part of

the ICT schools provided with smartboards by Gauteng provincial government. One teacher per school was observed and the same teachers who were observed were also interviewed.

3.4 Research Methods

Maxwell (2005) goes on to say that it is important to look at the research questions and the types of data one wants to collect when choosing a research method. In this research I used semi-structured interviews and conduct classroom observations. The reason for using both interviews and observations was to enable triangulation of the results. Triangulation may be defined as “the use of two or more methods of data collection in the study of some aspects of human behavior” (Cohen, Manion, and Morrison, 2007, p. 195). The importance of triangulation lies in its richness to explain more objectively the complex human behavior than when studying from a one point of view. It is further believed that a combination of interviews and observations gave the researcher an insight into the topic under investigation. I felt that the use of interviews alone would not give a complete picture of ICT integration and as such the use of classroom observation was very necessary to get a deeper understanding of the topic under investigation.

3.4.1 Interviews

In this research interviews were held after observations were done. A research interview is defined as “a two-person conversation initiated by the interviewer for the specific purpose of obtaining research relevant information, and focused by him on content specified by research explanation” (Cannell and Khan, 1968 cited in Ary et al, 2010). Cohen, Manion and Morrison (2007, p. 350) see an interview as

an interchange of views between two or more people on a topic of mutual interest, which sees the centrality of human interaction for knowledge production, and emphasizes the social situatedness of research data.

Interviews involve an oral questioning of the respondent so as to obtain information deemed necessary for the research purposes. In my research, interviews have been used to get a deeper insight into the teachers' perspectives and understanding of the process of integrating ICTs in teaching. The kinds of questions asked were open ended, to enable participants to speak freely and to ensure a deep understanding of various ways in which teachers integrate ICTs in the teaching of Geography. This also make provision for issues that emerged that are of concern to the participants that the researcher may not have anticipated.

Advantages of interviews over questionnaires are that they "allow for greater depth than is the case with other methods of data collection" (Ary et al, 2010, p.342). Responses that were not clear were clarified and even interviewees were given a chance to seek clarification before they make their responses. This addressed the problem of answering what is not asked and it reduced the problem of misinterpreting the questions asked.

While interviews are good for obtaining information, the researcher was aware of the likelihood that his or her presence may affect the way respondents respond to research questions. As a result, the researcher was careful not to influence the subjectivity of the responses. The interview setting was conducive to both the interviewer and the

interviewee to avoid unnecessary disturbances that may affect an objective response and put the whole study into disrepute. The interviewees were asked probing questions to enable them to elaborate more on their answers. The interviews were individual based interviews as opposed to group based interviews so as to avoid the influence of group psychology and being influenced by group members.

3.4.2. Classroom observation

Classroom observation is one of the two methods that I used to collect data on how geography teachers in Johannesburg East integrate technology in teaching. Cohen, Manion and Morrison (2007, p.396) posit that the distinctive feature of observation is that “it offers an investigator the opportunity to gather ‘live’ data from naturally occurring social situations”. The researcher enters and understands the situation that is being described in a real and practical way.

The reason I have chosen to do classroom observations as well as interviews was because I wanted to see exactly what is happening in the geography classroom in relation to what teachers will have said in their interviews. The use of both observations and interviews provides a form of triangulation. By triangulating data through observations and interviews I was able to develop a deeper understanding of the way some teachers integrate the use of technology in the teaching of geography in Johannesburg East. Triangulation is important to check validity and for the verification of findings.

Miles and Huberman (1994, p. 10) have argued that data collected through classroom observations has many advantages which include: focus on naturally occurring ordinary events in natural settings and that they have local 'groundedness'. Observations also have the advantage that they are collected in close proximity to specific situations, rather than through the mail or over the phone, and they are also rich and holistic, thereby providing meaningful explanations. Furthermore, observations emphasize people's lived experiences and help to understand "the meanings people place on the events, processes, and structures of their lives" (Cohen, Manion and Morrison, 2007, p. 358).

The fact that classroom observations focus on the natural occurring environment and that they are grounded in actual lived experiences makes it a useful research methodology in this kind of study.

In this research, I used the non-participatory approach to classroom observations. In the non-participatory approach, the observer does not get involved so that the observed is not influenced by the observer so as to avoid emotional involvement by the observer and the observer being part of the observed activity. There is of course potential that my presence might have caused the learners and the teacher to act differently than they usually would behave. I minimised this by sitting quietly in an unobtrusive space so that my presence didn't affect the way they behave naturally. Detailed descriptive notes were taken during the observation, as far as possible without any judgement to provide a basis for a detailed analysis of acquired data. I observed how teachers use various ICTs in the teaching of Geography. No live recording of the observations was made so as to protect the anonymity of the

respondents. Furthermore, the official names of the teachers involved were not revealed and artificial names were used instead.

Cohen, Manion and Morrison (2007, p.396) posited that the distinctive feature of observation is that “it offers an investigator the opportunity to gather ‘live’ data from naturally occurring social situations”. The researcher enters and understands the situation that is being described in a real and practical way.

In this research, I used the non-participatory approach after which the teacher was to respond to interview questions.

3.5. Data Presentation and Analysis

All raw data gathered in the research process needs to be analysed and interpreted.

Data analysis according to Cohen, Manion and Morrison (2007, p.461), involves organizing, accounting for and explaining the data, which means making sense of the data in terms of the participants’ definitions of the situation, noting patterns, themes, categories and regularities.

The data from interviews and observations was transcribed on the same day after each interview and observation has taken place. Thereafter the interview data and observation data was presented and discussed in themes derived from the questionnaires. This form of analysis is known as a “systematic approach to data analysis” (Cohen, Manion & Morrison, 2007, p. 470). The data analysis became the basis of the discussion guided by the research questions proposed.

3.6 Ethical Considerations

When conducting any research there are ethical issues the researcher needs to consider. According to DiCicco-Bloom and Crabtree (2006, p. 319), there are four main ethical issues to consider when conducting interviews, namely: “reducing the risk of unanticipated harm; protecting the interviewee’s information; effectively informing interviewees about the nature of the study, and reducing the risk of exploitation”.

It was the interviewer’s responsibility to ensure that the interviewee is safe at all times and that these unforeseen events are minimized as much as possible. The study was conducted in the school premises to limit any unforeseen events by providing a familiar environment for respondents and ensure that the interviewee is comfortable at all times and that there was minimal disruption to the teachers’ schedule (DiCicco-Bloom & Crabtree, 2006).

The participants were informed of the study and its purposes in advance before the interview sessions commences. They were also informed that they have the right to withdraw from the research study at any time they did not wish to continue. They were also informed that they would not be held liable for withdrawing from the study. Finally, the participants were told that the study was is not for any personal gain or otherwise but that it was for academic purposes only and very importantly, the participants were not to be paid for participating in the study. However, they were anonymously acknowledged in writing for participating in the study. (DiCicco-Bloom & Crabtree, 2006).

Ways of ensuring confidentiality included that the actual names of the schools or educator participants were not be used. They were replaced by pseudonyms such as Alexwood High School, Langa High School and Reavaya High School. Furthermore, the real names of teachers were replaced by Chico, Bula and Zande respectively, so that the information obtained was for writing the research report only and was not be disclosed to anyone for any other purpose or reason. The data will be kept in an encrypted memory stick in a secure office and will be erased after 3- 5 years.

The interviewees were given two informed consent forms, one was a letter asking them to partake in the study and the second asking the interviewees informed consent to be interviewed for validity and reliability purposes during the interview.

In addition, all information shared in the interviews was remain confidential and anonymous. The transcriptions from the questionnaire will be stored in my laptop and flash drive which only the researcher has access to. Under academic conditions, the research supervisor was granted access to analyse the transcripts which are stored by the researcher for safety and security purposes. The participants were informed of all of the information expected.

From the interview questionnaires and classroom observation, research questions were answered thereby giving meaning to the study. I'm confident that these research instruments revealed how teachers integrate technology in the teaching of geography in Johannesburg East. The next chapter will present and discuss data collected from classroom observation.

CHAPTER FOUR: DATA PRESENTATION AND DISCUSSION: OBSERVATIONS

4.1. Introduction

In this chapter, I describe the data gathered from interviews and questionnaires. Keeping in mind the study objectives, I highlight key observations made during the data gathering process. The interview questionnaires and observation notes and interview transcripts are supplied as part of the annexures (see appendix 1). I begin by describing the background of the participants to contextualise the data. I will then highlight key issues that emerged from the data gathering process. I support my observations with reference to the interview transcripts (provided as part of appendix 1). The data will be discussed under themes, which have been developed from the interview questions, namely 1) How and which ICTs do teachers use, 2) Frequency and value of using ICTs, 3) Challenges faced by both teachers and learners when using ICTs, and Necessity and meaning of ICT integration. As part of triangulation, the findings from both interviews and classroom observation are presented side by side to corroborate the findings from either interviews or observations.

4.2. Background of the schools

Reavaya High School

Reavaya high school is one of the schools established in 1994 by the new democratic South African government with over 1400 learners from Grade 8 to Grade 12. Being in the heart of Alexandra Township the school displays typical township characteristics of overcrowding but its well-resourced and has been identified as an ICT pilot school. The school is staffed by qualified teachers who were

all given GDE Proline laptops while each learner has a Huawei tablet. The school was also provided with smartboards and Wi-Fi facilities. Unfortunately, the Wi-Fi is unreliable and cannot be relied upon because most of the time it's down.

Alexwood High School

Alexwood High School is one of the oldest schools in Johannesburg East established in 1960 and is one of the pilot schools in the introduction of ICTs in learning and teaching. Because of its age the school has produced a lot of the current political leadership both at district level and at national level and this has proved an advantage that the school has exploited. As a result, these politicians have fallen on each other to do something for the school as part of their payback to the school. This has also seen Vodacom and MTN offering various e-learning programmes for the school which has actually put the school way ahead of many schools in terms of ICT infrastructure.

Alexwood high school is a township school characterized by learners from poor economic background, overcrowding, high teacher-pupil ratio, and very rich in resources through donations and government support. More so, the school was the first to have all learners getting Samsung tablets while all the teachers were given GDE Proline laptops. The school has excellent Wi-Fi that is extended to all learners. In terms of infrastructure, the school has a state of the art ICTs which included smartboards, video cameras and printers all connected to teacher through Wi-Fi connectivity. The school has a total enrolment of just over 1700 learners from Grade 8 to Grade 12 and all learners have tablets from grade 8 to 12.

Langa High School

Langa High School is also a relative new school built in the 1991 compared to Alexwood high school. The school has a total enrolment of over 1660 learners. The school experiences overcrowding in classes and this has also put a strain on school facilities with windows and doors broken. Iron security doors have been installed in some classrooms where smartboards have been installed. Since the school has been declared a full ICT school, all the teachers have GDE laptops and all learners

also have GDE provided tablets. Unlike Alexwood High School, smartboards are only installed in grade 10 to 12 classes only and grades 8 and 9 don't have smartboards.

Community policing has also been roped in to secure school infrastructure against vandalism more often from learners themselves and other unruly community elements. Despite all these efforts the school has suffered a break in and even lost a smartboard in 2016. The learners have vandalized windows, doors, walls and even floors. The classroom has got potholes and one has to walk carefully to avoid injury in potholes. This is the irony of the school with two extremes of poverty and affluence.

4.3. Background of Respondents

Participant A: Mr. Chico

Mr. Chico is a well experienced teacher who has been teaching grade 10 to 12 Geography for more than 20 years at Reavaya High School. Mr. Chico is currently a senior Geography Marker Matric examinations, and has recently been promoted HOD (Geography) at his school. Mr. Chico confesses that he normally hates using group work because learners get too excited when they are doing group work (Mr. Chico, Q. 5., Line 4). This indicates that he uses more of a lecture method, and his utterances leave no room for a constructivist approach to teaching which is child centred and allows learners active participation to their learning. Despite lack of computer training in his own teacher education he is dedicated to the teaching of Geography using ICTs. He actually confessed that many of his learners were more technically knowledgeable than him and that he uses their skills in class when he wants to use ITCs (Mr. Chico, Q.14, Line 1).

Participant B: Ms. Zande

Ms. Zande is also a senior Geography teacher of 22 years of experience at Alexwood High School who says she is passionate about ICTs. Although ICTs were not part of her teacher training she said that she is trying to embrace the use of

computers in teaching. In her own words she mentioned that “when teaching topic that need a lot of illustrations ...I find that audio-visual illustrations give learners a better understanding of rather abstract concepts”. (Ms. Zande, Q. 8, Line 1). Despite lack of computer knowledge her flair to use ICTs in her Geography lessons made her an ideal teacher to interview and observe in class. She actually confessed that many of her learners were more technically advanced than her and that she uses their skills in class especially the way they navigate the smartboard. (Mrs. Zande Q.14, Line 2).

Participant C: Ms. Bula

Ms. Bula is a junior Geography teacher at Langa High School with 4 years' experience. She is energetic and was trained when computers were part of the teacher education curriculum. She claims to be enjoying teaching and that she has little disciplinary problems. (Ms. Bula, Q. 4, Line 5). Unlike Chico, Bula argues that group work is an active engagement teaching method in class when using ICTs because learners are given the chance to engage each other with the resources to gain knowledge. (Ms. Bula, Q.8, Line 2).

4.4. Lesson observation and interview process

I observed one one-hour lesson per teacher followed by semi-structured interviews, which were done immediately after each lesson observed. This was done strategically so that the lesson under discussion was fresh in mind. All the observations and interviews were done with a Grade 11 class on the topic Structural Landforms. The teachers were told in advance that they will be observed and interviewed on the same date so that they could prepare. Permission was also obtained from the Principals of the schools to substitute the teachers to give an hour long time for the interviews with minimum disruptions.

During the lesson observations I sat at the back of the classroom, and observed the lessons unfold without participating in any way. I kept notes of what I observed from the beginning to the end (See Appendix 1). While observing the lessons, I took notes

as much as I could as the lesson progressed recording all that I observed as objectively as possible without putting my own interpretation. In addition, the teachers gave me their Gauteng Department of Education lesson plans which were prepared by Matthew Goniwe School of Leadership for Gauteng Department of Education to be used by teachers. Samples of these lesson plans are attached as Appendix 4. The lesson plans are detailed and the same for all the teachers with a GDE logo which shows that they were prepared by experts and remain the intellectual property of GDE. As can be seen in appendix 4, the GDE lesson plans are so detailed that they even included a suggested video clips for the topic and assessment tasks that the teacher could use as part of lesson development. In all the three teachers' I observed no attempt whatsoever was made by the teacher to personalize the lesson plan by even using the school logo. This passive consumption of GDE lesson plans without any teacher's input was a serious cause for concern.

Immediately after the lesson observation, I sat with the teacher and conducted the interview using my interview questions (see appendix 1). The interview questionnaire was enlarged to create space to jot detailed responses from the respondent as objectively as possible without analysing or and putting my own interpretation. These responses were then typed from my own clumsy writing maintaining the questionnaire structured provided in the interview questions. The responses were then referenced using the questionnaire structure as for instance, Bula, Q. 3. Line 4. Furthermore, I have also used bold and italicized font to highlight those responses that I have quoted verbatim in data presentation in the questionnaire for quick cross checking by the reader. Verbatim quotes have been used so as to present exactly what the teacher will have said so as to maintain objectivity as much as possible.

In my data presentation and discussion, I have presented findings from classroom observations first and then findings from interviews later. The two were presented in two separate chapters as Chapter 4 for classroom observations and Chapter 5 for interview presentations. This is because unlike presentation of classroom observations results, interview responses had common emerging themes which could have been monotonous if they have been presented separately per teacher.

4.5 Lesson Observations

4.5.1 Participant A: Mr. Chico

Mr. Chico was teaching a 45- minutes lesson on Landforms of Massive Igneous Rocks in accordance with the Annual Teaching Plan (ATP). The class was made up of 41 learners of mixed gender all supplied with GDE tablets while the teacher also used a GDE provided laptop. The class had a working smartboard and the whole school is connected to a GDE provided Wi-Fi which the teacher complained to be very unreliable because most of the time it's not working. The teacher is permanently based in that classroom and learners are the ones who move into his class whenever it's time for Geography. This arrangement provides security for the ICTs stored in the classroom as the teacher explained because security is a serious concern for electronic equipment in the township school.

The teacher introduced the lesson by recapping the previous lesson on structural landforms of horizontal strata. Many learners seemed to have forgotten previous concepts taught a day before which forced the teacher to play a snap video clip of previous lessons on the smartboard from his laptop. After watching the video, many learners raised up their hands to answer lesson introductory questions posed by the teacher. The questions asked were how are sedimentary strata was formed and what is the difference between a mesa and a butte? Learners were expected to answer as individuals as opposed to group work.

Learners had been given homework the previous lesson to draw features of internal and external vulcanicity. Only 6 learners out of 37 had drawn the diagram. The teacher was angry and threatened learners that no one was leaving school until they have done his homework. Although learners protested that the diagram in question was in both their tablets and textbooks the teacher insisted that they must do homework and draw the diagram in their notebooks. The teacher reasoned that they will remember more what they would have written in their notebooks than just reading from their tablets but many learners were not convinced and argued that this was extra work for them.

The teacher went on to introduce the new topic on landforms of massive rock origin which was based on the homework diagram that learners were asked to draw. The teacher referred learners to video clips on volcanoes but when the teacher made rounds in the classroom moving from one learner to the other, it emerged in the lessons that some learners had deleted school videos and instead loaded music videos of semi people. The teacher started shouting at why the learners deleted educational video clips. Some 3 minutes of the lesson were lost in the ensuing altercation between the teacher and the learners. As Mr. Chico went on screaming at learners who had deleted the video clips some two boys seated next to me were whispering at each other ridiculing him. My observation showed that use of ICTs in the classroom needed a strong discipline from both the teacher and the learners. Where a teacher is weak in discipline, ICTs become a good recipe for disaster. In such a situation, the use of ICTs can become a nightmare if not well planned and executed.

The teacher threatened learners that he will confiscate their tablets if they are found in violation of user policy as proposed by GDE. It was difficult for the teacher to proceed with the topic planned for the day because many learners had forgotten the basic concepts upon which the topic depended on. The teacher had to revise some Grade 10 work he taught them on vulcanicity because learners couldn't effectively engage during the lesson. The teacher forced learners to move closer to those learners who had video clips on volcanoes.

As learners presented their findings describing features of internal vulcanicity from their tablets, the teacher used their points to develop a smartboard summary notes. The subtopics included formation of the sill, laccolith, lapolith and domes and tors formed from batholiths.

The teacher constantly referred learners to use illustrations in their tablets for lesson development. Learners were referred to preinstalled textbook illustrations in their tablets since all learners were supplied with tablets. Despite the school being declared a paperless school Mr. Chico had also issued his learners with textbooks because of numerous problems associated with tablets. This also showed that the

teacher was still more attached to the textbook which seemed to be the default line of teaching for him. These preinstalled textbooks were full of coloured illustrations which seemed to bring illustrations closer to reality. They also have some short 2minutes video clips imbedded in them and also hyperlinks are included for further study and additional sources of information for learners Although the textbooks installed in the learner tablets were different from the ones installed in the teacher's laptop, the teacher was able to refer the learners to the appropriate pages of their textbooks.

The teacher went on to refer learners to google pictures of volcanoes as part of their homework and that where possible they should cut and paste those pictures in their notebooks. The teacher did not refer learners to a particular website but just told learners that if they google the topic on volcanoes they will get the pictures.

As part of the lessons development, the teacher asked the learners to draw a diagram of features of intrusive an extrusive vulcanicity in their Grade 11 textbook because the diagram was clearer in the textbook than in their tablets. The teacher wanted to use both resources in the learner tablets and hard copies of textbooks. The teacher also asked that learners to write smartboard power point summary notes in their notebooks but many learners seem to have left their notebooks and textbooks at home relying on slide notes in their tablets. Even more frustrating to the teacher was that some of the tablets did not even have the pre-installed textbooks with learners claiming that the textbook app had crashed. The noise levels were also too high as the learners engage each other on smart board questions on features of vulcanicity but the teacher managed to control his class.

During the lesson one learner was caught on WhatsApp and the teacher confiscated her tablet and an altercation ensued. The teacher forced the learner to apologize and sit on the floor for 10 minutes. The teacher concluded the lesson by giving the learners homework to bring pictures of the Matopos of Zimbabwe as an example of tors and domes from the internet and. Despite some protest from some learners, the teacher insisted that everyone must do the homework and those who failed will be punished

4.5.2. Participant: B Ms. Zande

Ms. Zande the teacher from Alexwood was teaching the topic on structural landforms on horizontal strata features. She started by recapping Grade 10 lessons on features of folding, faulting and vulcanicity, but most learners seem to have forgotten most of their Grade 10 stuff. The teacher refreshed their memory by flashing the smart board pictures of Grade 10 lessons on Geomorphology on the topic of volcanoes, faulting and folding from her own laptop connected to the smartboard. The teacher was very brief because she told the learners that she wanted to teach the lesson she had planned.

The teacher went on to explain how horizontal strata features were formed using a 2minutes video-clip provided by GDE and imbedded in the lesson plan that was played on the formation of the landforms of horizontal strata. Noticeable was that the video clip was not audible enough to the learners so the teacher did most of the talking and posed the video three times to explain key features to the learners. Background information on the formation of sediments was not given to the 2 minutes long video clip to highlight salient points and some learners kept on talking seeking direction from colleagues while the clip was already playing. The teacher displayed a deeper understanding of the topic but she basically used the lecture method although there was good use of the audio visual to clarify her points.

Although she integrated ICTs in her lesson, she was more in a hurry than to engage learners more and hardly referred to learner tablets. I also observed that the learners seem to be more interested in their tablets and didn't even bother to write chalkboard notes which however were quickly erased by the teacher. The teacher used both the smart board and the chalkboard to explain concepts to learners.

Teacher argued with learners that tablets make them not to concentrate on her explanation and she did not give learners time to comment or even ask questions based on the 2 minutes long video clip that she played. The lesson had to be cut when the bell rang. The bell rang when the teacher was still busy explaining some concepts and she even mentioned that the lesson was not finished because learners took too long to settle down.

The teacher told learners that the video clip was not in their tablets and that they could use pictures in their textbooks to study more on the topic. Since the lesson ended when the bell rang, no homework was given to the learners on the topic. This mismatch of what GDE loaded to the teacher's laptop and learner tablets was serious cause for concern for the teacher and she even complained about during the interviews. What is loaded into the teacher laptop should talk to what is loaded into the learner tablets so that the teacher could refer learners to their tablets for further study. However, the teacher was actually struggling to maneuver through the GDE prepared lesson plan and the resources at her disposal. This also revealed the dangers for teachers to be just passive consumers of GDE prepared lessons with very little of their input.

As the lesson was progressing the teacher who seemed to be firm on learners did not take it lightly on some learners whose tablets were illuminating during the video clip play. The teacher accused the learners of being on Facebook and WhatsApp, but learners denied that they were on social media during her lessons. As the teacher moved towards them they started fiddling with their tablets which actually confirmed the teacher's concerns that there was something wrong they were doing. During the lesson another learner had his tablet confiscated when some notification sound rang during the lesson. Even during the interview, the teacher spoke strongly against learners who spend more time on their tablets on social networks than studying. The teacher saw the learner tablets as more of a disturbance rather than a learning tool. Throughout the lesson she didn't even ask learners to open their tablets and insisted that they should listen to her explanation because the tablets were disturbing her lesson. Although some learners were trying to find out from their tablets the topic under discussion, the teacher insisted that they should concentrate on what she was showing them on the smartboard.

Since the lesson was ended prematurely when the bell rang no homework was given to the learners except that the teacher said learners should read their textbooks on the topic that was discussed during the lesson.

4.5.3 Participant C: Ms. Bula

Ms. Bula from Langa High School was also teaching Structural Landforms on Features of Horizontal Strata to a class of 47 learners. The class was a full ICT class with Wi-Fi and smartboard and all the learners were supplied with GDE tablets and the teacher also had a Proline laptop with a GDE logo inside and outside. The teacher went straight into the lesson by showing pictures of a mesa, a butte and a plateau mentioning that the lesson was a continuation of the previous lesson. A few questions were asked by the teacher about the previous lesson such as What are sedimentary rocks? Explain how strata is formed in sedimentary rocks? and What is the difference between faulting and folding? Only a few learners were able to answer and the teacher but the teacher insisted that they should refer to their tablets and notes instead of just looking at her. Learners began to refer to their tablets and more learners raised their hands to answer questions but the teacher reminded them that learnt material should be in their heads instead of being in their tablets.

The teacher then asked the learners to study the pictures in their textbooks Platinum Geography Grade 11 page 49 preloaded in their tablets on the Karoo landscape showing mesas and buttes. The teacher used illustrations from her laptop connected to the smart board by an HDMI cable because she felt it necessary for learners to listen attentively to her explanation. That the learners had not brought their textbooks in class seem to have partially disoriented the teacher but she was quick to browse her laptop to get appropriate materials. This disorientation was most probably because the teacher was using a GDE lesson plan she didn't even look at closely. The illustrations on mesa and buttes were clear and the teacher managed to capture her learners' attention but the teacher seem to be concentrating more on learners seated in the first two rows. Very little attention was given to those seated at the back of the class. She even mentioned that back benchers were not participating in class because they are busy with their tablets.

The teacher went on to explain how features of horizontal strata are formed using power point slides and a short animation video clip. Like the other participants in the study, the video clips the teacher used were YouTube videos provided by the Gauteng Department of Education through Matthew Goniwe School of Leadership

(MGSL). After the animation video clip the teacher asked learners to work in pairs to compare the mesa, butte and plateau and their value to human settlements. Some learners began to make noise and they took some time to settle down. The teacher moved from one pair to another to ensure that learners were working. The teacher demanded that they write their points in their notebooks but learners didn't have their notebooks with them and some produced pieces of paper to write on.

The teacher was very angry and threatened to chase out of her class anyone who didn't bring geography books for the following lessons. As the teacher ranted and raved, they seemed to be oblivious and unconcerned of what she was saying. This makes me conclude that learners seemed to enjoy carrying their tablets instead of textbooks and note-books while teachers strongly believe on the strength of the textbooks and notebooks. The teacher emphasized to learners that they will remember more what they will have written more than what they will only have heard.

In rounding off the lesson the teacher asked learners to write down the notes that were displayed on the smartboard she had developed with them through lesson development. Instead, many learners began to take a snap shot of the notes but the teacher insisted that she wants to see those notes in their note-books and not in their tablets. That learners were taking snap shots of the chalkboard summary notes didn't go well and it irritated the teacher so much to the extent that she even chased some of the learners.

As part of her lesson conclusion like the other teachers above, the teacher gave learners homework to go and draw in their notebooks the diagram showing the difference between a mesa and a butte found in page 49 of their Platinum Geography Grade 11 hardcopy textbooks. Some learners pointed out that they had similar diagrams in their tablets but the teacher like Mr. Chico and Ms. Zande insisted that they must draw the diagrams in the learner textbooks. The teacher insisted and threatened learners that if they don't have textbooks and note-books they should not attend her following lessons but learners continued grumbling as they went out of the class. The teacher went on to lambast learners accusing them of laziness and hiding behind that they are using tablets.

The teacher had a lot of materials prepared for the learners and some of these materials that the teacher used were GDE teaching and learning materials prepared by Matthew Goniwe School of Leadership (MGSL). These materials also included lesson plans and class activities also prepared by MGSL for Gauteng Department of Education. Even the power point slides used by the teacher were also prepared by MGSL for GDE. This also raised the question whether teachers are active or just passive consumers of teaching and learning material given to them by the department of education.

CHAPTER FIVE: DATA PRESENTATION AND DISCUSSION: INTERVIEWS

5.1. Introduction

The general themes that form the subheadings were derived from the questionnaires asked during the interviews and from the research questions. These broad themes are: How and which ICTs do teachers use, Frequency and value in using ICTs, Challenges faced by both teachers and learners in using ICTs, and the teachers' feelings about the necessity and meaning of ICT integration. Interview presentations have been grouped into these broad themes to avoid repeating responses that will have been given by other respondents.

5.2 How and which ICTs do teachers use?

The participants were asked the question: *Which ICTs do you use in your teaching?* All the teachers stated that they have been provided with GDE Modlin Proline laptops, smartboards, CDs, USBs, Data Projectors and smartboard writing pencils.

Teacher	ICT tools
Chico	smartboards, laptops, internet, projectors, CDs, USBs and tablets
Zande	smartboards, laptops, internet, projectors, CDs, USBs and tablets
Bula	smartboards, laptops, internet, projectors, CDs, USBs and tablets personal Samsung cell phone.

Table 2: ICT tools available at schools

Over and above the ICT tools provided by the Gauteng Department of education(GDE), Bula went on to mention that she also uses her Samsung tablet and cell phone as part of her ICT teaching tools. (This was observed during lesson observation).

Thus, there is evidence that GDE has been successful in installing infrastructure in these schools so that ICTs are available for use. All the three schools had GDE laptops, tablets, smartboards and internet access.

Mr. Chico although having the same ICTs as Ms. Zande and Ms. Bula, he mentioned that he relies more on the teacher and student discussions teaching approach and mainly used his ICTs more for illustrations (Chico, Q.10, Line 2). His teaching method involves more of the domination of the lesson by the teacher and learners being expected to listen to the teacher's explanation and pacing of the lesson. The lecture method of teaching typifies more of the traditional teaching approach where the teacher dominates the lesson and learners have a minimal contribution in terms of ideas. The teacher's pronunciations, such as "I may be wrong but I think tablets have made learners to be lazy and docile and weak. I get angry every time learners open tablets instead of textbooks" (Chico, Q.10, Line 8) showed that he still believes that the textbook is still the ultimate effective tool to achieve effective learning. His hatred of tablets is grounded on numerous technical problems associated with tablets and the abuse of social networks by learners that disturb effective learning. He mentioned strongly that "ICTs are time consuming and he was worried with syllabus coverage" (Chico, Q.8 Line 8). To Chico syllabus completion was the ultimate goal which should be accomplished within the stipulated ATP deadlines because when using ICTs, it will take a long time to move to the next content. Zande also said that

using ICTs in class is time consuming and as a result you will always be behind the time deadlines set by the ATP and learners get too excited and become difficult to control during your lesson. (Zande, Q.14, Line 2).

Ms. Bula mentioned that

in class group work is an active engagement teaching method in class when using ICTs because learners are given the chance to engage each other with the resources to gain knowledge (Bula, Q.8, Line 3).

Unlike Mr. Chico and Ms. Zande, Ms. Bula sees a lot of benefits from ICT integration but she also has some pedagogical limitations. From the preceding quotations, it seems teachers only used ICTs as content management systems with little learner engagement with the content. Teachers themselves are not yet pedagogically prepared to use ICTs as part of their pedagogy as evidenced by Mr. Chico and Ms.

Zande's contributions. As such there was little evidence of constructivist approach to learning derived from the use of ICTs especially from Mr. Chico and Ms. Zande.

It was also observed and confirmed through interviews by all the three teachers that they were not aware of Virtual Learning Environment (VLE) software packages that they could use. Since teachers are not using ICTs for Virtual Learning Environment (VLE), it shows that teachers are pedagogically lacking for the full implementation of ICTs in the teaching of Geography. Zande said that "I have heard of VLE but I don't know how to use them and I need to be trained on how to use these things" (Zande, Q.14 Line 4). Chico confessed that he needs serious training on VLEs particularly Moodle, Blackboard or Schoology because he has only heard of them and has never used them in class (Chico, Q.14, Line 8). Bula said that she has some ideas about how to use them even though she has never used them in class (Bula, Q.14, Line 1). This therefore means that teachers in this research only used ICTs as Content Management System (CMS) which I believe is a lesser level of ICT integration in the teaching of Geography. The teacher who uses Virtual Learning Environment(VLE) will have reached higher levels of ICT integration because there is more direct student interaction with the teacher and peers.

During the interviews, all the teachers bemoaned the negative effect social media has on the learners. The learner spent more reading quality time on Instagram, WhatsApp and Facebook. Chico in particular had no good words for Facebook and WhatsApp as learning tools. He described them as

a waste of time and a curse that derails serious learning into some social relations that promote promiscuity and other anti-social behaviour which negatively affects the learners (Chico, Q.5, Line 9).

Zande also expressed similar sentiments against the use of Facebook and WhatsApp as learning tools but Bula was more accommodative although to a lesser extent. Chico lamented that

learners were too addicted to Facebook and WhatsApp and nine out of ten times when they use their school tablets without being supervised by the teacher they will be on WhatsApp and Facebook chatting with friends on things that have nothing to do with geography or any other school subject (Chico, Q. 5, Line 10).

Neither during the interview or lesson observation was there any mention of Computer Assisted Design (CAD), digital cameras, core graphic programming or other educational software for designing their teaching programmes. All the three teachers agreed that they rely heavily on pictures, videos, power point presentation and word and part notes supplied by GDE prepared by Matthew Goniwe School of Leadership. This over-reliance on GDE prepared media without their input shows that teachers are passive consumers of GDE teaching materials. Chico confessed in the interview that he does not know how “to use PowerPoints and I still need serious training on both PowerPoint presentation and Excel” (Chico, Q. 14, Line 5).

Zande also expressed similar sentiments expressed by Chico and also need training to develop skills to be able to create her own teaching materials. Like her colleagues she mentioned that the GDE teaching materials were sufficient to see her go through the lesson without challenges. She mentioned that “designing teaching materials is time consuming and needs a lot of time, skills and internet resources which may be a challenge” (Zande, Q. 13, Line 3). This revealed that teachers heavily rely on GDE materials and that they can’t create, develop or even design their own materials. Furthermore, teachers have just basic skills in using computers and that they need a lot of training to be effective in using ICTs.

5.3 Frequency and purpose of using ICT tools

I asked the question: *when and how do you use ICTs at your school?* The answer was unanimous that teachers use ICTs tools in the classroom on daily basis especially the smartboards, laptops, tablets, CDs and DVDs’.

Chico went on to caution that “I use ICTs for a short time because they are time consuming, because you need more time than given in the Annual Teaching Plan to complete the syllabus” (Chico, Q. 8, Line 5). Zande also lamented the slow pace of syllabus coverage due to “too much ICTs and learner involvement and control of their learning environment” (Zande, Q. 8, Line 2). According to Zande too much ICTs are a drawback to syllabus coverage especially with matric classes which forces the teacher to give extra lessons after school and during weekends. Bula agreed that using ICTs is also time consuming and that she also teaches in the afternoon and

holidays to cover the syllabus because the ATP is so prescriptive as to what is covered per week, month, term and year. She said she is forced to do so because my learners need to be prepared enough through syllabus coverage because formal geography assessment tasks are all externally set from grade 10 to 12 which means that I need to move as per the ATP timelines on syllabus coverage. (Bula, Q. 4, Line 8).

Teachers must follow the ATP religiously in order to cover all the topics and be able to write provincial tests that are externally set. This was a sign that teachers still need to develop a more positive attitude towards the use of ICTs in the classroom.

All the three teachers in the study agreed that they use ICTs more for the videos and colourful pictures and diagrams that they use for illustrative purposes and that the audio-visual makes it easier to explain difficult concepts. Chico mentioned that “drawing diagrams in the chalkboard is now a thing of the past because GDE supplied coloured pictures which are at times accompanied by animations” (Chico, Q.8, Line 2).

Chico went on to illustrate that the concept of vulcanicity was a challenge to teacher but with the videos provided by GDE its easier for learners to understand it (Chico, Q.4, Line 4). Zande mentioned that teaching about the Grand Canyon or tors of Matopos is easier through the use of pictures and videos because it's like bringing them life in classroom for learners (Zande, Q.4, Line 2). Bula mentioned that through the use of video, teaching geography becomes easier because videos bring the whole world live in class. She mentioned that

her learners from poor township backgrounds may not have seen or heard of various parts of the world, but videos bring them live in the classroom which makes it easier to comprehend the topics being studied. (Bula, Q. 4, Line 6).

Zande added that geographical video clips especially on a smartboard help learners to live and see for themselves geographical places they are studying not that that they have never see. Bula commented that my learners from Alexandra townships are able to see the Grand Canyon, the Himalayas, the east African Riff valley or the Matopos of Zimbabwe right inside the classroom thereby removing poverty and class a serious barrier to learning. (Bula, Q.4, Line 4).

5.4 Is ICT integration improving performance?

The answers in this area were answering the question: *What do you think ICT integration into teaching and learning of your subject means to you and your students and have you identified any improvement in your learners' performance since you used ICTs to teach?*

In the interviews all the three teachers gave good definitions of what ICT integration was, for example Ms. Zande defined ICT integration when she said that

it involves learners participating active in their learning instead of just listening and that learners do activities, write notes and discuss in groups working with technology. (Zande, Q. 7, Line 2).

Bula gave a good summary of what ICT integration means in the teaching of Geography.

I think it involves using computers, laptops and tablets in the teaching of Geography and that students must do tasks instead of just listening to the teacher's lecture method without making any contributions. (Bula, Q. 7, Line 2).

While Chico appreciated that learners like their tablets and the use of smartboards in class, he was very worried that learners seem to have totally discarded their textbooks and notebooks. During his lesson that I observed only 6 learners had textbooks or notebooks, the rest claimed to be relying on their tablets. This didn't go well with him and some learners were threatened them that next time if they leave their textbook and notebooks at home he will punish them.

On whether ICTs help improve the pass rate, Chico said "I like using technology but I don't know whether they help improve the pass rate" (Chico, Q. 10, Line 5). Bula answered that "the pass rate has not improved since ICTs were introduced in our school two years ago because learners are too lazy to revise" (Bula, Q. 9, Line 1). Zande also said the same thing when she said "certainly ICTs have greatly improved performance in class, but on whether they help in increase pass rate it's still difficult to tell" (Zande, Q. 10, Line 3). From these words from respondents one can conclude that all the teachers interviewed have not yet seen any meaningful contribution of ICTs in improving the pass rate. While the MEC for education is convinced and has stated in public media that ICTs will improve the matric pass rate, teachers interview

think otherwise. In short, no evidence has been found that ICTs have improved performance!

Although this raises many questions, respondents to this research have not seen improvement in their Grade 11 classes and generally, in the matric pass rate which is seen as a bench mark by the public and government. Whether this absence of evidence is a problem of the teachers, ICTs or learners themselves, is beyond the scope of this research. Chico actually stated that

I still believe that memorization by learners is very important if learners are to pass exams, I may be wrong but I think tablets have made learners to be lazy, docile and weak. (Chico, Q.10, Line 7).

Bula said “I still don’t know whether tablets are a good replacement of textbooks” (Bula, Q. 10, Line 4). This inconclusively on whether ICTs improve pass rate still need further interrogation because it was one on the main reasons by MEC Lesufi when he introduced ICTs in schools.

5.5. Challenges faced by teachers and learners when using ICTs in the classroom.

Learner abuse of ICTs was sighted as the main cause for concern in effective integration of ICTs in teaching and learning. On two different occasions and in different teachers’ classes (Bula and Chico during lesson observation), learners were caught on WhatsApp chatting with friends during the lesson. Although Chico punished the two learners by making them to sit on the floor, the problem seemed to be pandemic because learners protested and pointed out that everyone was on whatsapp and why they were the only ones being punished. Although the learners were punished by sitting on the floor the teachers were worried as to how many of their learners who go into social networks instead of listening during class lessons. Ms. Zande highlighted that learners spend more time on social networks such as Facebook and WhatsApp pretending as if they are studying. She cautioned that “I must be very careful and vigilant all the times because these learners have a serious appetite for WhatsApp even during lesson”. Bula mentioned that

I must be always on the lookout because tablets are abused by learners and some learners are deleting school resource materials to create space for

music and other silly obscene music videos portraying naked people. (Bula, Q.5, Line 5).

Bula and Chico went on to highlight some other challenges that constrained effective ICT success. These included challenges of electrical outages in Johannesburg East townships especially in Alexandra townships where there are a lot of illegal electrical connections resulting in continuous tripping of power. They also unanimously highlighted lack of back up plans both the school, and GDE in case electricity is down. This was a serious cause for concern especially if all the planning for the day was centred on the use of smartboards and laptops. Without electricity most of the ICTs become dead and redundant and can't be used in the classroom thereby throwing off all the good plans for the day. Electricity outages are so serious and had even made teachers to even doubt the benefits of planning a lesson relying on the use ICTs in the classroom.

Over and above electricity outages the smartboards and GDE laptops are always freezing

these laptops and smartboards together with their internet hardly go for a week without freezing and you must have a teaching lesson plan with them working and another teaching lesson plan when end they are frozen. (Chico, Q.5, Line 10).

This freezing of laptops was a serious cause for concern to the Geography teachers wanting and willing to integrate ICTs in the teaching of Geography. One teacher angrily pointed out that

these laptops are “fong kong¹” and for me I prepare using my own laptop an HP compared to the Proline Chinese cheap laptops that can't go a week without freezing or overheating or refusing to switch on or refusing to charge. (Bula, Q. 5, Line 9)

The problem of technology malfunctioning is also experienced by the tablets used by learners. Bula mentioned that “in one Grade 11 class there is not a single tablet without a broken screen” Bula, Q. 5, Line 7). All the tablets in that class have broken screens and most of them are not even in good working condition. These have been accredited to learners using tablets without pouches or bags and just carelessness

¹ Fong kong is a term commonly used in townships to refer to cheap Chinese made product that doesn't last and is dumped on the South African market because it's cheap.

of the learners. Giving learners second hand tablets after they have been used for a year by other learners from other school is another worrying factor. Bula mentioned that some of the Huawei tablets given to learners have been used by other schools for more than two years (Bula, Q 5, Line 8). This presupposes that tablets are disposables and should not be retrieved to be given to another learner as was the case with textbooks. Even though, tablet retrieval is still low ranging around 57% of the total tablets issued. Bula believes that poor quality of the technology used in tablets is also another cause for these breakages. Zande highlighted carelessness of her learners and vandalism which she described as bad and barbaric culture of her learners. (Zande, Q. 5, Line 4) She mentioned that you can't leave learners in the class because they will either steal or break something. She said that

my learners have displayed little sense of beauty because going out of class for a minute you will find something broken or stolen. It seems as if vandalism and stealing is an achievement because the school is forever buying smartboard, tablets and USBs broken or stolen by these learners. (Zande, Q. 5, Line 7).

Stealing of tablets is a serious constraint when using ICTs in the classroom. Learners are stealing from each other and every day there are stories of a lost or stolen tablet. Chico who is also an HOD seemed to have had enough of tablet, memory card and USB cases of stealing because teachers are referring to him all theft cases in his Geography department. Furthermore, it is very difficult to recover a stolen tablet because learners swap them with tablets from neighbouring schools.

At many times police have been called but this has never deterred learners stealing from each other. So both internal and external assistance have failed to curb cases of both vandalism and theft. In the Alexandra township and surrounding areas in particular, Chico lamented that "all schools have once have had a break in and everything electronically stolen by thieves" (Chico, Q.5, Line 10). Thieves now target ICT schools because they know that they will get something worth stealing and selling. Furthermore, with vandalized ICTs and freezing laptops and smartboards assistance has been very slow and disappointing.

All the participants complained of the disappointing service provided by the service providers. Chico mentioned that in his school it takes about 3 to 5 days before a reported fault is attended to. He reasoned that most of the time most of the lesson

plans are planned knowing that ICTs cannot be relied upon at his school. He mentioned that at times he uses the expertise from the learners which at times is also unreliable because learner's knowledge can go that far and many a times they are not even authorized to touch or use teacher ICTs at school.

Another serious constraint was with that mismatch between teaching and learning materials loaded in the learner GDE Huawei tablets and GDE Proline teacher's laptops. Bula pointed that

there is no synchronization between teacher's textbooks and learners resource materials. Different textbooks are loaded into learner tablets different from the textbook loaded in the smartboard or teacher laptops (Bula, Q. 5, Line 4).

Chico for instance, gave an example of the textbook entitled Solutions in Geography loaded into the learner tablets while in the teacher GDE teacher laptops they preloaded a textbook entitled Platinum Geography. This makes it difficult for the teachers to use tasks and illustrations that are there in the teacher's laptop or smartboard but are not there in the learners' tablets.

Furthermore, teachers mentioned that they did not have control on materials in the learner tablets and that the stuff come preloaded by the GDE. This they found to be disturbing because they have absolutely no control on what is in the learner tablets. Many times the learning materials get deleted in the learner tablets and the teachers will need to log in the tablets with GDE who will in turn log in the problem with the service provider who will then attend to the school. Chico said that

Learner materials are provided by a service provider only known by GDE. If ever we experience technical problems log the query with GDE who in turn consult their appointed service providers who will in turn come to the school to attend to the problems raised (Chico, Q.13, Line 3).

Chico was critical of the system of service providers not known to the schools but only known to the GDE, revealing that "this has proved ineffective because the turn-around is so slow and some learners have even gone for a more than a term when the textbooks in their tablets deleted itself" (Chico, Q.13, Line 4).

Finally, the teachers bemoaned inadequate training offered to teachers on how to effectively use ICTs in the classroom. Chico actually used the term "oven-baking" of

teachers, by which he means that teachers are not trained enough to embrace the use of ICTs in the classroom. Since the use of ICTs need a paradigm shift from textbooks to ICTs, more time should be made available for teachers to fully understand and appreciate the use of ICT. Zande also used the term “oven baking” which she described as taking a tired after school teacher to attend training session on using ICTs and then expect such a teacher to perform wonders in the classroom with ICTs the following day. Zande called for a concerted effort in training teachers to understand, appreciate and perform basic functions of ICTs than a short “oven baking” system where teachers come out half-baked and at times more confused than before. Zande and Chico who described themselves as the Born Before Technology (BBTs) (Chico, Q. 14, Line 1) – a slang term that is used to refer to older people who were born long before the introduction modern technologies such as smart phones, laptops and tablets, asked for serious training for them to fully implement ICTs in their schools. Trial and error learning which seem to be the trend should be discouraged in favour of a more formalized and structured approach to teacher training and possibly even give certificates of attendance to motivate teachers to attend.

5.6 Conclusion

The findings of this chapter have been presented in a thematic form and the findings have been presented using both results of the observation and interviews. Teachers in the study use a variety of ICTs and seem to use them to enrich their teaching. These ICTs include smartboards, laptops, tablets and they have internet through Wi-Fi connectivity. The respondent teachers seem to be not yet convinced that ICTs improve the pass rate at school level.

Despite the lack of evidence of learner engagement, they were all convinced that using ICTs in the geography lesson makes it easier for learners to comprehend difficult topics. Even though learners are excited by the use of ICTs in the learning of geography, they are worried at how tablets have been used to sacrifice the use of

textbooks and notebooks. Teachers interviewed also agreed that they had limited computer skills that will add value to the use of ICTs in teaching. They were also worried by the level of freezing of laptops and smartboards which they believed were cheap products.

In the next chapter these findings will be discussed in detail to draw conclusion and suggest recommendation based on this study.

CHAPTER SIX: FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter presents an analysis of the data, and discusses the research findings. I will draw conclusions, make recommendations and discuss the limitations of the study.

Generally, the results of this research found that there is a general excitement when ICTs are used in class from both teachers and learners. Learners are more interested in the technology itself and not at technology as a means of learning. Whether this excitement translates into productive learning and teaching still needs to be seen through results.

6.2 Findings

Teachers in the study mentioned that the use of ICTs in their teaching makes it easier to explain abstract concepts such as vulcanicity, folding and formation of landforms of horizontal and inclined strata. Teachers also mentioned that abstract concepts were made concrete through the use of ICTs. They gave an example of vulcanicity as an abstract concept and how ICTs made it concrete to help the learners understand it. For instance, some Alexandra township children have never seen a volcano but through the use of colour pictures and real world video clips it makes it easier for the learners to understand the concept of vulcanicity. In the MEC Panyaza Lesufi's own words to learners at Grace Bible Church in Soweto "When they teach you that the heart is pumping, they will never give you a photocopy; you will see a heart pumping on the screen". He went on to mention that "If you want to see a chalkboard and duster you must go to the museum ... and not in our schools" (Nkosi, 2015, p.1).

This I believe is the greatest contribution to teaching and learning I saw in the classrooms I observed. In the teachers' own words, using ICTs in the classroom bring the real world into the classroom thereby making abstract concepts to be concrete because "learners from poor township backgrounds may not have seen or heard of various parts of the world, but videos bring them live in the classroom which makes it easier to comprehend the topics being studied" (Bula, Q.4, Line 6). While respondents said that ICTs make abstract concepts to be concrete, the teacher's pedagogy also plays an important role because ICTs on their own cannot perform miracles in the classroom. I observed Ms. Bula's lesson where the teacher played a video but she did not give a background to the video resulting in more confusion on the learners.

It was also found that the teachers had access to a variety of ICTs provided by the Gauteng Department of Education. Such ICTs included GDE Laptops, smartboards, tablets, internet, CDS, USBs and even data projectors. Some teachers went further to use their own laptops and cell phones as part of the ICT litany they use in teaching. Despite some short-comings with these ICTs, the availability of the varieties of ICTs make these schools to be ICT compliant schools.

All the respondents to the study mentioned that ICTs have played a major role in involving learners in their learning process, however, my classroom observations show that not all learners were actively involved this tells me that the excitement on using ICTs has a limited value in helping serious learning. This brings the hard question: Are learners excited by the ICTs per se or are they real benefitting educationally from ICTs?

Teachers mentioned that with the use of ICTs the number of learners who participate in class during lesson delivery has greatly increased. Respondents mentioned that using ICTs seem to have a profound effect on learner involvement in class thereby helping in the constructivist learning approach but this involvement seem to be overemphasized by the teacher. The degree of learner involvement was questionable because some learners kept on responding to the questions imposed by the teacher. Furthermore, all the three teachers complained about learners being involved on social media during the lesson in the class. This I found to be a serious

concern because mere looking at the tablet by the learner doesn't translate to serious engagement with learning materials at hand. This was even highlighted by the teachers themselves that learners pretend to be studying while they are busy on social networks and other irrelevant online activities such as games.

Switching on the smart board and asking learners to take out their tablets triggered a lot of noise and indiscipline in class. While the value of ICTs for illustrative purposes cannot be denied as mentioned by the teachers, a lot of indiscipline from learners was a serious issue the teachers were challenged to deal with. I also observed that it took a lot of time for learners to be in sync with what was on the smartboard and what they have in their tablets and that waste of time was counter-productive. It was during the use of tablets that all hell broke loose and teachers started screaming at learners for various forms of indiscipline and even disrespect. All the three teachers in the study found lack of courtesy and discipline in the use of tablets to be a serious cause for concern. During lesson observation, one form of punishment and yelling was metered on the learners who were found abusing tablets on sound media during the lesson.

WhatsApp, Facebook, and Instagram were found to be the main social networks that learners indulge in during lessons. Although tablets came without these social network applications, learners downloaded them into their tablets using school wifi. This means that tablets have negatively impacted on effective integration of ICTs in teaching. Mr Chico even wished that tablets should not be given to learners until they have developed good manners to make tablets productive. He lamented that "I may be wrong but I think tablets have made learners to be lazy and docile and weak. I get angry every time learners open tablets instead of textbooks" (Chico, Q. 10, Line 8). Chico's argument revealed something that was pedagogically sound that some learners first need to be psychologically and technologically mature to be given tablets as part of school learning material. Absence of that maturity rendered tablets useless as learning tools and in fact, they are seen as a disruption to learning. Even Zande bemoaned the uncontrollable appetite for social media during and after the lesson. Teachers found that they have to been extra vigilant to control learners indulging in these social media during lessons and after.

There is danger that these tablets may have brought more harm than good until and a time learners have developed responsible behaviour in using them. Until and a time when social media is blocked from being accessed using school tablets, the full realization of the benefits of education through tablets will be compromised. Even the MEC Panyaza Lesufi had actually sensed the dangers and destruction that can be caused by over indulgence on social networks. He is quoted to have promised that

Never in your life on anything related to education will you have to go out and buy data. You have free airtime to study but social networks would be disabled (Nkosi, 2015, p.1).

This study also revealed that teachers have limited computer knowledge and that serious re-skilling was necessary to turn schools into ICT schools. Two teachers in the study confessed that they cannot design their own teaching materials and that they rely heavily on GDE prepared materials through MGSC. This means that teachers are passive users of GDE prepared teaching materials. Since teachers are not involved in the creation of learning materials, their use and implementations in the classroom may be compromised. Instead of ICTs enhancing teacher initiatives and uniqueness, they seem to be taking away teacher individuality and initiatives because teachers use the same materials without adding their own.

All the teachers except for Ms. Bula reported that they had limited and or non-existent power-point and excel skills. Since these teachers had little or no power point skills, it means that they have no control on the teaching materials provided to them by

GDE. This reduces the teacher's flexibility and the ability to make ICTs part of their pedagogy. While materials prepared by GDE is of high quality, teacher involvement and input is necessary for the fully integration of ICTs in the teaching of geography.

Even the content in the learner tablets such as books and other learning materials comes preinstalled and teachers have to make do with what is available. This coupled with the limited technical knowledge makes it impossible for the teacher to deal with learner problems with learning materials in their tablets such as freezing, wrong textbooks, missing pages, etc.

The fact that simple technical problems cannot be solved at school level has a negative effect on value of ICTs as teaching tools. Over centralization and control of learner materials is not helping the learner at all especially when taking Chico's frustration that service providers "has proved ineffective because the turn-around is so slow and some learners have even gone for a more than a term when the textbooks in their tablets deleted itself" (Chico, Q.5, Line 5). Chico went on to highlight a sad bureaucratic bungling that need urgent attention before full ICT integration could be realized when he said that

very little technical assistance is available at school and whatever technical problem you experience at school will need to be reported to GDE district office who will in turn log in a query with an appointed service provider who will in turn ask the school to deliver to the district broken tablets who will then send them to the appointed service provider for repairs and this bureaucracy make take even weeks before tablets are fixed. (Chico, Q. Line 2).

Lack of computer skills for teachers results in ICTs being used as merely content management systems instead of using them as Virtual Learning Environment (VLEs). Content Management Systems are good as storage facilities for Geography content, but it is the Virtual Learning Environment that actually ensures full integration of ICTs in the teaching of Geography.

While I appreciate that the GDE appointed service provider is doing a good job as the sole installers of learner and teacher learning and teaching materials in both the teacher laptops and learner tablets, schools should also have resident technicians to deal with these issues on a daily basis. Without going into terms and references of the tender between GDE and the GDE appointed service provider which is not the scope of this project, I strongly suggest that the appointment of resident technicians will go a long way in dealing promptly with the many issues that are hindering effective integration ICTs in the teaching of Geography.

Theft and burglary was also identified as another serious challenge that faced full implementation of the ICT policy in schools. All the three schools which were part of the sample population had been hit by thieves and burglary with some being ransacked more than twice by thieves. This has posed a serious security threat and has affected the full integration of ICTs in the teaching of Geography in

Johannesburg East schools. The problem of burglary and theft has also been worsened by carelessness from the pupils. In all the three classes I observed, more than half the tablets for learners had broken LCD glasses. Although the learners blamed it on poor quality of tablets, carelessness seemed to be another problem. Teachers, Zande in particular lamented poor work ethics from learners whom they accused of being ill-disciplined and lacking aesthetic values. Chico accused learners for being careless and uncouth because they didn't take ownership of the tablets because they called them government tablets. The fact that learners called these tablets government tablets proved that these learners didn't take full ownership of these tablets hence these serious breakages.

The issue of ICTs helping to improve the pass rate was inconclusive. All the respondents couldn't establish whether ICTs results in the improvement of results. While they were all in agreement that using ICTs helps learners understand, they didn't agree of the same when it comes to the issue of pass rate. While others were not very sure, Chico observed that in his school the pass rate has not improved since the introduction of ICTs:

I may be negative but I think the excitement of tablets doesn't translate to better performance. Off-course I find it easier to teach using smart boards but my worry is that learners quickly forget what they have learnt. Even our school pass-rate has not changed much since the introduction of smart boards (Chico, Q 10, Line 3).

The correlation between the use of ICTs and the resultant pass rates needed further interrogation as a study of its own. This will shed more light and highlight some evidence and pedagogies that teachers may not have employed.

The study also revealed that the textbook versus tablets competition needs to be revisited. The Gauteng government policy of one textbook per child per subject needs to be re-visited taking into account that learners are now forsaking textbooks in favour of tablets. There is a danger that the excitement for tablets may have been for technology of the tablets per se and not the actual learning with tablets and this may make full ICT integration a serious challenge. The fact that learners intentionally deleted learning video clips and other learning media to open space for their music videos point strongly to the evidence that the excitement for tablets in some learners

had very little to do with learning. This corroborates the comment given by Dan Roodt that the level of culture will determine how effective the tablet can be used for learning or for porn. Reacting to the speech by MEC Panyaza Lesufi at Grace Bible Church that tablets will improve the quality of education and the pass rate, one commentator Dan Roodt argued that “What’s the use of a tablet and a laptop if you can hardly read, can neither spell nor write and your maths mark is below 20%” (Nkosi, 2015, p.4).

He went on to highlight that

the human mind is not dependent upon the device. In fact, the use of a device depends on the mind controlling it. You can use the internet to watch porn or research the 16th century French literature; the difference lies in the level of culture and education attained by the device user (Nkosi, 2015, p.4).

In the face of the findings of this research, Macho (2005)’s argument cannot be ignored. Macho (2005) argued that there is no evidence that ICTs improve learner’s performance. The respondents to the study particularly Chico and Zande were also convinced that ICTs have not improved the pass rate in their schools. They still hold that ICTs are not in any way a good replacement of textbooks and in fact saw tablets as a disruption of a serious revision oriented learning process. Hence, learners who did not bring textbooks in class were punished. While accepting that ICTs are good for illustration during lesson development, Chico argued that tablets were a serious distraction during the learning process and even during the study time hence need for a firm hand from both teachers and parents.

The qualification of teachers to use ICTs still needs serious attention because ICT integration needs both the technological and pedagogical skills. All the teachers interviewed seem to be at the basic level of level of using ICTs. With Chico and Zande’s confession that they lack basic computer skills presupposes that their pedagogical skills in the light of ICT integration still needs serious attention. GDE courses on ICT integration need to be thorough instead of the quick and afternoon after work short sessions. The fact that teachers themselves are not very much convinced that ICTs are the in thing for 21st century education is a cause for concern to realise full ICT integration in teaching. Comments by Zande such as that the use of ICTs is time consuming cannot be ignored. In fact, such pronunciation by the teacher reveals an inadequacy on the teacher’s pedagogy in the face of ICTs. An

attitudinal problem from the teacher's side is shown which may pose a challenge in the integration of ICTs in teaching Geography.

Although Chico and Zande confessed that they have limited knowledge of computers since it was not part of their teacher training, their argument that online teaching can be a waste of time cannot be ignored completely. Their skepticism is corroborated by Macho (2005) who has argued that ICTs are time-consuming and that once one goes online there are other many things that attract one's attention. Once you are online adverts start flashing, hyperlinks and other web-links that may take hours before a learner goes back into the gist of the subject matter under study. I also agree with Chico and Zande that online courses are time consuming and more suitable for mature learners. On the other hand, removing online courses for learners also reduces the level of full integration of ICT in teaching.

Lastly, positive ICT culture from both teachers and learners is needed so as to benefit from ICT integration particularly from the learners. Similarly, strong discipline is required for learners to benefit from ICTs otherwise introduction of ICTs can be a disruption and distraction of learning.

6.3 Conclusions

The research question asked to what extent are teachers integrating ICTs in the teaching of Geography? My investigation revealed that there is very minimal ICT integration in the teaching of Geography. No convincing pedagogy has been developed yet by teachers to meet the demands of ICT integration in a constructivist approach and teachers are still stuck in the pedagogy of yester years. The study showed that perceptions about the value of ICTs for teaching do not match the realities of trying to integrate ICT's in the classroom. There are a number of barriers to the proper integration of ICTs including limited ICT knowledge from both the learners and the teachers, security of tablets, power disruption, etc.

One of the most significant hindrances is what the teachers do with the use of ICTs. This study shows that when teachers do not fully understand how to work with technology, they either stop teaching all together- reverting to simply using what they have been given, or they use the ICTs as an illustrative tool and then fall back on

their 'traditional teaching methods'. It was also found that the teachers still view the hard copy textbook as the best learning tool ever and sometimes feel that the soft copy in learner tablets is inadequate. This is further worsened by the fact that learners pretend to be studying using tablets while they are actual on social media. For now, full ICT integration is still a dream and I hope the excitement of technology per se will have to die first before we realize fully ICT integration. A paradigm shift is needed for both the teachers and learners to appreciate ICTs as learning tools and this is a process that calls for patience from all stakeholders to achieve full ICT integration.

Furthermore, the role of parents and teachers to guide these young minds to ensure that these digital technologies are used appropriately cannot be overemphasized. As of now, this study revealed that learners are still too drunk and too excited with their tablets to put them into good educational use. Applying the TPACK model, it was found that all the three teachers in the study lacked the basic requirements needed for ICT integration. Teachers had a limited pedagogical, content and technical knowledge as well as pedagogical knowledge. Now that all teachers have laptops and smartboards does not necessarily mean that they are using them effectively in the classroom. Serious training is needed in all the parts of the TPACK model to enable constructivist learning through the use of ICTs. Some teachers are still struggling with the basic functions of using a laptop and worse off on integrating ICTs as part of their pedagogy.

As to whether ICTs improve the pass rate, most participants are still to see any meaningful fruits on this front. In a nutshell, these teachers concurred that no meaningful increased pass rates have occurred since they started using ICTs.

Finally, teachers in this study were found to be passive consumers of GDE prepared lesson plans and teaching resources. This also compromised the degree to which they could effectively integrate ICTs in their teacher.

6.4 Recommendations

Based on my research I recommend the following to fully integrate ICTs in the teaching of geography:

Quality hardware should be procured to ensure a steady flow of lessons without the interruption of freezing or malfunctioning laptops or tablets. The quality currently procured for both teachers has made some of the teachers and students to lose faith on the gadgets they are using.

Pedagogical training should be provided so that teachers are equipped with strategies on how to fully integrate ICTs in classroom in a world that was dominated by the use of textbooks. Some teachers still believe that hard copy textbooks are more superior than soft copy textbooks. Training is needed on how teachers can merge tablets, laptops, hard copy notebooks and hardcopy textbooks. Current training seems to concentrate more how to use ICTs more than concentrating on the paradigm shift from a pedagogy of using textbooks to a ICT 'paperless' classroom.

Ways and means need to be put in place that will make it impossible for learners to delete the learning materials such as pictures and videos installed in their laptops. This will stop the willy nil deletion of videos by learners to create space for the music videos for learners. Lessons were disrupted when the teacher realized that the information needed for the progress of the lesson was no longer there in the learner tablets.

School based technicians should put in place so that learner and teacher problem with the hardware should be dealt with promptly without compromising quality learning. Even the service providers who install e-books and other learning resources should be resident at school for a speedy and efficient service delivery.

A symbiotic relationship between the department of education should be developed so that teachers understand or even, have an input on lesson plans and media teachers are provided with. I have found it that it's not easy for the teachers to execute plans that they didn't have an input on. This will remove the passive consumption of GDE prepared lessons and resources without scrutinising and critical thinking. It's like teachers are expected to be someone whom they are not and the universal application of the lesson plan seem to be a challenge.

An accelerated training of teachers is hereby proposed as opposed to the “ovenbaking of teachers after school. Oven-baking has proved to be inadequate because teachers come out ignorant hence their reliance on trial and error and the use of learner as expects in the classroom. Even attitudes for the teachers have been hardened because teachers view the extra time after school to go for computer training as a bother hence negativity to the whole concept of ICT in education. But a concerted effort in training teachers will both equip and create a positive approach from the teachers who are the ultimate implementers of the programme.

Furthermore, systems should be put in place to ensure internet safety for the learners who are vulnerable to illicit consumption of bad stuff from the internet. Filters should be created to keep out materials such as advertisements, hyperlinks and web-links that are deemed anti-social and psychological damaging to the learners.

Very importantly, employment of resident ICT technicians is recommended to ensure a smooth flow of the integration of ICTs in the teaching of geography. Waiting for external assistance is a serious cause for concern especially when the return time is ranging between 3 to 5 days. This is a very long waiting time and destroys confidence in both teachers and students on the viability of ICTs in education.

Finally, security systems need to be put in place to minimize cases of theft and vandalism. These may include encrypting the ICT gadgets so that it becomes difficult for them to be used by any unauthorized person. A system of tracking these tablets and laptops will make it a little bit difficult for thieves to just steal them for resell. Even branding and logos of one form or another may also help to identify these gadgets with ease and understanding without a hassle.

6.5 Limitations of the study

This study provided me with more insight to the ways in which certain teachers are approaching the integration of ICTs in their teaching of geography. My professional and practical understanding of the use of ICT in the teaching of geography has been extended. However, a number of limitations have to be highlighted to put the study in its full perspective. Firstly, only three teachers were interviewed and observed and secondly the integration was only based in one subject. A larger sample populations

including teachers of other subjects should be observed and interviewed in order to make generalisations. Furthermore, the teachers who were respondents were all experienced with 4 to 20 years' experience. Newly qualified teachers could have produced different perceptions particularly taking into account that current teacher training has an ICT component unit in it.

More research on whether ICTs improve the pass rate need to be revisited as a study on its own. This research was inconclusive to confirm real that in fact ICTs real improve the pass rate.

It should also be noted that the study was based only on schools that had ICTs provided by GDE. As a result, private schools and government schools not sponsored by GDE were not included in the study. Their inclusion might have produced a different result.

Finally, the study did not take into account all stakeholders in the investigated schools. Principals, deputy principals, students and parents were not included in the study who may have been a great source of knowledge and more knowledgeable than the teachers.

Nevertheless, the limitations highlighted does not at all limit the validity and reliability of the study. Highlighting these limitations can assist in suggesting directions for further research and implementation for further findings.

6.6 Suggestions for further research

The following are suggested areas for further studies based on the findings of this research. Further research needs to be undertaken on how the use of ICTs help in the pass rate. While the MEC for education in Gauteng has made various pronouncements that ICTs should improve pass rates in schools, a detailed research on this topic is needed.

Secondly, better ways need to be found to better prepare teachers for the introduction and full implementation of ICTs in education.

This study concentrated on teachers, a further research should focus on learners who are the ultimate beneficiary's ICTs particularly in a South African township setup.

Lastly a detailed study is needed on developing a policy that will partner both the district and schools in both policy formulation and implementation. Such policy should take into account possible challenges at both school and district level especially at school where implementation take place.

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Appendix 1: Interview Questionnaires

INTERVIEW SCHEDULES

This research employed ethnographic techniques which are based on a less directed and prescriptive interview techniques. Thus the interviews will be unstructured and conversational and will be organized around themes rather than direct questioning. These interview schedules act as a guide some questions may not be asked while others may be included to elucidate issues. The interview schedule may grow as issues emerge in other interviews.

Title: ICT integration in the teaching of Geography at FET level in Johannesburg East.

Section A

1. What FET subject and grade do you teach?
2. What ICTs are you able to access from the school?

3. Which ICTs do you use in your teaching?
4. When and how do you use them those ICTs at your school?
5. What constraints have you experienced when using ICTs to teach Geography?
6. Is technical assistance available during your lesson presentations? If so, how effective is it to the smooth running of your lesson?

Section B

7. What do you think ICT integration into teaching and learning of your subject mean to you and your students?
8. Where and when do you find the use of ICTs most productive in your teaching?
Explain your answer.
9. Have you identified any improvement in your learners' performance since you used ICTs to teach? Explain your answer.
10. What do you attribute to the improvement or lack of improvement to your learners' performance since you used ICTs to teach?
11. What are critical skills your learners acquire as a result of your use of ICTs?
12. How do you develop these skills in your subject teaching with and without ICTs?

Section C

13. Do you prepare your ICT integration into the lessons on your own? How do you do it?
14. Do you feel you are adequately prepared to integrate ICTs into your teaching?

Motivate your answer.

15. What additional skills or knowledge would you need if you were to integrate ICTs into your teaching effectively?

Appendix 2: GDE Approval Letter



GAUTENG PROVINCE

Department: Education
REPUBLIC OF SOUTH AFRICA

8/4/4/1/2

GDE RESEARCH APPROVAL LETTER

Date:	27 February 2017
Validity of Research Approval:	06 February 2017 – 29 September 2017 2017/09
Name of Researcher:	Ncube N
Address of Researcher:	1 President Street Turf Club Johannesburg, 2190
Telephone Number:	011 434 0199 082 821 1019
Email address:	neverncube@yahoo.com
Research Topic:	ICT integration in the teaching of Geography at FET in Johannesburg East.
Number and type of schools:	Three Secondary Schools
District/s/HO	Johannesburg East

Re: Approval in Respect of Request to Conduct Research

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved to conduct the research. A separate copy of this letter must be presented to both the School (both Principal and SGB) and the District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted.

[Signature] 27/02/2017

The following conditions apply to GDE research. The researcher may proceed with the above study subject to the conditions listed below being met. Approval may be withdrawn should any of the conditions listed below be flouted:

1

Making education a societal priority

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7th Floor, 17 Simmonds Street, Johannesburg, 2001

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Appendix 3: Ethics Letter



Wits School of Education

27 St Andrews Road, Parktown, Johannesburg, 2193 Private Bag 3, Wits 2050, South Africa. Tel: +27 11 717-3064
Fax: +27 11 717-3100 E-mail: enquiries@educ.wits.ac.za Website: www.wits.ac.za

03 March 2017

Student Number: 794024

Protocol Number: 2017ECE001M

Dear Never Ncube

Application for Ethics Clearance: Master of Education

Thank you very much for your ethics application. The Ethics Committee in Education of the Faculty of Humanities, acting on behalf of the Senate has considered your application for ethics clearance for your proposal entitled:

ICT integration in the teaching of Geography at FET level in Johannesburg East.

The committee recently met and I am pleased to inform you that **clearance was granted**. However, there were a few small issues which the committee would appreciate you attending to before embarking on your research.

The following comments were made:

- The data will also need to be stored at the WSoE.
- Section 3.2: Please indicate the ages of the learners as well
- Section 3.5: Learners are vulnerable
- Section 6.1 and 6.2: You talked of confidentiality in both instances, when you were supposed to address questions of confidentiality (6.1) and Anonymity (6.2)

Please use the above protocol number in all correspondence to the relevant research parties (schools, parents, learners etc.) and include it in your research report or project on the title page.

The Protocol Number above should be submitted to the Graduate Studies in Education Committee upon submission of your final research report.

All the best with your research project.

Yours sincerely,

Wits School of Education

011 717-3416

Cc Supervisor: Dr Alison Kearney