THE INFLUENCE OF DIGITAL MEDIA USE IN CLASSROOMS ON TEACHER STRESS IN GAUTENG SCHOOLS

by

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DECLARATION

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The influence of digital media use in the classroom on teacher stress in Gauteng schools

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I declare that the above dissertation is my own work and that all the sources that I have used

or quoted have been indicated and acknowledged by means of complete references.

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SIGNATURE   DATE

ABSTRACT

In 2014, Gauteng Education MEC announced the "Big Switch On" project in which he envisaged paperless classrooms in Gauteng schools over the next three years. He also said that this would see digital media such as iPads and other electronic Tablets replacing textbooks and stationery. He had a vision that the chalkboard would disappear and projectors would take their place. When the MEC for Education introduced the Big Switch On project, he emphasised the positive effects that paperless classrooms will have on the learners. Education authorities were concerned about and wanted to improve the quality of learning and teaching for disadvantaged learners. However, the MEC for Education failed to highlight the possible impact that paperless classrooms will have on educators. It is important that educators are given an opportunity to provide input with regard to the implementation of paperless classrooms.

This study will focus on the perceived stress experienced by teachers in Gauteng, whose schools have been part of the Big Switch On project and have had to mandatorily include the use of digital tablets in their classrooms. This study sought to investigate the influence of digital media use in classrooms on teacher stress in Gauteng schools. It is important to conduct a contextual study that explores the perceived stress factors experienced by teachers in the Gauteng schools that were selected in the Big Switch On project. The research from other contexts can only provide general frameworks regarding the constructs involved. It cannot replace the research conducted specifically for the Big Switch On project.

The purpose of this study is threefold. Firstly, the Big Switch On project has been introduced in 2015 in seven Gauteng schools, and was expanded to 375 schools in the following two years. For many schools, this is a first time, thereby rendering it a scarcely researched topic. The implications and effects of the project have yet to be considered. Secondly, it is often assumed that the use of digital tablets in the classroom makes teachers lives easier and reduces their workload. The research that will be undertaken will address this question scientifically to make reliable and valid conclusions that go

beyond assumptions. Thirdly, related research has indicated barriers and challenges to the implementation of digital tablets in the classroom. The research will address these barriers and make recommendations regarding future implementation of digital tablets in the classroom.

In this qualitative study, I chose a multi-site case study with purposeful, convenience sampling. Two secondary schools that were part of the Big Switch On project were selected. The classrooms in the schools had smartboards, the teachers were given laptops and learners were given tablets. Furthermore, a lot of money was spent on the upgrade of the infra-structure of the schools. These schools were chosen as sites to study the influence of digital media use in the classroom on teacher stress. I chose to interview all levels of teachers and principals, which would allow me to make comparisons as well as provide me with data from which I would be able to reflect on my own practices. I chose to gather data by means of semi-structured face to face interviews.

The data revealed that teachers were not part of the decision-making process to introduce digital media in the classroom. Although teachers cited benefits, they felt that the challenges were frustrating with the implementation of digital media in the classroom. Teachers expressed that the initial workload increased but felt that it would decrease over time. Whilst teachers felt that the quality of teaching has improved, they indicated that the quality of learning has deteriorated because learners use the tablets for off-task behaviour.

Teachers made recommendations that mirrored the recommendations from the literature and if these concerns are addressed, it would make the implementation of digital media in the classroom more effective and at the same time empower teachers.

In order to address school effectiveness, one needs optimum levels of commitment and performance from teachers. Therefore, it is important to emphasize any notion

affecting the performance capability of teachers and learners and to create stress free working conditions. It is with this in mind that the study was conducted.

KEY TERMS:

digital media, tablets, smartboards, secondary schools, teacher stress, quality of learning and teaching, benefits of digital media, challenges of digital media, teacher workload, learner discipline, digital media training, secondary schools.

DEDICATION

I dedicate this dissertation to:

- My husband Mohammad and children Ayesha, Eyaaz and Yusuf, whose faith in me, support and encouragement was instrumental in my completing this study.

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- The principal and staff of the sample schools whose participation made this study possible.

- All the dedicated and committed teachers who make a positive difference by going above and beyond the call of the teaching profession.

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LIST OF ABBREVIATIONS

Some abbreviations used in this study are:

GDE – Gauteng Department of Education

The Project – The Big Switch On Project

SGB – School Governing Body

ICT – Information Communication Technology

DoE – Department of Education

TPACK – Technological, Pedagogical and Content Knowledge

GAS – General Adaptation Syndrome

eBook – Electronic Book

IWB – Interactive White Board

eLicense – Electronic License

WIFI – a facility allowing computers, smartphones or other devices to connect to the internet or communicate with one another wirelessly within a particular area

CHAPTER ONE
ORIENTATION TO THE STUDY

1.1   INTRODUCTION AND BACKGROUND

On 29 June 2014, Gauteng Education MEC Panyaza Lesufi announced to the media that R2 billion had been set aside to realise paperless classrooms in Gauteng schools over the next three years. He also said that this would see digital media such as iPads and other electronic Tablets replacing textbooks and stationery. He envisaged that the chalkboard would disappear and projectors would take their place (Nkosi, 2014). In Tembisa at the official launch of the Big Switch On project, he stated*: "Tomorrow morning in this school, we are officially burying the chalk board, we are officially burying the duster, we are officially burying the chalk."* (Falanga, 2015, p. 2). These are profound words that have had and will continue to have an impact on South African education.

When the MEC for Education introduced the project the Big Switch On, he emphasised the positive effects that paperless classrooms will have on the learners. He said that, *"The department is committed to investing in the futures of young South Africans especially those from disadvantaged communities."* (Bendile, 2015, p. 1). These words highlight the concern of education authorities who want to improve the quality of learning and teaching for disadvantaged learners.

However, the MEC for Education failed to highlight the possible impact that paperless classrooms will have on educators. The feasibility of including the use of digital tablets in the classroom is no longer an issue to be pondered; it is a reality in schools worldwide. For many years schools are using digital tablets in classrooms. The inclusion of digital tablets in the classroom opens a whole spectrum of conflicting opinions and even research approaches.

It is important that educators are given an opportunity to provide input with regard to the implementation of paperless classrooms. As Carl (2005: p.194) succinctly puts it, *"Teachers are regarded as partners in the process of curriculum change. There should, therefore, be an opportunity to make an input during the initial curriculum development processes."* Carl (2005) adds that the teacher is the curriculum and that teachers' direct involvement will determine the level of success.

Teacher unions raised concerns about the department's timing to transform classrooms. Teachers were given training but had not been given enough time to adjust and to familiarise themselves with the technology (Mashaba, 2016). A principal from a school in Soweto said that he blamed the drop in matric results on the introduction of the tablets. A learner from Tembisa who failed her exams admitted that they focused more on enjoying the perks that came with the tablet than on studying (Mashaba, 2016).

David Warlick is an educator, author, programmer and public speaker. He is an early adopter and promoter of technology in the classroom, Warlick has taught and written about technology integration and school curriculum for more than 30 years. He has also developed instructional software and interactive Websites to support teachers and students in using computers and the Internet for education. In 2011, David Warlick was named one of the Ten Most Influential People in EdTech by Technology & Learning Magazine (Habley, 2014).

David Warlick is among many top educators and administrators who view the idea of a paperless classroom as an inevitability in education. In today's digital age, these educators believe that a paperless classroom promotes a more efficient and organized classroom while preparing learners for the practical world outside classroom walls. However, implementing a plan through technological mediums such as digital media still necessitates the same care and mindfulness of creating a conventional lesson plan, and transitioning to online platforms isn't without its own unique hurdles (Staff, 2014).

Oigara and Ferguson (2017) from the Department of Teacher Education at Canisius College in the USA, conducted a study in the Northeast USA. Their study found that the majority of teachers believed that the iPads played a significant role in the teaching-learning process to engage learners in the classroom. They also found that teachers responded with concerns that iPads caused learner distraction and allowed off-task behaviours in the classroom.

It is vital that educators are knowledgeable and comfortable with administering all Web tools to be used in the classroom. Web tools are revolutionary new ways of creating, collaborating, editing and sharing user-generated content online (Anon, 2014). A lack of in-depth educator training will inevitably cause hiccups in workflow, cause undue teacher and student frustration, and compromise classroom efficiency (Staff, 2014).

Teaching has been cited as one of the 5 most stressful jobs in South Africa (Vandeyar, 2013). A slew of policies and technologies promising to dramatically revolutionize teaching and education over the past decade has not only failed to produce desired results, it has also led to a decline in teacher morale, with large numbers leaving the profession (Ward, 2015).

According to Van der Merwe (2013), school stressors include a lack of proper direction from the Department of Education in the face of continuous change, which causes uncertainty and conflict when dealing with important curriculum related decisions. This is particularly evident with the introduction of digital tablets in Gauteng classrooms in the Big Switch On project.

Magubane (2016) illuminates that an analysis of data from the Organisation of Economic Co-operation and Development (OECD) shows that more than 17000 South African teachers were working abroad in 2015. Reasons given by teachers who leave the teaching profession include inadequate pay, increased workload, poor relations with the education department, lack of professional recognition, dissatisfaction with work policies and job security (Lemmer & Van Wyk, 2010).

It is evident that new policies and curriculum changes create opportunities as well as challenges for teachers. The Big Switch On project, introduced by the MEC for Gauteng Education in 2015, has been the subject of media scrutiny. Seventeen billion rand has been invested in the project. Teachers are the most important resources in the implementation of any new changes in the classroom. For this reason, it is important to ask whether teachers were part of the decision-making process in the implementation of digital tablets in the classroom in Gauteng public schools? It is also important to ask to what extent has the introduction of digital tablets in the classroom contributed to the perceived stress levels of teachers? Furthermore, we must ask, has the introduction of digital tablets in the classroom enhanced the quality of learning and teaching in schools? Finally, how can the dissemination of digital tablets be undertaken to empower teachers and reduce stress?

1.2   RATIONALE FOR THE STUDY

In my experience as a teacher, I found myself frequently asking that if learners from underprivileged schools received digital media in their classrooms, how would it impact on the quality of learning and teaching? I was fortunate to be part of a school which was selected for a full ICT roll out in 2014. I was very excited as I looked forward to the digital divide being narrowed. However, my excitement soon turned to dismay when the school did not get a full ICT rollout and I was presented with the challenges of learners having tablets in the classroom. The challenges turned to frustrations which led to a certain amount of stress. I would still like to see digital media being used optimally in the classroom and sought to look at other teachers' perceptions on the implementation of digital media in the classroom.

This study will focus on the perceived stress experienced by teachers in Gauteng, whose schools have been part of the Big Switch On project and have had to mandatorily include the use of digital tablets in their classrooms.

The rationale for this study is threefold. Firstly, the Big Switch On project has been introduced in 2015 in seven Gauteng schools, and was expanded to 375 schools in the following two years. For many schools, this is a first time, thereby rendering it a scarcely researched topic. The implications and effects of the project have yet to be considered. Secondly, it is often assumed that the use of digital tablets in the classroom makes teachers lives easier and reduces their workload. The research that will be undertaken will address this question scientifically to make reliable and valid conclusions that go beyond assumptions. Thirdly, related research has indicated barriers and challenges to the implementation of digital tablets in the classroom. The research will address these barriers and make recommendations regarding future implementation of digital tablets in the classroom.

It is important to conduct a contextual study that explores the perceived stress factors experienced by teachers in the Gauteng schools that were selected in the Big Switch On project. The research from other contexts can only provide general frameworks regarding the constructs involved. It cannot replace the research conducted specifically for the Big Switch On project.

1.3   STATEMENT OF THE PROBLEM AND OBJECTIVES

1.3.1 Research questions/hypothesis

This situation described above raises the main research question for the study:

How does the use of digital media in the classroom influence teacher stress in Gauteng schools?

To help provide an answer to this question, the following secondary research questions or sub-questions have been developed:

- How can teachers be involved in the decision-making process on the implementation of digital tablets in Gauteng public schools, and thus reduce stress?
- How has the introduction of digital tablets in the classroom contributed or lessened the perceived stress levels of teachers?
- In which way has the introduction of digital tablets in the classroom enhanced the quality of learning and teaching in schools and reduced the stress of teachers?

  In which ways can the dissemination of digital tablets be undertaken so as to empower teachers and reduce stress?

1.3.2 Aims and objectives of the study

The main objective or purpose of this study is to provide an overview of the perceptions of stress encountered by educators in the Gauteng schools that were part of the Big Switch On project. The study will focus on the Gauteng public schools that have had to 'bury the chalkboard' and adopt new technology to teach.

This researcher will determine the teachers' views and perceptions on their overall experience of having paperless classrooms in Gauteng public schools. It is a social issue and of immediate concern. The research will highlight areas of perceived stress of educators, will question whether indeed the quality of teaching and learning has been enhanced, and will put forth recommendations for future dissemination of digital tablets in the classroom. If technology is going to be implemented, the change must be managed to empower teachers and reduce stress levels of teachers. Teachers must be involved and consulted in every stage of the change.

The research conducted will consider the perceptions of the most important educational resources, the teachers, and the effect digital tablets in the classroom has had on them. The research will evaluate teachers' perceptions from the conception of the idea of using digital tablets in the classroom through to the actual implementation of digital

tablets in the classroom. It will also question whether the quality of learning and teaching has improved.

In so doing, the proposed study will make an evaluation of the government education policy of introducing digital tablets in the classroom and its effect on the teachers. Evaluation research assesses the merit and worth of a particular practice, whether the practice works. It also determines whether the practice is worth the associated costs of development, implementation and widespread adoption (McMillan & Schumacher 2014).

To achieve this goal, the following research sub-aims have been formulated to guide this study in discussing the issue of digital tablets in Gauteng's public schools:

- To determine how teachers can be involved in the decision-making process on the implementation of the digital tablets in Gauteng public schools, and reduce their stress
- To determine how the introduction of digital tablets in the classroom has contributed or lessened the perceived stress levels of teachers?
- To determine in which way the introduction of digital tablets in the classroom has enhanced the quality of learning and teaching in schools, and reduced stress of teachers.
- To determine ways in which the dissemination of digital tablets can be undertaken to empower teachers and reduce stress among them.

1.4   PRELIMANERY LITERATURE REVIEW

In general, researchers who have explored the effect of digital tablets in the classroom have found that teachers experienced challenges in the use of technology in classrooms. They have also found that the more support teachers receive, the easier the transition and the change can be. South African studies identified new curriculum approaches as a possible stressor. Educators who are set in their ways could find it

more difficult to adapt to curriculum changes and new teaching approaches (Schulze & Steyn, 2007). The introduction of tablets in Gauteng classrooms in the Big Switch On project is a new way of approaching the delivery of curriculum and requires new teaching approaches, so it would be a stressor for teachers.

New innovations such as digital technology, smart boards, internet, and computer teaching aids can make the educators' skills obsolete in a very short period of time. The older and seasoned educators are not too comfortable and do not have the know-how to embrace technology and will result in stressful situations for the educators and the learners (Naidoo, Botha & Bischoff, 2013). Inadequate or irrelevant educator training programmes also influence the development of stress, because these fail to provide educators with the required skills to meet the demands of teaching. Inadequately trained educators lack self-confidence, doubt their ability to communicate effectively with learners and feel disempowered (Schulze & Steyn, 2007).

As the demands on educators and schools increase, so does the incidence of stress in the teaching profession. Although some pressure is necessary for people to perform effectively, excessive pressure may lead to distress, poor teaching, poor decision-making, lowered self-esteem, low job satisfaction and lack of commitment in terms of remaining in the profession (Schulze & Steyn, 2007).

The digital shift has also created more work for teachers. Beth Hughes, who teaches English in a paperless classroom at Wakefield High School, said she spends hours each night responding to student e-mails, while viewing their blogs, videos, and listening to their podcasts. And from 4 to 6 every morning, she catches up on any other curriculum or grading that's necessary. Teachers, like students, need to find a balance while using technology (Rosenburg, 2016).

Various countries have introduced ICT in various forms over the years in schools. It is evident from the literature research conducted that the introduction of ICT in schools has presented both benefits and challenges. Carver (2016), warns that even though

schools have embraced the digital revolution, reading and mathematics scores are at about the same level that they were 40 years ago. Consequently, the positive impact of technology does not happen automatically; its impact is determined by how teachers use the technology in their classroom instruction.

Tilton and Hartnett's research (2016) involved participants from a school in Germany. Teachers were provided with iPad mini devices, professional development sessions, subject specific instruction on their devices, presentations and access to an ICT coordinator. This was before learners were given their devices. They concluded that an individual's belief in their ability to master new skills and develop competence continues to be a key aspect of any process of acceptance of change.

Green's research (2016) confirms that teachers face various types of barriers and become reluctant to use technology within their curriculum driven lessons. Green's research discovered that there were time constraint issues, inadequate number of devices, professional development/training concerns, and lack of knowledge. He conducted his research in the United States where educational authorities were implementing 1:1 technology, i.e. where one child has access to one computer, iPad or tablet.

Research conducted by Ditzler, Hong and Strudler (2016) in the United States in the 1:1 laptop program indicated that some challenges faced by teachers were that teachers felt that learners do not think of the iPad as a learning tool; frustrations with internet connections; the iPad is a convenience tool not a learning tool; the temptation to play games were an enormous distraction and difficulty in choosing the appropriate apps from the multitude of apps available. Furthermore, in their conclusion they said that teachers were not successful with the integration of technologies in their classrooms for teaching and learning.

Pinker (2015), clearly says that being charitable to students, especially those from struggling families, will not shrink the class divide in education, if anything, it will widen it. Pinker adds that with no adults to supervise, many learners use their devices to play

games, troll social media and download entertainment. This resulted in an adverse effect in reading and math scores.

Alqallaf (2016) conducted his research in Kuwaiti schools. He concluded that the barriers to the use of technology in classrooms, based on teachers' perceptions, were budget constraints, IT limitations, time constraints and administrative support. Isci and Demir (2015) found in their study within the scope of FATIH Project in Turkey that the teachers did not use the tablets in the classroom for reasons such as technical problems and not having sufficient in-service education and the tablets have become play things for the students. The study was conducted with a qualitative case study method. The participants in the study were determined by using critical case sampling. Nurzali (2015) has elaborated on policy and investigates the actual practice related to the integration of new media in schools. He says that despite continuous government effort to integrate new media in schools, the use of digital technologies for teaching and learning in the classroom remains limited. His study suggests that, apart from the issue related to the state of technological infrastructure, other related factors, including school's leadership and policy, and teachers' attitude and knowledge of new media, can also influence the integration of digital technologies into the classroom. Hence, it is important for schools to develop a comprehensive policy of new media, to ensure that the technological infrastructure is carefully managed and maintained. Schools also should provide teachers with continuous professional development opportunities, to ensure that their knowledge and skills of new media remain relevant in the constantly changing digital environment.

Du Plessis and Webb (2012) used a qualitative interpretive exploratory case study to investigate teachers' perceptions from South African township schools in the Port Elizabeth district. They concluded that it is a complex task for those who aspire to meet the challenge of effectively promoting the use of ICT in schools.

The research conducted will be specifically for the Gauteng public schools in South Africa that were selected for the Big Switch On project. The research will question

whether teachers were part of the decision-making process for the Big Switch On project; it will address perceived stress factors experienced by the teachers that were part of the Big Switch on project; whether the Big Switch On project has enhanced the quality of learning and teaching as perceived by the teachers and how the change of implementing tablets in the classroom can be managed to make teachers feel empowered.

1.5   RESEARCH METHODOLOGY AND DESIGN

1.5.1 Research approach

To examine the perceived stress levels of teachers who have had to adopt the use of digital media in their classrooms during the Big Switch On project, this study will engage in a qualitative case study research design. It is an ideal method for investigating the impact of policy on practice (McMillan & Schumacher, 2014; Creswell, 2013) because this method will enable the study to position the participants' experiences, perceptions and decisions in relation to both the specific demands presented by their school and district requirements as well as to the state and national legislation that shaped those requirements. Qualitative research is an accepted methodology for many important questions, with significant contributions to both theory and practice. In addition, the case studies are intended to provide detailed, specific accounts of particular circumstances rather than offering broad, generalizable findings (McMillan & Schumacher, 2014; Yin, 2014).

1.5.2 Population and sampling

The study will potentially conduct a survey of all levels of teachers and principals at two out of the seven Gauteng schools in which the Big Switch On project was launched for paperless classrooms. These seven schools are therefore the population of the study.

The data will be collected using non-probability, purposeful sampling. Non-probability sampling does not include any type of random selection from a population. Rather, the research will use teachers who represent certain types of characteristics, in that they are part of the Big Switch On project (McMillan & Schumacher, 2014; Morse et al., 2015). In purposeful sampling, particular elements from the population are selected, that will be representative or informative about the topic of interest (McMillan & Schumacher, 2014; Creswell, 2015).

The population will be made up of all levels of teachers, with different skills, and differing years of teaching experience. The teachers involved in the research will be from mixed socio-economic status, race and gender. Teachers will be selected from schools that were selected for the Big Switch On project and will be asked to participate in the study. The sample will be made up of five teachers and a principal, from two of the seven public schools chosen for the Big Switch On project in Gauteng, South Africa. The emphasis of the research will be on representativeness as well as in selecting cases that are information rich. Hereafter, the Big Switch On project will be referred to as 'The Project'.

1.5.3 Instrumentation and data collection techniques

A qualitative case study has been chosen as a research method for the obvious reason that the study needs to develop a holistic understanding of the perceived stress encountered by teachers who have had to use digital media in their classrooms as part of the Project. A case study is a flexible form of inquiry best suited for studying a particular phenomenon within its natural context (McMillan & Schumacher, 2014; Creswell, 2013). Accordingly, the study will rely on semi-structured face to face interviews.

Face to face interviews are used so that the interviewer has better control over the types of information that they receive, they can pick their own questions, and if worded effectively, questions will encourage unbiased and truthful answers (Creswell, 2013;

McNamara, 1999). This offers an advantage over self-completion methods, such as surveys, because the participant is more likely to give their full attention and the interviewer can deduce the quality of each response (Marshall, 2016).

Following a case study perspective, the study seeks to understand the teacher's viewpoint and therefore semi-structured interviews will be conducted. The semi-structured format guarantees that each open-ended question is asked, following a predetermined interview guide (McMillan & Schumacher, 2014, Creswell, 2013). All interviews will be audio-taped with participants permission and field notes will be kept during the session and after the session.

1.5.4 Data analysis and presentation of data

The qualitative data that will be obtained from the face to face and semi-structured interviews, will be organized using pre-determined categories. The data will be coded and the codes will be compared for duplication. In the process of data analysis, patterns will be identified to establish the main ideas emerging from the data.

The qualitative data will be presented using selected quotes that are poignant and/or most representative of the research findings. The setting and speakers will be established in the text at the end of the quote.

1.6   CREDIBILITY AND TRUSTWORTHINESS

The credibility of the findings will be verified through data triangulation (McMillan & Schumacher, 2014; Patton, 2001) by using field notes and verbatim transcripts. Triangulation is the cross validation among data sources, data collection strategies, time periods and theoretical schemes. To find regularities in the data, the study will compare different sources, situations and methods to see whether the same pattern keeps recurring.

In qualitative studies, researcher bias occurs when the researcher selects data that fit his/her existing theory or preconceptions and selects data that stand out to the researcher. To establish trustworthiness, the exact texts from the participants' survey will be used directly during the coding process. For the second validity threat, McMillan and Schumacher (2014) suggest that eliminating the actual influence of the researcher is impossible and the goal in a qualitative study is not to eliminate this influence, but to understand it and to use it productively. The data will be presented objectively and used in my personal interpretations only to interpret the findings and in the conclusion. As the data will be collected from face to face interviews, the individuals studied will not face any of my personal influence.

Trustworthiness can be demonstrated using the four criterions: credibility, transferability, dependability and confirmability (Babbie & Mouton, 2011). However, for this study trustworthiness will occur through credibility and transferability. Credibility will occur through triangulation of the open-ended interview questions. These methods will ensure that the data is rich, thick and comprehensive and will confirm the consistency of the findings of the data. Transferability may occur if thick descriptions of data with sufficient and precise details are given within the context of the Gauteng schools selected for The Project. Purposive sampling verifies the trustworthiness because teachers will be carefully selected from schools that were selected for The Project and they have a range of information that is relevant for the particular context.

1.7   RESEARCH ETHICS

The costs to participants will involve psychological difficulties such as anxiety, shame and loss of self-esteem. Such costs, if a potential result of the research, are weighed against the benefits for the research participants, and future participants in projects like the Big Switch On.

The researcher will be open and honest with all participants about all aspects of the study. It will involve a full disclosure of the purpose of the research. Participants will not

be compelled, coerced, or required to participate. All participants will participate voluntarily. This voluntary aspect can be a barrier to conducting the research especially if large percentages of potential participants decide not to participate.

Informed consent will be achieved by providing participants with an explanation of the research, an opportunity to terminate their participation at any time with no penalty, and full disclosure of any risks associated with the study. The research may result in a certain degree of mental discomfort to the participants. As a researcher I would have to carefully anticipate such risks and do whatever is needed to minimize them. The privacy of research participants will be protected. This means that access to participants' characteristics, responses, behaviour and other information will be restricted to me. Privacy will be ensured by anonymity, confidentiality and storing the data appropriately.

An ethics clearance certificate will have to be obtained before data gathering occurs from the research ethics committee at UNISA. Permission to do the research will have to be obtained from the Gauteng Department of Education. A search will be conducted to establish the schools that were involved in the Project. The Education Department in Gauteng will be contacted to obtain this information.

Principals of the particular schools will have to be contacted in order to establish contact with the teachers. Appointments will have to be made to provide a synopsis of the research project, the questions involved and to make appointments with participants at the various schools. The time and place for the face to face interviews will have to be mutually agreed upon by the participants and the researcher.

The schools will be purposefully selected to obtain information from two schools that had the full ICT roll out. Subsequently, the principals of the particular schools will have to be contacted in order to establish contact with the teachers. The participants will have to be assured of anonymity of participation.

1.8   LIMITATIONS AND DELIMITATIONS OF THE STUDY

The limitations of the study will include legal and ethical considerations. The study will focus primarily on human beings. I will be ethically responsible for protecting the rights and welfare of the participants who participate in the study. Informed consent will have to be obtained from the participants and the confidentiality of data and privacy of the participants will have to be protected. Another limitation will be history; this is the amount of time that has lapsed between the inception of digital tablets in the classroom and the research conducted. The time lapsed may affect the participants' responses. In addition, participants cannot be studied meaningfully by ignoring the context of real life. South Africa has had many changes to the educational system since 1994, and its social, economic and political structures continue to affect education.

Another limitation of the study will be subject effects. Subject effects refer to changes in behaviour initiated by the participants themselves in response to the research situation (McMillan & Schumacher, 2014; Flick, 2014). In this study participants may want to increase positive or desirable behaviour, by trying to appear intelligent, competent and emotionally stable, which may affect the results. Mono method bias refers to limitations based on a single way of measuring variables (McMillan & Schumacher, 2014; Creswell, 2013). There are many ways used to measure stress. The semi-structured face to face interview will be used to measure stress and inferences will be limited to this method. The final constraint on this study will be methodological difficulties. This study will measure a complex human characteristic, that is, perceived stress levels of educators. It will involve formulating conceptual definitions and deciding on issues of validity.

A delimitation of the study will be the selection of participants. When digital tablets were given to learners at schools, some schools did not have a full ICT roll out and others did. The participating educators from these different schools may have differing views. All schools that were selected for The Project will not be selected for the study due to time and resource constraints. Another delimitation is attrition. Attrition occurs when

participants systematically drop out or are lost during the investigation. This study will not be able to determine the attrition of teachers from the system due to The Project.

1.9   DEFINITION OF KEY CONCEPTS

1.9.1 Stress

Stress relates to a person's perception of risk factors in the environment and his or her assessment of whether personal resources to meet the environmental challenges or whether, on the other hand, he or she will become overwhelmed. Frequent exposure to stressors can have far-reaching physical, emotional and psychological consequences (Van der Merwe, 2013).

1.9.2 Tablets

A tablet computer, commonly shortened to tablet, is a thin, flat mobile computer with a touchscreen display, which is usually in colour, processing circuitry, and a rechargeable battery in a single device. Tablets often come equipped with sensors, including digital cameras, a microphone, and an accelerometer so images on screens are always displayed upright. The touchscreen display uses the recognition of finger or stylus gestures to replace the mouse, trackpad and keyboard used in laptops.

Tablets are typically larger than smartphones or personal digital assistants with screens 7 inches (18 cm) or larger, measured diagonally. However, much of a tablet's functionality resembles that of a modern smartphone, like having a virtual keyboard or running a dedicated 'mobile' operating system.

Tablets can be classified according to the presence and physical appearance of keyboards. Slates and booklets do not have a physical keyboard, and usually accept text and other input by use of a virtual keyboard shown on a touchscreen-enabled display. Hybrids, convertibles, and 2-in-1s do have physical keyboards (although these

are usually concealable or detachable), yet they typically also make use of virtual keyboards. Some 2-in-1s have processors and operating systems like a full laptop, whilst having the flexibility of being used as a tablet. Most tablets can use separate keyboards connected using Bluetooth (PC Magazine, 2010).

1.9.3 Digital tablets in the classroom

The devices give students and teachers a mobile source for information, textbooks, interactive media, and a wealth of tools through downloadable applications, frequently referred to as apps (Pilgrim, Bledsoe, & Reily, 2012).

1.9.4 The Big Switch On

The Big Switch On was a project envisaged by the MEC for Gauteng Education, Panyaza Lesufi, in 2014. The project envisaged classrooms in Gauteng turned into classrooms of the future, enabling learners to have access to learning material through the use of information communications technology (ICT).

As part of the project the Gauteng Department of Education promised to equip each leaner with a tablet, each teacher with a laptop, each classroom with an interactive smart board, an upgrade of school infra-structure and access to the internet.

1.10 CHAPTER OUTLINES

The research will be expounded as follows:

Chapter One will be an orientation of the study, with an introduction to the topic of study, rationale and background to the research problem: *How has the introduction of digital media such as Tablets in the classroom contributed to or lessened perceived stress of teachers?* The chapter will also focus on the statement of the problem, aims

of the research, research design and methodology, assumptions, limitations and delimitations, concept clarification, ethical considerations, as well as a plan of study.

Chapter Two will review relevant literature on the use of digital media such as tablets in the classroom. International and local literature centring on inclusion of teachers as part of the decision-making process, teacher stress, teachers' perceptions on the use of digital media such as tablets in the classroom and the impact on the quality of learning and teaching with the introduction of digital media in the classrooms will be explored. The study will also examine how digital media can be disseminated to empower teachers.

Chapter Three will discuss the research design, development of the research instrument, population and sample. The research methodology will be based on a qualitative research design. Semi-structured face to face interviews will be conducted with teachers and principals who were part of The Project.

Chapter Four will discuss in detail the findings of the study. Data will be collected, analysed and interpreted. Attempts will be made to relate empirical findings to literature findings. The research will attempt to find out if the introduction of digital media such as tablets in Gauteng schools has increased perceived stress levels of teachers. The research will also attempt to discover if the quality of learning and teaching has improved with the introduction of digital tablets in classrooms that were part of The Project in Gauteng.

Chapter Five will present a summary of the findings, make recommendations and draw conclusions from the research.

1.11 CONCLUSION

A review of several investigations carried out on the use of technology in the classroom is presented above. From the literature it is evident that technology in the classroom

has its merits and its drawbacks. The research will ask teachers to what extent they were part of the decision-making process on the introduction of tablets in the classroom in The Project. The research that will be conducted will be a scientific study of teachers perceived stress levels with regard to the introduction of tablets in Gauteng classrooms during The Project. The research undertaken will also determine if the quality of learning and teaching in these schools has been enhanced by the introduction of tablets in the classroom as perceived by the teachers. Furthermore, the research will look at ways in which the dissemination of digital tablets can be undertaken so as to empower teachers. The research will be a qualitative case study design where the participants will be all levels of teachers and principals whose schools were chosen for The Project in the Gauteng province.

CHAPTER TWO
LITERATURE REVIEW

2.1   INTRODUCTION

This chapter presents a theoretical background for the study as it reviews relevant literature on the use of digital media such as tablets in the classroom and the concept of stress in the classrooms. International and local literature centring on inclusion of teachers as part of the decision-making process, teacher stress, teachers' perceptions on the use of digital media such as tablets in the classroom and the impact on the quality of learning and teaching with the introduction of digital media in the classrooms will be explored. The chapter will also examine how digital media can be disseminated so as to empower teachers.

2.2   THE IMPLEMENTATION OF ICT IN CLASSROOMS

2.2.1 Introduction

Worldwide education departments are implementing ICT (Information Communication Technology) policies. According to a UNESCO document (UNESCO, 2011), there is no consensus regarding the actual benefits of digital media in the classroom in ensuring quality learning. UNESCO warns that while there may be a potential value of ICT in education, many countries face significant challenges in transforming the promises of technology into tangible benefits for learning. ICT in education requires taking into account teacher capacities, which are defined as a combination of competencies, motivation and the characteristics of teachers' working environment. Addressing this challenge involves a cultural change for teachers which cannot always happen rapidly.

The trajectory of research on digital media in education has been an interesting one. The focus of digital media in education research was on the needs of learners, as well

as on the rationale on a broad philosophical, political and practical stage. Recently there has been a shift by also focusing on the teachers involved in the process of usage of digital media in the classroom (Kiridis, Drossos and Tsakiridou, 2006; Mukhari, 2016). The provision of teaching practices for the classroom with digital media is an important aspect of this process. However, a prerequisite for effective teaching practices in the classroom with digital media is the dire need for teachers to be supported effectively in education. Otherwise they may not implement the most inclusive teaching strategies because they may be overburdened and stressed. Hence areas where teachers experience most stress should be identified – and in an effort to support them effectively, assumptions about stress should not merely be made.

2.2.2 ICT education policy and practices in South African classrooms

ICT in the education arena has been on the policy agenda in South Africa since 1996 (DoE, 1996). National focus on ICT as a catalyst for economic growth and social development has prompted provincial governments to respond by initiating ICT projects in education. In 2000, "Khanya" and "Gauteng-On-Line" were education initiatives of the Western Cape Province and Gauteng Province respectively in pursuit of provincial economic development. These projects may be considered as the first 'education-centred' initiative not only in South Africa, but in Africa as a continent. However, there was no guiding policy on how the relevant stakeholders would implement ICT in education objectives. Finally, in 2004 the Department of Education responded with the e-Education policy and motif of 'transforming learning and teaching through information and communication technologies' (DoE, 2004).

The e-Education policy (DoE, 2004) and the Guidelines for Teacher Training and Professional Development in ICT and Training (DoE, 2007) are two main policy documents that frame the ICT in education policy environment. The main principle of the e-Education policy is the achievement of national education goals by 'providing modern technologies to schools in order to enhance the quality of learning and

teaching' (DoE, 2004, p. 6). The second mentioned policy for Teacher Training and Professional Development in ICT and Training (DoE, 2007) identifies ICT knowledge, skills, values and attitudes required by teachers to implement the national curriculum effectively. Though this policy makes frequent reference to meeting the principles of the e-Education policy, it falls short of defining specific roles and responsibilities of provinces and district e-learning directorates to support schools. The e-Education policy also allocated specific roles and responsibilities at various systemic levels.

At national level the e-Education policy expects the Department of Basic Education (DBE) to develop a national framework for ICT competencies for teachers, school managers and administrators. The national DBE was also mandated to: revise the norms and standards for teachers, review in-service and pre-service training programmes as an enabling factor for teachers to use ICT, create appropriate teacher accreditation with an ICT focus and allocate a dedicated ICT trained teacher to support teaching and learning. The e-Education policy mandates provinces and districts to provide schools with both professional and technical support. In response to this policy directive, e-learning directorates were established at district and provincial levels to support schools in the implementation of the e-Education policy objectives. The policy tacitly expects that provinces, districts and schools would take up the challenge to drive the process beyond ICT planning and ICT experimentation. However, the policy does little to direct provincial and district officials to comply with policy mandates and strategies to change teachers' pedagogy.

At institution level the e-Education policy suggests that school managers and administrators promote the use of ICT, with the realisation that ICT is a 'transformative tool' for education. To date, the e-Education policy has made significant strides in developing and supporting ICT administrative systems in institutions but falls short from achieving the main strategic target of influencing and changing classroom practice. Sadly, the e-Education goals that every learner will be ICT capable by 2013; that teachers will be qualified and competent to enhance teaching and learning; that schools

will become e-schools fostering socio-economic growth is far from being achieved (Vandeyar, 2013).

Despite policy implementation delays, the introduction of ICT into the South African education system has become common place in most schools. ICT as a 'new' teaching technology gradually made its entry into a broader range of schools, without schools being ready to exploit its usefulness to improve the quality of teaching and learning. Recently principals, school governing bodies and communities are demanding a higher return on investment on ICT (other than for administrative purposes), that ICT needs to enhance teaching and learning (Vandeyar, 2013).

2.2.3 The 'Big-Switch-On' project

It was with a directorate given at National level that The Project was introduced in 2014, by the MEC for Education, in the Gauteng Province. The launch of this project, 'The Big Switch On' will see classrooms in 375 schools in Gauteng being turned into 'Classrooms of the Future', enabling learners to have access to learning material, workbooks and other subject matter through the use of Information Communications Technology (ICT). These schools will experience for the first-time state of the art technology to support effective teaching and learning in the classroom. The Project is the first step in realising Gauteng's vision which aspires to build a world-class education system by modernising public education and improve the standard of performance of the entire system.

Minister of Education Angie Motshekga (2015) said in her speech at the launch of the second phase of the project that each leaner will be equipped with a tablet, each teacher with a laptop, each classroom with a laptop and interactive smart board. These schools will experience for the first-time state-of-the-art technology to support effective teaching and learning in class. The project is standing on six pillars, namely:

- Connectivity
- Devices
- E-Learning content
- Training and Development (Teachers and Learners)
- Support, security and maintenance
- Refurbishment and renovation

Motshekga (2015) envisioned that technology would assure equity to any learner irrespective of their race, class or gender. She hoped that ICT in education would break the recurring shackles of poverty. The Gauteng 'Schools of the Future' Program's thrust was the enhancement of the education system's ability to continuously improve through better and more widespread use of data, research and evaluation, innovation and technology. Through this project, the Gauteng Provincial Education Department planned to advance ICT connectivity and equipment to enable learners to have access to learning material, workbooks and e-books. In enhancing the implementation of the e-Learning program, educators in these selected schools should have been trained in the use of the equipment to facilitate teaching and learning in class through modern technology.

Motshekga (2015) also expected that results in these schools should improve considering the massive investment in the project. She emphasized that communities, teachers and learners had to safeguard the resources. She said that all schools had to be ICT enabled and compliant by 2019.

2.2.4 Conclusion

The Project introduced digital media in the form of tablets to learners at Gauteng schools. The study will examine the influence the introduction of digital media in the classroom has on the perceived stress levels of teachers who had to adopt the use of the digital media in their classrooms. The study will examine whether teachers perceive

the introduction of digital media in the classroom contributing to the improvement in the quality of learning and teaching.

2.3   DIGITAL MEDIA IN THE CLASSROOM

2.3.1 The history of digital media in the classroom

We live in a rapidly evolving world in which social, educational, economic, political and technological contexts are changing ever faster. The constructs of social justice, democratisation and globalisation have contributed to the breaking down of barriers and the creation of inclusionary practices in a variety of contexts – be it educational, economical or political (Cornali & Tirocchi, 2012). In terms of education, the notion of digital media in the classroom is premised on the belief that *all* learners – regardless of their disability, social background, cultural origin, religion or language, should have equal access to digital media in the classroom to attain quality learning and teaching. The purpose of integrating ICT in the classroom has been stated as being "*to improve and increase the quality, accessibility and cost-efficiency of the delivery of education, while taking advantage of the benefits of networking learning communities together to equip them to face the challenges of global competition*" (Lloyd, 2005, p2).

In order to understand the move towards including digital media in the classroom, it is important to consider the global contexts and the societal forces that led to this movement. It is also important to understand the way in which including digital media in the classroom impacts on the levels of teachers perceived stress levels, and whether the inclusion of digital media in the classroom does indeed improve the quality of learning and teaching.

This discourse is relevant for the research underlying this study, as it illuminates the background and the philosophical underpinnings of the move towards including digital media in the classroom. It also underlines the importance of exploring the nature of the perceived stress encountered by teachers working with digital media in the classroom.

There is a need for constant collaboration and communication among all the stakeholders in the process of including digital media in the classroom (Chai, Koh, Lim & Tsai, 2014).

2.3.2 The expanded TPACK framework of digital media in the classroom

For the purpose of this study the theoretical framework for the study of digital media in classrooms as advocated by Chai et al. (2014) will be used.

2.3.2.1   *Understanding the TPACK framework*

TPACK is an approach to designing ICT integration that recognizes the complex issues that teachers face in the classroom (Mishra & Koehler 2006, Chai et al., 2014). Six types of knowledge can be drawn upon to form TPACK. TPACK begins with three foundational forms of knowledge, namely TK (technological knowledge), PK (pedagogical knowledge), and content knowledge (CK). However, educators also need to draw upon the intermediate knowledge formed through two interacting types of foundational knowledge to create TPACK. These intermediate forms of knowledge are technological pedagogical knowledge (TPK), technological content knowledge (TCK), and pedagogical content knowledge (PCK). TPK denotes the PK associated with the use of specific ICT (e.g., how to facilitate learning with discussion forums); TCK denotes technological knowledge embedded with CK (e.g., Google Earth for geography); while PCK refers to knowledge about how to teach certain content to specific groups of students (e.g., using water flow to teach the concept of electric current).

TPACK may be formed through multiple pathways depending on the breadth and depth of the teachers' existing knowledge; the more knowledgeable an educator, the more easily he/she could formulate an ICT integrated lesson. If the educator possesses more knowledge of the technology, pedagogy, and content, as well as the interrelated

knowledge, he/she will be able to design more appropriate artifacts for ICT in education (Chai et al., 2014).

For any lesson to achieve optimal outcomes, the teachers cannot rely on the standardized application of a pre-designed lesson but must customize the lesson to suit the students' profile, such as their prior knowledge. In other words, TPACK is an epistemologically dynamic and situated form of knowledge (Mishra & Koehler, 2006). One limitation of the TPACK framework is that the "context" in question concentrates only on the classroom and has ignored the influences of the larger sociocultural context. For instance, building on the variables that emerged from earlier ICT integration research, Chai et al. (2014) have suggested four categories of contextual variables that influence and are influenced by teachers' efforts in creating TPACK. The physical and/or technological environment obviously contains some basic variables that enable or constrain teachers' design of TPACK. For example, the classroom management strategies to be adopted for an ICT class for teachers who have access to network-based classroom management technology are much simpler than for those teachers who do not have such access. The intrapersonal category accounts for teachers' intra-mental variables such as their pedagogical beliefs, attitudes towards ICT, etc. Teachers' with constructivist beliefs have been found to be more inclined to use ICT as cognitive tools. As TPACK is usually constructed by teacher design teams, the interpersonal dimension could also impact the TPACK development.

TPACK does not take into account contextual variables associated with the cultural categories, education stakeholders' expectations of teaching and the examination-oriented culture. Many categories of contextual variables may shape teachers' design decisions. Therefore, to deepen the understanding of ICT integration, Chai et al., (2014) propose an expanded TPACK framework that considers a wider meaning of 'context', such as the inclusion of interpersonal or cultural factors.

2.3.3.2 The expanded TPACK framework

In line with Porras-Hernandez and Salinas-Amescua's (2013) theorization, the 'context' in TPACK can be delineated in terms of (a) actor, and (b) scope. The actor refers to the stakeholder in the system, who requires some form of TPACK in order to shape ICT integration. The current research on TPACK is confined to teachers as the main subject while ignoring the other actors in the education system. These actors include the student, the curriculum designer, the head of department, the school principal, ministry officers, software designers, parents, and industry partners. These other actors need to understand TPACK so that they can contribute to the design of curriculum guidelines, policies, infrastructure and physical space allocation, etc. in order to achieve ICT integration.

Porras-Hernandez and Salinas-Amescua (2013) criticized the research in TPACK as defining the teachers' work context too narrowly, and proposed that researchers should employ Bronfenbrenner's ecological approach (Bronfenbrenner, 2005) to consider how different levels of context could impact on teachers' TPACK. They focused on three levels of Bronfenbrenner's framework, namely the micro-level (i.e., the classroom), the meso-level (i.e., the local community and the educational institution), and the macro level (i.e., the social, technological, and political environments). Their research also attempts to illustrate through the phenomenological approach how teachers view the various context levels. Bronfenbrenner's ecological approach, also known as the ecological systems theory, provides an influential and systematic scope for TPACK.

The ecological approach is a model of human development with the child at the center of the system. It consists of five rings of interconnected systems, namely the microsystem, mesosystem, exosystem, macrosystem, and chronosystem, which shape the child's psyche. Bronfenbrenner (2005) theorized that the microsystem is one immediate environment of the child, e.g., the home, family, or peer group. The mesosystem is the relationship between two or more microsystems, such as the link between home and school. The exosystem refers to the linkages between the

microsystem, and an environment that the child does not reside in, e.g., the home and the parent's workplace. The macrosystem consists of the wider processes and patterns prevalent in the micro-, meso-, and exosystems such as belief systems, customs, lifestyles, and policy structures. Lastly, the chronosystem emphasizes the passage of time and is a slightly different dimension from the earlier levels. This historical context examines both the change in the child over time as well as the change in the environment in which the child lives. Bronfenbrenner's ecological system has enlightened many social science researchers, prompting them to look at the different realms of influence that any social phenomenon could be subjected to.

Chai et al., (2014) articulate four levels of context as Ministry of Education, Education Technology Division (the office within the Ministry in charge of education technology), schools and classrooms. The framework allows the study to recognize important insights into ICT integration such as highlighting the problems of contradictory relationships between the activity systems that are pegged at different levels. Their research also recognises the different levels at play, i.e., the macro-level (the Ministry), the exo-level (the Division), the meso-level (the school, consisting of the different classrooms), and the micro-level (the classroom). Putting the "contexts" of actor and scope together, they propose that research on TPACK, and thus on ICT integration, can be conceptualized at five levels as depicted in

Figure 1. This expanded TPACK framework argues that TPACK creation is a multilevel context with actors of different designations.

Figure 1: Multi-level contextual TPACK framework (Adapted from Chai et al., 2014)
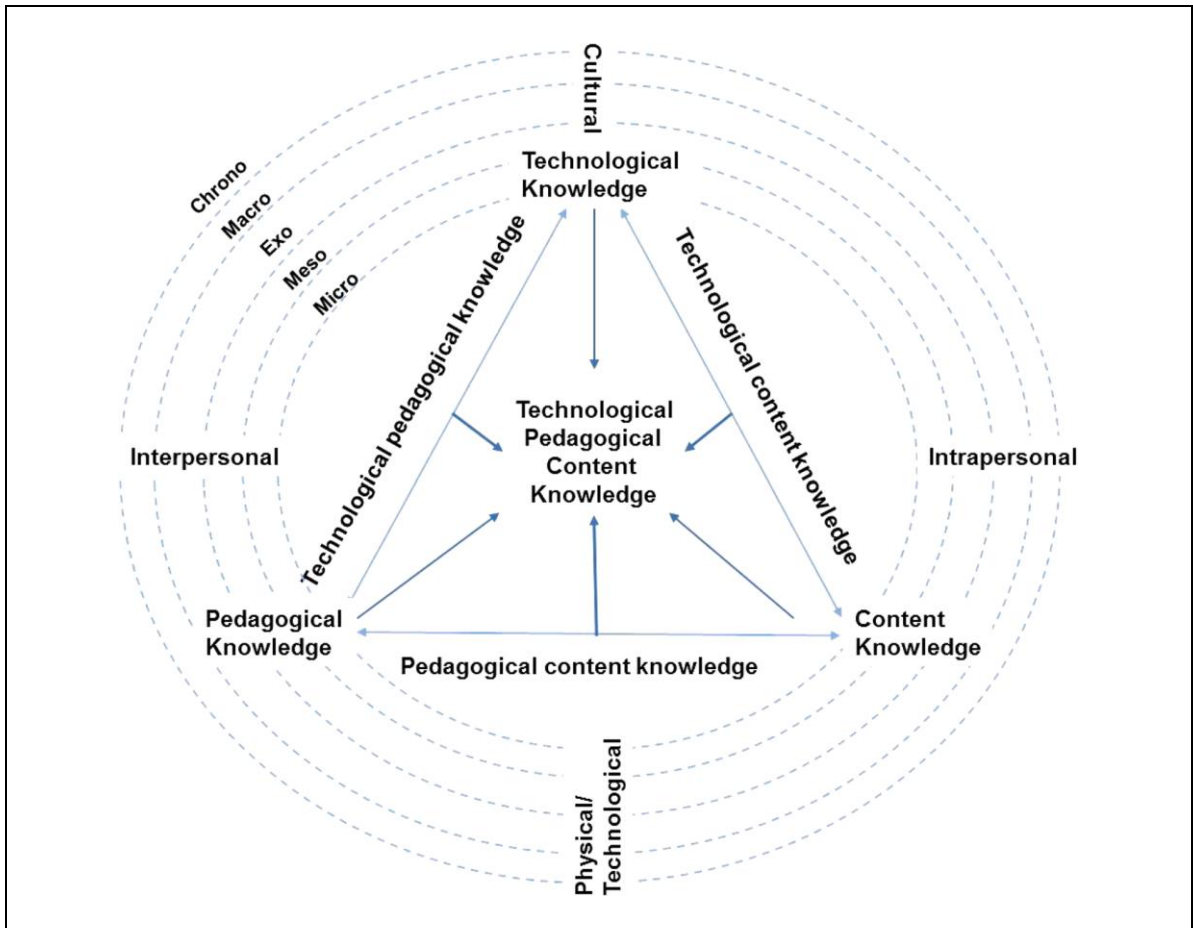
However, teachers are not usually the decision makers beyond the micro-level. There is therefore a need to consider the other levels and the major decision makers'

perspectives within each level, rather than confining the perspective to the teachers alone. The meso-level concerns the relationships and patterns in the environments in which the teacher is involved such as the classroom and the teacher's home or two or more classrooms (i.e., the school). Thus, the educators at this level could be the principals and heads of department. The exo-level refers to the teacher's immediate environment, and another environment that the teacher is not directly linked to such as the student's home, industry partners, research institutes, and educational bodies. Thus, at the exo-level, parents, software designers, researchers, and even ministry officers are the co-actors (Chai et al., 2014).

The macro-level includes the societal norms, the national policies, etc. Educators at this level include policy makers as well as media personnel. Lastly, the chrono-level examines the change in the teacher over time, and also the change in the classroom environment. In essence, all the aforementioned educators are involved in this level as they collectively change and influence with time (Chai et al., 2014).

Therefore, the expanded TPACK framework argument is that design thinking should not rest solely on the teachers' shoulder but on all designations of educators. That is, all educators can design and create TPACK. This enables a collective effort to design and re-culture the education system and create the emergence of a new culture of learning (Chai et al., 2014).

The proposed theoretical framework described in Figure 1, allows the study to generate a comprehensive research agenda to study and document the totality of "successful" and "unsuccessful" integration of digital media in the classrooms of Gauteng schools. Such a study will inform policymakers, school administrators and teachers about how to take up the opportunities and address the limitations of digital media in the classroom, and how to successfully integrate digital media in schools, specifically within their broader sociocultural contexts.

Even though the purpose and focus of needs to be clear and precise for the purpose of effective academic discourse, the constructs under discussion are therefore

considered in the light of this broader meta-approach to the use of digital media in the classroom. It acknowledges the wider context and the interdependence of contextual systems.

2.4   HISTORICAL DEVELOPMENT ON THE PERSPECTIVE OF STRESS

2.4.1 Introduction

This section will explore the different theoretical approaches to stress and the different theories of stress. It also includes a view of the types of stress that can be encountered by teachers and the causes of stress. This section concludes with the reactions to stress by teachers in the classroom. This is pertinent to the study as the study purports to present empirical data on the perceived stress levels of teachers who have to include the use of digital media in their classrooms.

A review of several different literatures on stress (Roeser et al., 2013) reveals that there are basically different, but overlapping, approaches to the definition of stress as indicated by Kyriacou (2001). Teacher stress is commonly defined as the experience by a teacher of unpleasant emotions resulting from aspects of the work as a teacher.

2.4.2 Approaches to stress in the work environment

Three different approaches of stress have been suggested in the literature to explain stress related issues in the work environment:

2.4.2.1   Engineering or the Stimulus-based approach

Proponents of this approach view stress as a demand from their environment, which produces a strain reaction: the greater the strain, the larger the reaction. This approach assumes that undemanding situations are not stressful. The engineering analogy is also problematic because it makes the assumption that individuals function both unconsciously and automatically; no consideration is given to the mediating psychological processes, but such processes are very important (Cox, 1993; Goldberger & Breznitz, 2010; Abraham, Conner, Jones & O'Connor, 2016).

Occupational stress is treated as a property of the work environment, and usually as an objectively measurable aspect of that environment. According to this approach stress is said to produce a strain reaction which although often reversible could, on occasions prove to be irreversible and damaging. The concept of stress threshold grew out of this way of thinking and individual differences in this threshold have been used to account for differences in stress resistance and vulnerability. This approach whilst limited in view does account for the fact that individuals are affected differently by the same stressor (Abraham et al., 2016). It accounts for the fact that what is a stressor for one teacher is not necessarily a stressor for another.

2.4.2.2   The response based or medico-physiological approach

The physiological approach to the definition and study of stress was first derived from the work of Selye. He defined stress as a state manifested by a specific syndrome, 'general adaptation syndrome' (GAS), which consists of all non-specific changes within the biological system. Selye's investigation involved the use of animals and included the measurements of hormones and the change in organ (thymus and kidney) size under conditions of stress (Selye, 1955; Curtis, 2000; Abraham et al., 2016).

Selye argued that the physiological response was triphasic (three phased) in nature, involving an initial alarm stage (sympathetic-adrenal medullary activation), followed by

a phase of resistance (adrenal cortical activation), which in turn may be followed by the final stage exhaustion (terminal reactivation of the sympathetic-adrenal medullary activation) (Selye, 1955; Curtis, 2000; Abraham et al., 2016).

Repeated or prolonged activation of this response increases the wear and tear and leads to what Selye called the 'disease of adaptation'. The physiological response to stress has a short-term advantage (energy mobilisation for active response) and long-term disadvantages (increased risk of certain 'stress related' diseases) (Selye, 1955; Curtis, 2000; Abraham et al., 2016).

The view forwarded by Selye is evident in that all teachers experience stress differently as well as the fact that their physiological responses are varied. The different stages of stress in this study will be demonstrated when the introduction and use of digital media in the classroom cause alarm in some teachers, changes in practices being met with resistance and unreasonable demands cause teachers to become exhausted. Hence, elements identified by Selye may be evident in this study.

2.4.2.3   Psychological or interactional appraisal approach

This approach conceptualises stress in terms of the dynamic interaction between the person and their work environment; inferring a problematic person-environment interaction which may be measured in terms of cognitive processes and emotional reactions which underpin those reactions (Cox, 1993; Abraham et al., 2016).

In this study work related-stress with regard to the introduction and use of digital media in the classroom, is viewed as a problematic relationship between the teacher and the school (work environment). However, the problem is not restricted to the physical environmental conditions of the school but also includes problematic relations between people (colleagues, learners, managers or parents).

2.4.3 Criticisms of these approaches

Two criticisms have been offered to these approaches: empirical and conceptual. Firstly, engineering and physiological models do not account for much of the existing data. Secondly certain stimuli may be problematic to certain individuals only. This suggests that individuals may be able to mediate the stress factor by strong cognitive ability and contextual factors. Cox explained from the results of his investigation, that the risk of stress has a group and cultural bias (Cox, 1993; Rom and Reznick, 2015).

The physiological model was also open to criticism as the responses to the physical stimuli do not produce the stress response in its entirety. There is also difficulty in differentiating between those physiological changes which represent stress and those which do not, as the former may be dissociated in time from the stressor. One can be justified in questioning the applicability of the effect of stress on animals compared to that in humans as demonstrated by Selye (Cox, 1993; Rom et al., 2015).

The physiological conditions identified by teachers may not necessarily be as a result of work-related stress but could be caused by lifestyle (diet, alcoholism, drug abuse or lack of exercise); or hereditary (family history – hypertension, aneurisms or stroke). Thus, in this study the focus is on the causes of teacher work-related stress with regard to the introduction and use of digital media in the classroom, rather than the physiological effects as this would require the assistance of a medical practitioner to confirm this. The validity and reliability of Selye's generalisations becomes questionable, considering the fact that Selye used food as the stress factor and that humans are more complex emotionally and cognitively. In present day studies such conditions (food deprivation) will be viewed as unethical because of the physiological and emotional trauma which may result.

2.4.4 Modern view of stress

According to many researchers (Travers & Cooper, 1996; Bush & Middlewood, 1997; Wilson, 2002; Taylor, 2014) trying to understand stress is not an easy task. They recommend that before looking for a definition for stress, we should consider what happens when a person becomes stressed.

Stress reaction has its origins in the 'fight or flight' model that occurred when prehistoric humans were faced with a frightening situation. The hormonal reaction to equip the body to prepare for the danger in the wild is now being used for action in social predicaments. The reaction in these instances, is in most case not violent, however, the signs (raised blood pressure, sick feeling in the stomach) are the same. (Abraham et al., 2016).

Drawing from Travers and Cooper (1996), Wilson (2002) and Abraham et al (2016), the presently accepted definition of stress by most clinical psychologists is a combination of the various theories and draws mainly from Transactional Theories (Lazarus & Folkman, 1984; Curtis, 2000; Abraham et al., 2016) and the work of Hans Selye. Selye described stress in terms of General Adaptation Syndrome (GAS) and developed a framework for describing the four basic variations of stress, namely, hyper-stress (too much stress), distress (bad stress), hypo-stress (too little stress), and eustress (good stress). These contributions form part of the modern definitions and perspective of stress.

Newberry, Gallant and Riley (2013) define stress as a response syndrome of negative effects which are developed when there are prolonged and increased pressures that cannot be controlled by an individual's coping strategies. Abraham et al (2016) view stress as an umbrella term covering a general field of study. Within this field there are many diverse areas of research, which look at relationships between objective or perceived antecedents (or stressors) and a range of physiological, psychological or behavioral outcomes. The views supported by Newbury et al (2013) and Abraham et al (2016) has been accepted as the definition of stress for the purpose of this study. Hence, this study focuses on the excessive psychological and physical demands made

on teachers as a result of the introduction of digital media in Gauteng classrooms, as identified in the selected   schools. The demands may be viewed by teachers as unreasonable, unnecessary and excessive.

2.4.5 Theories of stress

Whilst literature reviewed earlier revealed consensus around the definition of stress, there are variations to the theories of stress. The three distinct theories of stress that have been identified are interactional (transactional) theories, the person-fit environment theory and the job demand/decisions-latitude theory (Cox, 1993; Davidyan, 2015; O'Connor and Ferguson,2015).

2.4.5.1   Interactional (transactional) theories of stress

Although some theoretical perspectives have focused on stress as a stimulus and others have focused on stress as a response, most modern conceptualizations of stress can be considered interactive or transactional in nature. Transactional theories incorporate the importance of both stressors and stress responses in explaining the linkage between stress and illness or disease (Davidyan, 2015; O' Connor and Ferguson, 2015).

Additionally, transactional theories of stress suggest that stress responses can serve as new stressors that elicit more intense stress responses. For example, if an individual responds to interpersonal conflict (a stressor) by drinking alcohol and smoking cigarettes (an acute behavioral stress response), these behavioral responses may become new stressors that warrant additional stress responses (Davidyan, 2015; O' Connor and Ferguson, 2015). Thus, transactional theories of stress incorporate components of stress stimuli and responses that operate upon one another in a cyclic fashion. In addition, interaction or transactional theories emphasize the relation between the individual and the environment, something rarely discussed by purely stimulus or response theorists.

Transactional theorists recognize that a great deal of variability exists regarding the magnitude of acute stress responses to seemingly comparable stimuli. As such, they have looked to individual difference factors to help explain these common observations. Lazurus and Folkman (1984) and O' Connor and Ferguson (2015) proposed a transactional theory of stress that has received considerable attention over the years. According to their perspective, it was not the initial stressor per se that was critical in linking stress to disease, but the individual's response to the stressor that determined whether a cyclic stress reaction developed.

Focusing upon the acute cognitive stress response system, Lazarus suggested that three types of cognitive appraisal occurred in determining the magnitude of the stress reaction: primary appraisal, secondary appraisal, and reappraisal. Primary appraisal focused upon the degree to which a person detected a stressor as being harmful (leading to potential injury or illness), threatening (causing anxiety, fear, or damage to self-esteem), or challenging (leading to potential gain or growth) (Lazarus & Folkman, 1984; Davidyan, 2015; O' Connor and Ferguson, 2015).

According to Lazurus, individuals determined whether a stimulus was irrelevant, benign-positive, or stressful; only stimuli appraised as stressful elicited ongoing stress responses. Imagine, for example, brushing one's leg against something furry while hiking. It might be appraised as irrelevant if it was moss, benign-positive if it was a baby rabbit, or stressful if it was a rabid skunk! Primary appraisal was conceptualized as being accompanied by secondary appraisal, which focused upon a person's determination of his or her resources to cope with the stressor perceived during primary appraisal. Most individuals clearly possess the resources to cope with brushing up against moss or a furry baby rabbit; however, many would question what to do when encountering a rabid skunk (Davidyan, 2015). Finally, the process of reappraisal involved any change in the primary appraisal as a result of the assessment of coping resources that occurred during secondary appraisal.

Not all transactional perspectives rely on cognitive appraisal. Therefore, controllability and predictability represent contextual components that determine the magnitude of the stress response evoked by the stressor. In a situation that provoked a threat to an organism, the fight-flight response was triggered, resulting in the defense reaction characterized by fleeing or displaying aggression. In contrast, if the situation resulted in a loss of control by the organism, the defeat reaction occurred, characterized by limited activity and subordination. These two systems clearly were differentiated behaviorally as well as physiologically. Not only were they associated with distinct observable behavioral differences, they also involved different brain mechanisms, different neurotransmitter systems, and different peripheral manifestations of the response in the peripheral nervous system (Davidyan, 2015; O' Connor and Ferguson, 2015).

Most transactional theorists focus on the cognitive processes and emotional reactions underpinning the individual's interaction with their environment. Stress is viewed as a problematic transaction between individuals and their environment. In this study teachers will express how the inclusion of digital media in the classroom affects them emotionally. The cognitive processes are demonstrated by the inability to prepare their work, complete tasks timeously and forgetfulness. This theory however, encompasses life events as well as work-related stress. The transaction between teachers and the inclusion of digital media in the classroom forms a critical focus of this study.

These theories focus on the structural characteristics of the person's interaction with their work environment. The two interactional theories which stand out are: The Person-Environment Fit theory (Dawis, 1992; French, Caplan, & Harrison, 1982; Kristof-Brown and Guay, 2011); and the Jobs Demands/Decisions Latitude theory (Karasek, 1979; Jones & Bright, 2001; Cooper & Quick, 2017).

2.4.5.2   Person–Environment-Fit theory

According to this theory, stress is likely to occur, and the well-being of an individual is likely to be affected when there is a lack of fit between the degree to which the employee's attitudes and abilities meet the demands of the job; and the extent to which the job environment meets the worker's needs. Person-Environment is defined as the degree to which individual and environmental characteristics match (Dawis, 1992; French, Caplan, & Harrison, 1982; Kristof-Brown and Guay, 2011). Person characteristics may include an individual's biological or psychological needs, values, goals, abilities, or personality, while environmental characteristics could include intrinsic and extrinsic rewards, demands of a job or role, cultural values, or characteristics of other individuals and collectives in the person's social environment (French et al., 1982).

Person–environment fit has been linked to a number of affective outcomes, including job satisfaction, organizational commitment, and intent to quit. Among these, job satisfaction is the attitude most strongly predicted by person–job fit (Kristof-Brown and Guay, 2011). Stress has also been demonstrated as a consequence of poor person–environment fit, especially in the absence of the complementary fit dimension (Kristof-Brown and Guay, 2011).

This theory is viewed as restrictive in that stressors are limited to the work environment. Stressors of life events (deaths, illness, trauma, etc.) are excluded by this theory. However, it is directly relevant to this study as the focus of this study is the work environment. This research aims at addressing the causes of stress at the place of work due to the introduction of digital media in the classroom, in the selected Gauteng schools. This assumes that stress is as a result of a problematic relationship between the teacher and the work environment. There as a notion of work related stress as being a disagreement between the teacher and the work environment (the classroom in which digital media has been introduced).

2.4.5.3 *Job Demand/Decisions-Latitude theory*

Karasek's demand-control model of occupational stress has had a large influence on the job design and occupational health literature, in part because it is quite sparsely found, practical and testable. (Karasek, 1979; Jones & Bright, 2001; Cooper & Quick, 2017). In Karasek's model, workplace stress is a function of how demanding a person's job is and how much control (discretion, authority or decision latitude etc.) the person has over their own responsibilities. This creates four kinds of jobs: passive, active, low strain and high strain.

Job demands represent the psychological stressors in the work environment. These include factors such as: interruption rate, time pressures, conflicting demands, reaction time required, pace of work, proportion of work performed under pressure, amount of work, degree of concentration required, and the slowing down of work caused by the need to wait for others (Jones & Bright, 2001).

Decision latitude refers to employees' control over their tasks and how those tasks are executed. It consists of both skill discretion and decision authority. Skill discretion describes the degree to which the job involves a variety of tasks, low levels of repetitiveness, occasions for creativity and opportunities to learn new things and develop special abilities. Decision authority describes both the employee's ability to make decisions about their own job, and their ability to influence their own work team and more general company policies (Cooper & Quick, 2017).

Crossing the dimensions of strain and latitude give us four stress categories for jobs, as follows (Karasek, 1979; Jones & Bright, 2001; Cooper & Quick, 2017):

- *P – High Strain Jobs (Low Latitude, High Strain)***:**

Producers are more likely to augment their strain levels by taking more on without seeking additional latitude, partly because of their appreciation of challenge and their desire to enjoy individual mastery experiences, and partly because they take an individual approach to responsibility ascription, which may cause them to overlook

opportunities to ask for more latitude. Producers enjoy levels of strain that people with other dominant styles would find excessive. Of all the styles, they are most likely to thrive in high strain jobs.

- *A – Passive Jobs (Low Latitude, Low Strain)***:**

As long as the passivity of a job stems from successfully forestalling disruptions, then that passivity is likely to be highly satisfying to an Administrator. Passivity that stems from the job being either irrelevant or unimportant will not be satisfying. The Administrative style seeks to manage disruptions by putting processes into place that cope with all contingencies and buffer the vital variables of the organization, preventing them from disruption. When latitude is reduced by following a procedure, and when that procedure causes things to proceed smoothly with low levels of strain, an Administrator will take that as evidence of success. The goal state of Administration will be reached and maintaining that peace will be a pleasure.

- *E – Active Jobs (High Latitude, High Strain)***:**

Active jobs are not seen as stressful in Karasek's typology, because employees have many protective measures available to them to reduce the strain. Of all the PAEI styles, it is E that most naturally thrives in active situations. E is characterized by great ambition and almost no fear surrounding disruptions of the status quo. Strain is thus a continual consequence of E type work. E also needs great flexibility and latitude both to stir up problems and seek out solutions. The active mode most nearly matches the mode in which E naturally works.

- *I – Low Strain Jobs (High Latitude, Low Strain)***:**

The combination of high levels of latitude with low levels of strain indicates that social processes are very significant in the low strain job. Employees will have a lot of authority

relative to their strain levels, and thus will presumably participate more in the definition and management of tasks than in other, more stressful working environments.

According to this theory the greater the latitude in the job decision by the workers the less the stress. This is even though the work load may be high. However, there is only moderate evidence in support of this theory. Similar to the person environment-fit theory it is limiting to work stressors. The implication of this theory in the context of this study is that stress is only related to the inclusion of digital media in the classroom. This theory allows for abuse by teachers who are not committed to their work and may diminish the merits of digital media in the classroom. On the other hand, teachers who are resistant to change may exaggerate the stress caused by the introduction of digital media in the classrooms.

2.4.6 Types of stress in the school context

Stress can be categorised into two types, namely eustress (good stress) and distress (bad stress) (Steyn & Van Niekerk, 2012; Van der Merwe, 2013). Eustress is described as positive stress, because it has a positive impact on the individual similar to the feeling one gets when facing a challenge (like marriage or promotion). Eustress is also seen as a motivator, as in the absence of this, a person may lack the drive for peak performance. With the introduction of digital media in the classroom, the Gauteng Department of Education may cite eustress as a motivation factor, or for the reduction of boredom.

Hypo-stress (too little stress) may lead to boredom and reduced effectiveness of staff. The difficulty that arises is how managers determine the correct amount of stress so that the staff is motivated, relieved from boredom and not adversely affected.

Distress is the form of stress that is harmful to the individual and leads to the various symptoms from mild headache to severe heart attack. The ability to withstand stress varies from person to person. Understanding the individuals stress threshold is a challenge to managers and the management of stress in the work environment.

Incidents such as the death of children or spouse, financial crisis, or conflict at work are some of the causes of extreme distress. Stressors such as noise level, odours, bright lights or untidy office space may exert different levels of stress on individuals. Steyn and Van Niekerk (2012) define a stressor as a source of stress. Stress in this study in fact refers to distress. The level of stress (distress) experienced by teachers in Gauteng schools during the Project, where digital media was introduced in the classroom, will be explored.

2.4.7 Causes of stress in the classroom

According to Steyn and Van Niekerk (2012) stress may be as a result of personal factors, life events or work related. The fact that life outside the work environment impacts on the individual's performance at work, is reason for managers to be cognisant of the external stressors of their staff and recognise the impact it has on the individual's performance and the resulting impact on the organisation.

2.4.7.1   Life events (general causes)

Life events like, emotional (worries, fears, anxiety...); family (death, illness, parenting...); social (lack of status, delivering a speech,); financial; environmental (noise, odours,) and travel (long distances, heavy traffic) are some of the general causes of stress (Steyn & Van Niekerk, 2012). These are what are commonly termed as resulting from fate, as the individual has little if any control over such events. There is belief that the character of the individual may have a significant role in determining the impact of life event stressors. This study acknowledges the factors external to the work environment that may lead to stress, however, the study would be too extensive if the external factors were to be explored as well.

2.4.7.2   Personal factors

A great deal of attention was placed on individual vulnerability in relation to coronary heart disease and on the role of psychological and behavioral factors in reacting to and coping with stressful situations (Cox, 1993; Steyn & Van Niekerk, 2012). Two personality types A and B were identified by Friedman and Rosenman in 1959 (Cox, 1993; Surbhi, 2016), in respect to their vulnerability to stress.

Personality type A which were prone (thrice compared to type B) to coronary disease from stress, marked by a strong commitment to work and involvement in work, a well-developed sense of time urgency (always aware of time pressure and working against deadlines), and a strong sense of competition marked by tendency to be aggressive. Type A personality individuals are regarded as easily stressed and more prone to the impact of stressors. Type B personalities are believed to be in contrast to Type A and have a greater tolerance to stressors (Cox, 1993; Surbhi, 2016).

Hence, we may find that the introduction of digital media in the classroom will cause stress in some teachers but have no effect on others. The degree of stress caused by a particular factor may also vary from person to person, depending on their personality type (A or B).

2.4.7.3   *Work-related stress*

The following have been identified by Steyn and Van Niekerk (2012), as the main work-related causes of stress: professional demands, career developments, role based stress, interpersonal relationships and home/work interface. There is definitely a need for managers to take heed of these factors and strategise on how to reduce these stressors in their organisation. Some work-related causes of stress will be discussed.

a) *Professional demands*

Heavy workloads and too little time (Kyriacou, 1998), lack of resources, large classes, the effort to raise standards (Olivier & Venter, 2003) are some of the well-known researcher teacher work related stress. In the selected Gauteng schools, teachers

spend up to forty periods in a five-day cycle teaching, thus having a single non-teaching period a day. This period may be taken to serve relief for teachers who are absent, took leave or leave school on official matters. Teachers are also expected to serve ground duty once a week (during recess) as well as co-ordinate and participate in extra mural activities after school. There are cluster subject committees and moderation process of continuous assessment tasks which teachers must attend after school hours. Teachers may teach up to five different class units; hence the volume of preparatory work for lessons would be extensive. The schools that will be studied are public schools and have an average of forty learners per class. Hence, it may be difficult to disagree with teachers who express how stressful their workloads are. The introduction of digital media in the classroom may add on to an already heavy workload for teachers.

b) Interpersonal relationship

Poor relationships and learner motivation may lead to teacher stress (Kinman & Jones, 2001). The poor discipline and behaviour problems are important predictors of stress (Olivier & Venter, 2003). Learners with emotional problems and learning difficulties add to the teachers' level of stress (Steyn & Van Niekerk, 2012). Relationship with other staff members, heads of department or the principal may also be stressful. In the schools that will be studied there may be cliques formed amongst teachers. These cliques may have a positive effect, in that it allows for mentoring, coaching and teamwork. However, when cliques form as a result of being drawn together by negative factors (racial, gender, religious or personalities) then the danger of discord and conflict may arise. The interpersonal relationships may become stressful.

This study also explores problematic relationships between teachers and learners which is presently evident in most schools as a result of the banishing of corporal punishment; and strained relationships between teachers and over empowered parents (as a result of power entrusted in school governing bodies). This study explores the effect of these factors on teacher work-related stress with the introduction of digital media in the classroom.

c) Role based stress

This occurs when teachers are not clear about their responsibilities, expectations and objectives (Steyn & Van Niekerk, 2012). Role ambiguity occurs when duties and responsibilities are ambiguous and teachers have to play too many roles. This study may reveal the roles teachers are required to play ranging from counselors, clerks, police, doctors and sports coaches to mention a few. Not all teachers are trained or equipped to handle all these demanding roles physically and emotionally. This study explores the roles played by teachers in implementing the Project, where digital media was introduced in the classroom, to facilitate learning and teaching, and the effect of this on the stress levels of teachers.

d) Career development

Inadequate training (common reason for the untimely resignation of novice teachers) to meet the demands of teaching (the content and methodology), continuous learning (grappling with the ever-changing curriculum) and professional development owing to time constraints, may lead to stress (Adams, 1999; Steyn & Van Niekerk, 2012).

Teacher training does not incorporate the use of digital media in the classroom. The Project made it mandatory that teachers in the selected Gauteng schools had to implement the use of digital media in the classroom. For the project teachers were given two days of training at the Mathew Goniwe School of Excellence. The study will explore the perceived stress encountered by teachers from the training.

e) School factors

A restrictive bureaucratic style of management, interfering parents, adverse working conditions, excessive rules, poor salaries and low status of teachers, all have the potential to act as stressors (Harris & Hartman, 2002). Added to the above school

factors, teachers feel that trade unions do not represent them effectively and do not give voice to their grievances.

2.4.7.4   Home/work interface

Although educators report that a high level of their stress is caused by their jobs, their home life may become a significant source of stress. Twice as many female educators report this as a problem, mainly because they carry a disproportionate share of household chores. (Rout & Rout, 2002).

Of particular significance is the effect of stress on women, considering that over 60% of teachers are females. This happens when family life is adversely affected and the individual is trapped in a web of stress between work and home. The work and home stress may have a compound effect on the individual. In this instance the individual may resort to alcohol or drugs for relief from the stressors. In the absence of positive intervention this may lead to a downward spiral and can ultimately lead to death by overdose or suicide. The family members and the work organisation may become ultimate losers of the individual.

2.4.7.5   Creation of stress by managers

Jongeling and Lock (1995) and Steyn and Van Niekerk (2012) indicated that there are various ways in which school principals may cause stress in teachers. The lack of support, favoritism, poor communication, failure to provide adequate resources, non-consultation, lack of respect, lack of leadership and unfairness in job allocation; are some of the ways in which the principal may create stress in schools (Steyn & Van Niekerk, 2012). However, this does not apply to just the principal; it may apply to the deputy principal or heads of department or the Department of Education, whose failure to consult with teachers on the implementation of digital media in classrooms may lead to stress in the teachers.

2.4.8 Reactions to stress in the school context

Individuals in an organisation react differently to stress. If the stressor is as a result of a positive life change, it may lead to increased motivation, energy and performance. If the stress is the result of a negative life change, then it may lead to individual consequences, organisational consequences and burnout (Steyn & Van Niekerk, 2012).

Individual consequences may be behavioral, psychological or physical. Behavioral consequences are displayed by alcohol abuse, violence, drug abuse, difficulty with sleeping; and psychological consequences have a major impact on a person's well-being (withdrawn, depressed); and physical consequences are headaches, intestinal disorders, backaches and other physical complaints (Van der Merwe, 2013). Stress related disorders and symptoms are numerous to mention, however, according to Umstot (1988), stress related disorders may be divided into: poor performance, low satisfaction, lack of commitment as shown in high absenteeism and tardiness, and a poor quality of relationships which is manifested in distrust, suspicion and low consideration.

Burnout may be defined as a progressive loss of idealism, energy, purpose, and concern as a result of conditions of work. In general, burnout is an inconsequential feeling that no matter how hard one works, the pay offs in terms of accomplishment, recognition, or appreciation are not there (Schaufeli, Maslach & Marek; 2017). For example, it has been shown that when teachers' needs for self-actualization and self-esteem are unfulfilled there is a higher probability of burnout (Cox, 1993; Cherniss, 2016).

Burnout is most often the result not of stress per se (which may be inevitable in teaching) but of unmediated stress, of being stressed and having no "out," no buffers, no support system, no adequate rewards (Cherniss, 2016; Schaufeli et al., 2017). In

this regard too, teachers may feel obligated to spend hours preparing lesson plans from an infinite number of online resources, which may cause stress.

2.5 TEACHERS' STRESS AND DIGITAL MEDIA

2.5.1 Teacher stress

Stress and coping with it in general remain a prominent research focus area – even though the research regarding stress outweighs the research on coping tenfold (Aldwin, 2000). Teacher stress has been investigated since the 1980s (Dunham, 1992; Dworkin, 1987; Cole & Walker, 1989), but the research on teacher stress in including digital media in the classroom is still expanding.

There are various issues when attempting to define teacher stress (Kyriacou, 1998):

- The first issue is whether to use the concept in terms of the level of demands made on the teacher, or whether the term should refer to the emotional state rendered by the demands.
- The second issue relates to the inclusion of both negative and positive demands as stress factors, and subsequently whether both positive and negative emotional states should be referred to.
- The third issue involves the relationship between a teacher's perception of a situation and the perception of her ability to cope with the situation. The circumstances in which a teacher experiences stress imply an objective aspect, but also a subjective appraisal of the teacher's own circumstances.

These issues necessitate a very broad definition of teacher stress that conceives of teacher stress as a reaction to difficult or excessive demands that need to be dealt with. For the purpose of this study teacher stress is defined in terms of the environmental demands on the teacher in the context of including the use of digital media in the classroom. The focus is on the demands of including digital media in the classroom,

rather than on the emotional state rendered by this demand. The nature of the scale utilised to assess stress enables teachers to express both positive and negative demands put to them and it will also give them the opportunity to express their perceptions regarding their own ability to cope with the situation.

The stress factors are largely defined in terms of key areas of stress in including the use of digital media in the classroom, that is: administrative issues, support, health, safety and hygiene, learner behaviour, the classroom situation, parents, professional and personal competency. As stress often results from the disequilibrium between the demands of the environmental situation and the individual's ability to cope with it, it is also acknowledged that individual differences are bound to occur.

An issue that remains unresolved is whether the effects of stress on the individual are cumulative or multiplicative. According to Aldwin (2000) most research on stress factors assumes that the effects of stress are cumulative. The assumption is that there is a linear increase in symptoms and negative effect, with incremental increases in stress. However, the effects of stress may very well be multiplicative; therefore, the presence of three stress factors may multiply the stress effects by more than a factor of three. In this study it is acknowledged that stress in teachers may very well be multiplicative.

2.5.2 Stress and digital media in the classroom

The most rapidly growing new technology in the classroom is the tablet computer, for example, the Apple iPad (Johnson et al., 2013). The devices give students and teachers a mobile source for information, textbooks, interactive media, and a wealth of tools through downloadable applications, frequently referred to as apps (Pilgrim et al., 2012). The apps are available for activities ranging from organization to productivity, and some allow users to apply their creativity (Sykes, 2014). According to ABI Research (2013), there was an estimated 14 billion tablet app downloads in 2014, with 75% of those on the iPad. The numbers of available apps for the iPad geared toward education keeps increasing. Apple announced in 2012 that there were 20,000 education apps

(Rao, 2012); in 2015 it cited more than 80,000 apps for education (Apple, 2015), a 400% increase.

Many of the available apps, however, are focused on content acquisition rather than on increasing higher order thinking skills such as critical thinking and creative thinking. An extensive list provided by Shoemaker (2012) on a Palm Beach School District wiki is one of many such lists found on the Internet. However, they are mostly for information gathering; examples include e-readers, e-books, calculators, and encyclopedias (Shoemaker, 2012). The iPads used in a project implementing a 1:1 iPad program, for instance, are preloaded with text editing, spreadsheets, planners, graphing calculators, and photo-video apps (Takahashi, 2012).

To utilize tablets effectively in the classroom and to help students benefit from them, the teacher must be familiar with these apps and their educational potential. Moreover, finding appropriate apps is an important process that should be included when defining learning objectives, aligning standards, recognizing the limitations of the app, and identifying the needs of the students (Powell, 2014). This means that knowledge of technology, pedagogy, and content should be aligned for effective instruction.

Some teachers see the mobile devices and the apps loaded on them as a distraction rather than an education tool, limiting how they can be used to their full potential in the classroom (Barnes & Herring, 2011). It is therefore important to understand how teachers view tablets as an educational tool, as their perceptions may limit or increase the use of tablets for teaching and learning. As those issues emerged during classroom applications of laptops as just discussed, tablet technology must be implemented by teachers trained for effective use of the technology (Means, 2010).

Teachers are not always well versed in the use of new technologies. However, like the younger generation, teachers are increasing their uses of mobile devices due to necessity in a technology-driven world (Gentile, 2012). The increased use and availability for personal use, however, does not indicate that teachers are successful

with the integration of new technologies in their classrooms for teaching and learning (Pilgrim et al., 2012).

Although effects of technology use in the classroom have been explored extensively (Greenhow et al., 2009; Powell, 2014), due to recency in the use of tablets in the classroom, research regarding their educational potential and implications of the device is rare. More importantly, however, how the users of the technology in education think of the introduction of this technology in the classroom is not well known. Understanding how teachers view the use of technology in the classroom is an important step to guide proper uses of technology and to produce enhanced tools for teaching and learning. The current study will attempt to bridge the gap by exploring the views and opinions of the major stakeholders— teachers.

2.6 PREVIOUS STUDIES DONE IN THIS FIELD

2.6.1 Local studies

Mukhari's (2016) study focused on teachers' experience on ICT use in ten Mamelodi primary and high schools which fall under Tshwane North District of Gauteng Province, South Africa. The selected schools had ICT infrastructure for teaching and learning and they were in partnership with certain independent schools in Pretoria. Mukhari's empirical findings indicated that many teachers lacked ICT knowledge and are incompetent when it comes to integrating ICTs in their teaching. It is imperative for GDE to conduct intensive ICT training workshops and institute continual training to ensure that all teachers are on board in terms of integrating ICTs into their pedagogical activities.

Teachers must start by acquiring technological knowledge (TK) which means that they must know about digital technology and the software and how to use them. The learned technological knowledge must be used with the pedagogical knowledge (PK) which is the second type of knowledge. The pedagogical knowledge is the teachers' knowledge of the pedagogical strategies that they use in teaching their participants. This is the

knowledge which teachers received during the teacher training. Content knowledge (CK) is the third type of knowledge and refers to knowledge of the subject matter which teachers specialise in (Mukhari, 2016).

The training must enable teachers to combine technological and pedagogical knowledge to form technological pedagogical knowledge (TPK). The intention is to capacitate teachers to know what technologies to use with certain pedagogical strategies. The training must enable teachers to develop technological content knowledge (TCK). Finally, the mastery of the three types of knowledge will connect technological pedagogical content knowledge (TPACK) which will enable teachers to use the necessary technologies and pedagogical skills to teach subject matter effectively (Mukhari, 2016).

Du Plessis and Webb (2012) conducted a case study with teachers from previously disadvantaged South African schools. Their study reveals many barriers that include limited resources, time constraints as a result of large class sizes, limited ICT related vision, lack of support from the Department of Education, not enough computer skilled teachers as well as a lack of rewards and incentives.

2.6.2 International studies

Kiridis, Drossos and Tsakiridou (2006) conducted a study to elucidate the perceptions of Greek teachers towards the use of ICT, and to explore the potential of the integration of the new technologies in public primary education. They found that an important percent of Greek teachers were not certain that new technologies will benefit society in general. Greek teachers pointed out that everyday use of ICT in the classroom created technical problems, which were difficult for teachers to cope with. Greek teachers felt that the mere existence of ICT in a small minority of public schools creates inequity problems, and the absence of ICT from the majority of Greek households engenders this inequality. We have to be mindful of these statements as a similar scenario and

expectations have been created by the Gauteng Department of Education with the Project.

Sabieh (2011) conducted interview surveys in the Middle East. Her findings were a scathing attack on authorities who spent vast amounts of money on adopting interactive whiteboards in classrooms, and did not result in a win-win solution. Her study showed that the role of the educator, the role of training to use the technology, and the role of training to use the technology effectively did not enhance teaching and learning. Participants may have known what was interactive teaching or learning or active learning in theory; however, the practical implementing in the educational setting was not perceived. Also, the training in interactive whiteboard (IWB) use and in its use to enhance the teaching/learning setting was redundant. Results did not show that IWB created diverse learning possibilities for the participants or the students. IWB was not found to be highly motivating nor did it contribute to enhancing learner-centered settings. At present, IWB is seen in the classroom as an expensive board being used in the traditional sense to visually transmit content, statically.

In a qualitative study conducted by Tallvid, Lindstrom and Lundin (2014) in Sweden, they found that during the last decade, several one laptop per student-initiatives (1:1) have emerged as a solution to the recurrent disappointments with the pace of transformation of teaching methods in schools. Furthermore, their research indicated that despite major expenditure, increased access and improved technical equipment, few teachers have integrated ICT in the curriculum in a way that leads to significant changes in classroom practice. Their study found five different, but overlapping, patterns in the explanations for their reluctance to use digital media in the classroom: lack of technical competence, not worth the effort, in appropriate or insufficient material, diminishing control of learners and lack of time. The teachers´ arguments exposed technical, pedagogical, and content concerns.

It is clear from both national and international studies that digital media in the classroom presents many challenges for the teacher. These challenges can create stress for the

teachers which will affect the quality and efficiency of teaching. The challenges identified from all studies are very similar, indicating a common set of stressors for teachers world-wide who must include the use of digital media in the classroom.

2.7   CONCLUSION

This chapter presents a theoretical background for the study as it reviewed relevant literature on the use of digital media such as tablets in the classroom. The chapter looked at relevant literature with regard to ICT policy in South African classrooms, in particular, the implementation of The Project in Gauteng schools. The chapter presented a historical background of digital media in the classroom as well as the historical development on the perspective of stress in the classroom. The chapter looked at various theories of stress, types of stress, causes and reactions to stress that are relevant to the study, as the study purports to present empirical data on the perceived stress levels of teachers who have to include the use of digital media in their classrooms. The literature review looked at teachers' stress and digital media and also explored previous studies conducted locally and internationally in this area of research.

The next chapter will discuss the research design and methods used in conducting this study.

CHAPTER THREE
RESEARCH DESIGN AND METHODOLOGY

3.1   INTRODUCTION

The previous chapter provided the theoretical background to the study on including digital media in the classroom and the effect it may have on the perceived stress levels of teachers. In the literature review the existing body of evidence, regarding ICT policy in South African classrooms, in particular, the implementation of the Project in Gauteng schools, was closely examined. The previous chapter presented a historical background of digital media in the classroom as well as the historical development on the perspective of stress in the classroom. It also looked at various theories of stress, types of stress, causes and reactions to stress that are relevant to the study, as the study purports to present empirical data on the perceived stress levels of teachers who have to include the use of digital media in their classrooms. The literature review explored previous studies conducted locally and internationally in this area of research.

This chapter will present a detailed account of the research method and design. The aim of the research, research method, and the design of qualitative case study research methodology will be portrayed. In addition, the study will address the sampling techniques, population selection, research instrumentation, and data collection procedures. Data analysis and processing methods and the presentation of data will also be examined and outlined.

This chapter will include a segment on the rationale for choosing a qualitative case study research design. Finally, validity and reliability of a qualitative case study research design are explained to provide a clear understanding and meaning of the relevant terminology. Ethical considerations towards participants will also be expanded upon in this chapter.

3.2 PURPOSE OF THE STUDY

The planning stage focuses on identifying the research questions or other rationale for doing a case study, deciding to use the case study method (compared with other methods), and understanding its strengths and limitations (Yin, 2014). Clearly defining the research problem is probably the most important step in the entire research project. As such, every case study should begin with a comprehensive literature review (see chapter 2) and a careful consideration of the research questions and study objectives (Baskarada, 2014).

This study intends to investigate how the introduction of digital media in the classroom has influenced the perceived stress levels of teachers in The Project. To do this, the study must answer the research problems and realise the study objectives through the utilisation of appropriate research design and methods. These research problems and objectives are listed in section 1.3 of Chapter 1 but repeated below for a quick reference.

3.2.1 Research problems

The study identifies the sub-problems with the implementation of the Project as:

- How can teachers be involved in the decision-making process on the implementation of digital tablets in Gauteng public schools, and thus reduce stress?
- How has the introduction of digital tablets in the classroom contributed to or lessened the perceived stress levels of teachers?
- In which way has the introduction of digital tablets in the classroom enhanced the quality of learning and teaching in schools and reduced the stress of teachers?
- In which ways can the dissemination of digital tablets be undertaken so as to empower teachers and reduce stress?

3.2.2 Study objectives

The study objectives that are necessary to answer the problems under 3.2.1 are:

- To determine how teachers can be involved in the decision-making process on the implementation of the digital tablets in Gauteng public schools, and reduce their stress
- To determine how the introduction of digital tablets in the classroom has contributed or lessened the perceived stress levels of teachers?
- To determine in which way the introduction of digital tablets in the classroom has enhanced the quality of learning and teaching in schools, and reduced stress of teachers.
- To determine ways in which the dissemination of digital tablets can be undertaken to empower teachers and reduce stress among them.

The scientific realisation of this set of objectives and consequent answers to the research problems will assist the researcher in the investigation and to understand how the introduction of digital tablets in the classroom has contributed to the perceived stress levels of teachers in the schools selected for the Project in Gauteng.

3.3   RESEARCH PARADIGM

This study purports to present some empirical data on the stress levels of teachers who have to include the use of digital media in their classrooms. However, the underlying philosophical basis and life and world view that influenced the inquiry process is constructivism. (I refer to the illuminating explanations of Lincoln, Lynham and Guba (2011) in this regard.) The ontology of this research, and constructivism, is relativist. Reality is socially constructed and therefore multiple mental constructions can be apprehended, some of which may be in conflict with one another. Furthermore, perceptions of reality may change as concepts of stress are socially constructed phenomena that mean different things to different people (Mertens, 2010).

Social constructivists believe that individuals seek understanding of the world in which they live and work. Individuals develop subjective meanings of their experiences—meanings directed toward certain objects or things. These meanings are varied and multiple, leading the researcher to look for the complexity of views rather than narrowing meanings into a few categories or ideas. The goal of the research is to rely as much as possible on the participants' views of the situation being studied. The questions become broad and general so that the participants can construct the meaning of a situation, typically forged in discussions or interactions with other persons. The more open-ended the questioning, the better, as the researcher listens carefully to what people say or do in their life settings. Often these subjective meanings are negotiated socially and historically. They are not simply imprinted on individuals but are formed through interaction with others (hence social constructivism) and through historical and cultural norms that operate in individuals' lives. Thus, constructivist researchers often address the processes of interaction among individuals. They also focus on the specific contexts in which people live and work in order to understand the historical and cultural settings of the participants. Researchers recognize that their own backgrounds shape their interpretation, and they position themselves in the research to acknowledge how their interpretation flows from their personal, cultural, and historical experiences. The researcher's intent is to make sense of (or interpret) the meanings others have about the world. Rather than starting with a theory (as in post-positivism), inquirers generate or inductively develop a theory or pattern of meaning (Creswell, 2013).

The epistemology is transactional and subjectivist (Marshall & Rossman, 2016) and the methodology dialectical and hermeneutical (Eatough & Smith, 2017). This means that the aim of inquiry is *understanding* the individual reconstructions of reality, i.e. the inclusion of digital media in the classroom and its effect on the stress levels of teachers. Democratic values (as discussed in the theoretical and philosophic framework) are regarded as an integral part of the research process and ethics is intrinsic to the process. Constructivism gives preference to multi-voice reconstructions of reality and encourages multiple inputs from participants (Mann & MacLeod, 2015), as is done in

this research process. It is both qualitative, as is also evident from this research design. Varying constructions are also brought into juxtapositions. Constructivism holds that realities are apprehendable in the form of multiple, intangible mental constructions. The form and content of these constructions are dependent on the individuals or groups who create these constructions. The constructions are socially and experientially based. The research undertaken will attempt to understand the stress levels experienced by teachers who have to include the use of digital media in the classroom, by acknowledging that these constructions are subjective and socially based.

The data collection will be conducted over a two-week period and semi-structured face to face interviews will include both open and closed ended questions. The data collected will be analysed to verify the effect of the implementation of digital tablets in Gauteng classrooms on teachers' perceived stress levels.

3.4 RESEARCH DESIGN

3.4.1 Introduction

De Vaus (2006) refers to research design as the overall strategy that is chosen to integrate the different components of the study in a coherent and logical way, thereby, ensuring that the researcher will effectively address the research problem; it constitutes the blueprint for the collection, measurement and analysis of data.

McMillan and Schumacher (2014) define research design as a plan that describes the conditions and procedures for collecting and analysing data. Furthermore, they say that a research design describes the procedures for conducting the study, including when, from whom and under what conditions the data will be obtained. The purpose of the research design is to specify a plan for generating empirical evidence that will be used to answer the research questions. The intent is to use a design that will result in drawing the most valid, credible conclusions from the answers to the research questions.

Qualitative research designs are usually flexible, evolving, and may include a "general hunch as to how you may proceed" (Bogden & Biklen, 2003, in Suter, 2014, p. 364). The general advice to "hang loose" means being open and flexible when planning a design, but "rigor" is a more appropriate word when describing qualitative procedures to establish trustworthiness. This study views research design as a general and flexible plan that will direct the investigation on the implementation of digital media in Gauteng classrooms during the Project and the effect of the introduction of digital media in classrooms on the perceived stress levels of teachers.

3.4.1.1 Qualitative research design

A qualitative research design will be used to construct the overall study plan for the research. McMillan and Schumacher (2014) elaborate on some prominent characteristics of qualitative research, which are relevant to this study:

- *Natural settings*

A distinguishing characteristic of qualitative research is that behaviour is studied as it occurs naturally. There is no manipulation or control of behaviour or settings, nor are there any externally imposed constraints. Rather, the setting is an actual classroom or school. This is why qualitative research is sometimes described as field research (McMillan & Schumacher, 2014; Creswell, 2013). The qualitative approach of this study will be to conduct the research at Gauteng schools in which the Project has been implemented.

- *Context sensitivity*

The situational context is very important in understanding behaviour. This is based on the belief that human actions are strongly influenced by the settings in which they occur. Essentially, it is assumed that an explanation of behaviour that does not take into

account the context is incomplete (McMillan & Schumacher, 2014; Creswell, 2013). The researcher will be context sensitive in that it will be bound by social, political, gender-based, racial, class and technological factors.

- *Direct data collection*

Qualitative researchers want to have information directly from the source (McMillan & Schumacher, 2014; Creswell, 2013). A considerable amount of time will be spent in direct interaction with the settings and participants.

- *Rich narrative descriptions*

Qualitative researchers approach a situation with the assumption that nothing is trivial or unimportant. Every detail that is recorded is thought to contribute to a better understanding of behaviour. The descriptions are in the form of words or pictures rather than numbers. The intent is to provide "rich" descriptions that cannot be achieved by reducing pages of narration to numbers (McMillan & Schumacher, 2014; Flick, 2014). The detailed approach to description will obtain a complete understanding of the implementation of digital media in Gauteng classrooms during The Project and attempt to accurately reflect the effect it has on teachers' stress levels, which is a complex human behaviour.

- *Process orientation*

Qualitative researchers want to know how and why behaviour occurs. Qualitative studies look for the process by which behaviour occurs as well as explanations, not just outcomes or products. The emphasis on process allows for conclusions that explain the reason for results (McMillan & Schumacher, 2014; Flick; 2014). The qualitative inquiry will focus on the perceived stress encountered by teachers who have to implement the use of digital media in their classrooms, and how this change affects the quality of learning and teaching.

- *Inductive data analysis*

Qualitative researchers gather data first and then synthesise inductively to generate generalisations. The emphasis is on inductive reasoning. Theory is developed from the ground up. This approach is important because the researcher wants to be open to new ways of understanding (McMillan & Schumacher, 2014; Creswell, 2013). A picture will be created from the pieces of information obtained from the participants at different schools.

- *Participant perspectives*

Qualitative researchers try to reconstruct reality from the standpoint of participants perspectives, as the participants they are studying see it (McMillan & Schumacher, 2014; Creswell, 2013; Flick, 2014). This study will not apply pre-determined definitions or ideas about how people will think or react. The goal in this study will be to understand participants from their own point of view, in their own voice. In other words, there is a focus on the meaning of events and actions as expressed by the participants.

- *Emergent design*

Qualitative researchers have a plan or design for conducting the research. Qualitative researchers do not know enough to begin the study with a precise research design. Rather, they use an emergent design. As they learn about the setting, the people and other sources of information, they are better able to know what needs to be done to fully describe and understand the phenomena being studied. The qualitative researcher will begin the study with some idea about what data will be collected and what procedures will be employed, but a full account of the methods is done retrospectively, after all the data has been collected. The design is emergent in that it evolves during the study (McMillan & Schumacher, 2014; Creswell, 2013).

- ***Complex understanding and explanation***

Central to qualitative research is the belief that the world is complex and that there are few simple explanations for human behaviour. Behaviour results from the interaction of multiple factors (McMillan & Schumacher, 2014). This will lead the researcher to examine multiple perspectives, while at the same time acknowledging that it is not possible to account for all of the complexity present in a situation.

Thus, a qualitative case study research design is implemented in this research study to investigate the effect of the introduction of digital media in classrooms on the perceived stress levels of teachers in Gauteng schools, who have been part of the Project.

3.4.1.2 Research purpose

Historically, qualitative researchers cited two major purposes of a study: to describe and explore and to describe and explain. Exploratory studies add to the literature by building rich descriptions of complex situations and by giving directions for future research. Explanatory studies show relationships between events and meanings as perceived by participants (McMillan & Schumacher, 2014; Creswell, 2013; Flick, 2014). This study will use an exploratory study. Themes of participants meanings will be discovered in relation to the introduction of digital media in Gauteng classrooms and how this has impacted on teacher's perceived stress levels. This is a new, or little understood phenomena.

3.4.1.3 A qualitative case study design

Case study research involves 'intensive study of a single unit for the purpose of understanding a larger class of (similar) units … observed at a single point in time or over some delimited period of time' (Gerring, 2004, p. 342). As such, case studies provide an opportunity for the researcher to gain a deep holistic view of the research

problem, and may facilitate describing, understanding and explaining a research problem or situation (Baskarada, 2014).

A case study is an in-depth analysis of a single entity. It is a choice of what to investigate, identified as a single case or the case (Stake, 2013 in McMillan & Schumacher, 2014). Creswell (2008 in McMillan & Schumacher, 2014) refers to a case study as 'an in-depth exploration of a bounded system (e.g., an activity, event, process or individuals) based on extensive data collection' (p. 370). Being bounded means being unique according to place, time and participant characteristics.

The design stage focuses on defining the unit of analysis and the likely cases to be studied, developing theory/propositions and identifying issues underlying the anticipated study, identifying the case study design (single, multiple, holistic, embedded), and developing procedures to maintain case study quality (Yin, 2014). Research design logically links the research questions to the research conclusions through the steps undertaken during data collection and data analysis. Thus, research design, which can be seen as a 'blueprint' for the research project, should address the research questions, relevant propositions/hypotheses, the unit of analysis, the logic linking the data to the propositions, and the criteria for interpreting the findings (Baskarada, 2014). The logic linking the data to the propositions should also ensure the correct type and amount of relevant information is collected. The criteria for interpreting the findings should include any relevant rival theories/explanations so that relevant data can be collected during the data collection stage. Common design-related issues include choosing an inappropriate unit of analysis, inappropriate case selection, insufficient attention to alternative theories/hypotheses, and more/fewer cases selected than necessary (Baskarada,2014).

The unit of analysis defines what the case is—for example, an event, a process, an individual, a group, or an organisation (Yin, 2014). As the literature is not consistent with respect to the terminology—for example, Gerring (2004) advocates a taxonomy in which units comprise cases—clearly defining relevant terms is critical. In the case of

an event or a process, defining the time boundaries (i.e., the beginning and the end of the case) is imperative. While it may sound obvious and simple, identifying the appropriate unit of analysis requires careful consideration, as any confusion over it may invalidate the whole study (Gerring, 2004; Baskarada, 2014). As the choice of the theoretical lens is entirely subjective, there are no explicit guidelines for how exactly this should be done (Walsham, 2006). Nevertheless, from a pragmatic standpoint, theoretical foundations should not be dated, immature, overused, or overly practitioner-oriented (Pan & Tan, 2011). When the case study data uncovers constructs that do not neatly fit within the foundational theoretical schema, the researcher may have the opportunity to extend it by including additional constructs and/or propositions. The alternative and reasonably controversial view argues against any theoretical preconception prior to data collection with a view that any theory should purely emerge from the raw data (Baskarada, 2014).

Baskarada (2014) provides a more detailed classification, differentiating between six types of case studies:

- illustrative—this case study is descriptive in character and intended to add realism and in-depth examples to other information about a program or policy;
- exploratory—this is also a descriptive case study but is aimed at generating hypotheses for later investigation rather than for illustrating;
- critical instance—this examines a single instance of unique interest or serves as a critical test of an assertion about a program, problem, or strategy;
- program implementation—this case study investigates operations, often at several sites, and often normatively;
- program effects—this application uses the case study to examine causality and usually involves multi-site, multi-method assessments; and
- cumulative—this brings together findings from many case studies to answer an evaluation question, whether descriptive, normative, or cause-and-effect.

Individual cases may be selected based on convenience, purpose, and probability. According to Yin (2014), reasons for justifying single-case studies include studying a

critical case, an extreme case, a representative or typical case, a revelatory case (involving a novel situation), and a longitudinal case. Purposive case selection provides an ability to collect the most relevant data, and longitudinal cases provide an ability to identify trends over time.

According to Yin, in multi-case studies, each case should be selected so that it either predicts similar results (literal replication) or predicts contrasting results but for anticipatable reasons (theoretical replication). If multiple cases lead to contradictory results, the preliminary theory should be revised and tested with another set of cases (Yin, 2014). Both single and multiple designs can be either holistic (one unit of analysis per case) or embedded (multiple units of analysis per case).

Yin (2014) provides advice on qualitative case study research, which is acknowledged in this study:

- The argument or theory should be made clear at the beginning of the case study.
- The argument should be grounded in a research literature rather than specifically related to the case study.
- Findings should show how the results of the case study either challenged or supported the theory or argument.
- If the findings support the theory, a logical and sound argument needs to be made by researchers to show how these findings can be generalised to similar situations.
- Examining rival hypotheses will strengthen claims of analytical generalisation.

Beyond making a claim, the generalizability of the findings from a single case study increases immeasurably if similar results have been found with other case studies—whether such studies already existed in the literature or were completed after the first case study.

Significant contributors to the field of case study research are Stake, Merriam and Yin (Yazan, 2015). Stake an educational psychologist with an interest in developing

program evaluation methods, used a constructivist orientation to case study. This resulted in placing more emphasis on inductive exploration, discovery, and holistic analysis that was presented in thick descriptions of the case (Stake, 2013). Similarly, Merriam and Tisdell (2015) used case study research to explore and evaluate educational programs. Merriam and Tisdell's (2015) approach emphasized defining and understanding the case through the products of inquiry. Merriam and Tisdell (2015) describe case study research by its characteristics: particularistic, descriptive and heuristic, highlighting the purpose and qualitative nature of case study research, the focus on a specific entity and, the motivation to understand and describe the findings.

This researcher will use a multi-case study which will be based on convenience and purposeful sampling where the unit of analysis will be teachers who have had to implement the use of digital media in their classrooms during The Project in Gauteng, and the impact this has had on the perceived stress levels of teachers.

3.4.1.4   *Significance of qualitative case study design*

A qualitative case study design has been chosen for because qualitative research can be designed to contribute to theory, practice, policy, social issues and action (McMillan & Schumacher, 2014; Yin, 2014). I would like to elaborate on these as they are relevant to justify the choice of research approach in the study.

- *Contributions to theory*

Case study design is appropriate for exploratory research. An exploratory study examines a topic about which there has been little prior research and is designed to lead to further inquiry (McMillan & Schumacher, 2014). The outcome of this research will provide an understanding of an abstract concept, such as perceived stress in teachers, from the teacher's social experience, and link it to the introduction of digital media in the classroom.

- ***Contributions to practice***

Qualitative studies can provide detailed descriptions and analysis of particular practices, processes or events (McMillan & Schumacher, 2014). The aim of the study is to highlight to educational authorities the impact of the introduction of digital media in the classroom on the perceived stress levels of teachers. The study also aims to increase the understanding of the practice and to provide recommendations on improving the practice.

- ***Contributions to policy***

Qualitative research employing a case study design also contributes to policy formulation, implementation and modification (McMillan & Schumacher, 2014). It is hoped that policy makers will take cognisance of the recommendations of this study.

3.4.1.5   *Assumptions of the research design*

This researcher will use a qualitative exploratory case study research design to guide data collection, processing and evaluation when investigating the effect of the introduction of digital media in Gauteng classrooms, during the Project, on the perceived stress levels of teachers. The research design makes the following assumptions:

- Ethical aspects in the study shall be observed;
- The two selected schools shall represent all Gauteng schools that were chosen for the Project;
- The two selected schools will represent the population;
- Recordings will be audible enough to be easily transcribed
- The interviewer will effectively conduct the semi-structured face to face interviews;
- Interviewees will freely and openly respond to the interview; and

- The semi-structured face to face interview will unveil how the implementation of digital media in classrooms during The Project in Gauteng impacted on the perceived stress levels of teachers.

3.4.2 Research approach

Creswell (2013) states three approaches to research as quantitative (positivistic, scientific) approach, qualitative (interpretive) approach, and mixed-methods. A qualitative research approach to achieve the study objectives will be applied. The researcher believes that the qualitative achievement of the study objectives will yield educationally important findings. These findings will inform the DoE at school, circuit, district, provincial and national levels that the implementation of digital media in Gauteng classrooms have had an impact on the perceived stress levels of teachers. Furthermore, more research needs to be conducted on the feasibility of the introduction of digital media in the classroom and its impact on the quality of learning and teaching. It is hoped that the study will inform policy makers of the impact that the introduction of digital media in the classroom has had on teachers and whether indeed the introduction of digital media has improved the quality of learning and teaching in the classroom, more specifically in The Project.

Different authors define qualitative research in different ways. For example:
- Creswell (2013) defines qualitative research as an approach for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. The process of research involves emerging questions and procedures, data typically collected in the participant's setting, data analysis inductively building from particulars to general themes, and the researcher making interpretations of the meaning of the data. The final written report has a flexible structure. Those who engage in this form of inquiry support a way of looking at research that honours an inductive style, a focus of individual meaning, and the importance of rendering the complexity of a situation.

- Wyse (2011) says qualitative research is primarily exploratory research. It is used to gain an understanding of underlying reasons, opinions, and motivations. It provides insights into the problem or helps to develop ideas or hypotheses for potential quantitative research. Qualitative Research is also used to uncover trends in thought and opinions, and dive deeper into the problem. Qualitative data collection methods vary using unstructured or semi-structured techniques. Some common methods include focus (group discussions), individual interviews, and participation/observations. The sample size is typically small, and participants are selected to fulfil a given quota.
- McMillan and Schumacher (2014) broadly define qualitative research as a type of research that refers to an in-depth study using face-to-face or observation techniques to collect data from people in their natural settings.

These definitions imply that qualitative research uses a naturalistic approach that seeks to understand phenomena in context-specific settings (Hoepfl, 1997). However, Key (1997) says that a qualitative research methodology seeks to understand people's interpretations under their natural conditions. As a researcher, I will take cognisance of the naturalistic, context-specific settings that are prevailing at the selected schools in Gauteng that have been chosen for The Project, in which teachers had to adopt the use of digital media in their classrooms. The targeted informants are principals and all levels of teachers.

One of the forms of qualitative inquiries is the 'case study', which McMillan and Schumacher (2014) define as a qualitative research that examines a bounded system (i.e. a case), over time in detail, employing multiple sources of data found in the setting. For this study, a method is required that can be used to explore factors such as participants' perspectives and the influence of socio-political contexts on curriculum successes and failures (Simons, 2009). Development of case study research in education, focuses on the need to determine the impact of educational programs and provide relevant evidence for policy and practice decisions that support social and educational change.

While the case study method has traditionally been classed as soft research, case studies are particularly difficult to execute well (Yin, 2014). Case studies allow for confirmatory (deductive) as well as explanatory (inductive) findings (Baskarada, 2014; Yin, 2014), can be based on single or multiple cases, and can include qualitative and/or quantitative data. They can be exploratory, descriptive, or explanatory, and they have been described as the preferred research method when *how* and *why* questions are posed, the investigator has little control over events, and the focus is on a contemporary phenomenon within a real-life context (Yin, 2014). Conversely, a case study research method may not be the best choice in situations where the phenomenon of interest is mature and well-understood, where there is little interest regarding *how* or *why* a phenomenon occurs, and where real-life context is irrelevant. According to Yin (2014), *how* and *why* questions are better answered through case studies as such questions deal with operational links needing to be traced over time, rather than mere frequencies or incidence.

While case studies do not aim to generalise to populations (statistical generalisation), similar to experiments, they aim to generalise to theories (analytical generalisation) (Yin, 2014). Thus, according to Yin, replication may be claimed if two or more cases are shown to support the same theory. Stake (2013), on the other hand, argues that case studies are particularly well-suited for naturalistic generalisations that are based on experiential transformation of tacit knowledge into explicit knowledge. In any case, case studies are particularly well-suited for extensive and in-depth descriptions of complex social phenomena. In fact, the depth of analysis is one of the primary virtues of the case study method (Gerring, 2004; Baskarada,2014). As a research method, case studies are commonly used in education (Stake, 2013; Baskarada, 2014).

However, 'given the time required, the rich, in-depth, nature of the information sought, and the need to achieve credibility,' case studies can also be costly to conduct (Baskarada, 2014, p. 4). Other challenges identified by Baskarada include choosing the method for selecting cases, reporting the basis for selecting cases, and integrating

findings across several cases when the findings in one were inconsistent with those in another.

Exploratory case studies may be undertaken prior to the definition of the research questions and hypotheses. Exploratory case studies aim to find answers to the questions of 'what' or 'who'. Exploratory case study data collection method is often accompanied by additional data collection method(s) such as interviews, questionnaires, experiments etc. Accordingly, they are mainly used for theory building.

Descriptive case studies aim to analyze the sequence of interpersonal events after a certain amount of time has passed. Case studies belonging to this category usually describe culture or sub-culture, and they attempt to discover the key phenomena. Descriptive case studies try to completely describe different characteristics of a phenomenon in its context and they are also mainly used for theory building. Such studies may also identify differences between individual cases with a view of potentially generating a classificatory framework (Gerring, 2004; Baskarada, 2014).

Explanatory case studies may be undertaken to investigate causal relationships; hence, they are mainly used for theory testing. They are characterised by *how* and *why* research questions because they investigate the relationships that are proposed between different theory components (Yin, 2014). Any inconsistencies between a preliminary theory and the evidence may lead to theory modification and enhancement (Aneshensel, 2012). The investigation applies an exploratory qualitative case study methodology to study how the implementation of digital media in Gauteng classrooms during The Project, has impacted on the perceived stress levels of teachers.

Stake (2013) differentiates between intrinsic, instrumental, and collective case studies. Intrinsic case studies only aim at acquiring better understanding of the particular case of interest. Thus, such case studies are not used for theory building. Instrumental case studies provide insights into an issue or are used to refine a theory, and collective case studies comprise several instrumental case studies. However, Stake also argues that

studies seldom fit neatly into such categories, and that researchers have to make a strategic choice in deciding on the scope of the case study, since everything cannot and need not be understood.

This study will adopt a qualitative case study design, to assist the researcher to achieve the study objectives, that will guide the study from the beginning of the investigation to the end. The case study design will be descriptive in nature and will be an instrumental case study.

3.4.3 Population and sampling

In this section, the study will provide the methodological and logistical issues of the research. This will include the selection of participants, data collection, data analysis, measures for trustworthiness and ethical considerations.

An exploratory qualitative case study methodology will be applied to study how the implementation of digital media in Gauteng classrooms during the Project impacted on the perceived stress levels of teachers. To do this, the researcher will pay attention to important strategic issues in designing a qualitative case study.

3.4.3.1   Selection of participants from the population and sampling

In research, the group of participants or participants from whom the data are collected is referred to as the sample (McMillan & Schumacher, 2014). The sample can be selected from a larger group of persons identified as the population. This study necessitates further discussion of the term population. A population is a group of elements or cases, whether individuals, objects or events that conform to specific criteria and to which we intend to generalise the results of the research. This group is also referred to as the target population or the universe. The target population is often

different from the list of elements from which the sample is actually selected, which is termed the survey population or sampling frame (McMillan & Schumacher, 2014). The target population is made up of all the teachers and principals from all the schools in Gauteng that were part of the Project. The survey population constitutes five teachers and the principal from each of two schools that will be selected by the researcher that were part of the Project. Thus, although the intent of the research is to generalise to all teachers that were part of the Project, the sampling frame places some limitations on such generalisations.

Several literatures refer to target population as the universe and survey population as the sampling frame (McMillan & Schumacher, 2014; Strydom & Venter, 2003). Strydom and Venter (2003) define the universe as that which refers to all potential participants who possess the attributes in which the researcher is interested. In this study the participants/elements are the teachers of schools that were part of the Project, and a complete qualitative coverage of it would be difficult. The researcher has selected two schools from the 375 schools that are part of the project. This sets boundaries between the schools in Gauteng that are part of the Project and those that are not. Strydom and Venter (2003) term this setting of boundaries on the study units that possess specific characteristics in the universe, a population.

The population for this study consists of 375 schools that were part of The Project (ANA Reporter, 2015). This is a large number to study under qualitative conditions and thus requires a reduction to a subset or size of elements of the population for a study without compromising the desired rich and thick analytic generalisation. This is purely a sampling process through which a researcher can select a sample for the study.

Sampling is a process through which researchers take a portion of a population or universe that is representative of that population or universe and involve themselves in the selection of sites, time, people and events (Merriam and Tisdell, 2015; McMillan & Schumacher, 2014). However, Leech (2005) remarks that many qualitative researchers do not regard sampling and sample size considerations as issues in qualitative

research. She argues that making appropriate sampling and sample size decisions is central to qualitative research and does assist the qualitative inquirer to make analytic generalisations by collecting data that reach data saturation, theoretical saturation or informational redundancy. Thus, in this qualitative case study, the researcher will make appropriate sampling and sample size decisions to investigate how the implementation of digital media in Gauteng classrooms impacts on the perceived stress levels of teachers.

However, Strydom and Venter (2003), warn that the findings of a study can only be generalised if we can assume that what we observed in the sample of participants would be observed in any other group of participants from the population or universe. This implies that a sample does not necessarily represent a population or universe, especially in qualitative research. McMillan and Schumacher (2014) add that generalisation is usually not the intent of a qualitative study but that generalisation is possible to similar participants. This restricts the essence of generalisation in qualitative studies.

A common concern about case studies is that they provide little basis for scientific generalization. "How can you generalize from a single case?" is a frequently heard question (Baskarada, 2014). In fact, scientific facts are rarely based on single experiments; they are usually based on a multiple set of experiments that have replicated-the same phenomenon under similar conditions. The same approach can be used with multiple-case studies but requires a different concept of the appropriate research designs. The short answer is that case studies, like experiments, are generalizable to theoretical propositions and not to populations or universes. In this sense, the case study, like the experiment, does not represent a "sample," and in doing a case study, the goal of the researcher will be to expand and generalize theories (analytic generalization) and not to enumerate frequencies (statistical generalization) (Yin, 2014).

Robert Yin describes the process of analytic generalisation as a two-step process: First, a conceptual claim is made by researchers which shows how their case study findings bear upon a particular theory, theoretical construct, or theoretical sequence of events. Secondly, this theory is applied to implicate situations in which similar events might occur (Yin, 2014). This study adopts Yin's approach to qualitative case study generalisation in investigating how the implementation of digital media in Gauteng classrooms during the Project impacted on teachers' stress levels.

Researchers apply two major sampling techniques to conduct empirical studies. These are probability and non-probability sampling techniques (McMillan & Schumacher, 2014). In probability sampling participants are drawn from a larger population in such a way that the probability of selecting each member of the population is known. This type of sampling is conducted to efficiently provide estimates of what is true for a population from a smaller group of participants (sample). That is, what is described in a sample will also be true, with some degree of error, of the population. When probability sampling is done correctly, a very small percentage of the population can be selected. This saves time and money without sacrificing accuracy. In educational research it is both impractical and unnecessary to measure all elements of the population of interest (McMillan & Schumacher, 2014).

Non-probability sampling does not include any type of random selection from a population; this form of sampling is the most common type in educational research. The researcher uses participants who happen to be accessible or who may represent certain types of characteristics (McMillan & Schumacher, 2014). Sarantakos (2003) describes non-probability sampling in qualitative research as relatively limited, based on saturation, not representative, the size not statistically determined, involving low cost and not being time consuming. This implies that in qualitative investigation non-probability sampling occurs almost without exception. McMillan and Schumacher (2014) identify non-probability sampling techniques as convenience sampling, purposive sampling and quota sampling.

Purposive or purposeful sampling will be applied to select teachers from schools in which digital media was introduced in classrooms during The Project in Gauteng. This will allow the researcher to choose representative or information rich teachers from schools regarding the implementation of digital media in Gauteng classrooms. McMillan and Schumacher (2014) maintain that the purposeful sampling technique allows the researcher to select particular elements from the population that will be representative or informative about the topic of interest. Thus, in purposeful sampling it is assumed that the investigator wants to discover, understand and gain insight about the research topic and therefore must select a sample from which the most can be learned.

McMillan and Schumacher (2014) define a sample as the group of participants from whom data are collected and are often representative of the population. Strydom and Venter (2003) support this definition by saying that a sample comprises the elements of the population considered for actual inclusion in the study. The sample in this exploratory qualitative case study will be selected from the population of 375 schools in which teachers had to implement the use of digital media in classrooms during the Project in Gauteng.

Many authors refer to samples from which most could be learned as the information rich portion of the population (Merriam and Tisdell, 2015; Strydom & Venter, 2003; McMillan & Schumacher, 2014). They maintain that the power and logic of purposeful sampling is that a few cases studied in-depth yield many insights about the topic. The strengths of purposeful sampling are that it is less costly and time consuming, is easy to administer, usually ensures high participation rate by participants, generalisation is possible to similar participants, collects data from information rich participants, and assures receipt of needed information (McMillan & Schumacher, 2014).

This study will therefore utilise purposeful sampling to discover, understand and gain insight about the implementation of digital media in Gauteng classrooms during the Project and its impact on the stress levels of teachers. The researcher will use face to

face interviews to interview presumably knowledgeable and informative (i.e. information rich) teachers at selected schools in Gauteng.

McMillan and Schumacher (2014) identify different types of purposeful sampling as site selection, comprehensive sampling, maximum variation sampling, snowball sampling and sampling by case type (extreme case, intense case, typical case, unique case, reputational case, critical case, concept/theory based and a combination of purposeful sampling strategies).

The researcher will apply a combination of purposeful sampling strategies such as convenience, concept/theory based and homogenous sampling strategies. It is important to explain these terms for this study:

- **Convenience sampling** is where a group of participants is selected on the basis of being accessible or expedient. Although this type of sample makes it easier to conduct the research, there is no precise way of generalising from the sample to any type of population. This does not mean that the findings are not useful; it simply means that caution is needed in generalising (McMillan & Schumacher, 2014). Convenience sampling will be used due to practical constraints, efficiency and accessibility.
- **Homogeneous sampling** brings together people of similar backgrounds and experiences. It reduces variation, simplifies analysis, and facilitates interviewing. This strategy is used most often when conducting face to face interviews (Patton, 2001).
- **Concept/theory-based sampling** selects information rich persons or situations known to experience the concept or to be attempting to implement the concept or theory (McMillan & Schumacher, 2014). In this study teachers from Gauteng schools who have had to implement the use of digital media in their classrooms during the Project will be selected as sampling participants.

Choosing to combine and apply a combination of purposeful sampling strategies will allow the researcher to incorporate the strengths of each sampling procedure (McMillan & Schumacher, 2014). This approach requires a selected school earmarked for the study to meet certain selection criteria based on the characteristics of convenience, homogenous and concept/theory sampling procedures. Each selected school will have to be part of the Project in Gauteng, be easily accessible, and have informative and knowledgeable participants (teachers) in respect of the implementation of digital media in classrooms during The Project in Gauteng.

While there is no ideal number of cases, depending on the nature of the research question, the available resources, the study timeframe, and case availability, either breadth (across multiple cases) or depth (within case) may take precedence (Darke, Shanks & Broadbent, 1998; Baskarada, 2014). Nevertheless, multiple cases typically lead to more robust outcomes than single-case research, especially in the context of inductive theory building (Eisenhardt & Graebner, 2007). As gaining access to suitable case study organisations is perhaps the most challenging step in the entire process (Walsham, 2006), some argue that it may be more pragmatic to tailor any theoretical contribution based on case study accessibility (Pan & Tan, 2011). In other words, that searching for, and gaining access to relevant cases should come prior to the identification of research questions (Baskarada, 2014).

From each of the selected two Gauteng schools, five teachers and the principal in each school will be requested to be participants in a face to face interview. This gives a total of 12 (6 x 2) participants to provide information on the implementation of digital media in Gauteng classrooms during the Project. The researcher will label the selected schools X and Y for ethical reasons. For example, School X may stand for Letstasi High School (fictitious name) and School Y may stand for Thato Secondary School (fictitious name). The teachers will be called Participant A, Participant B, etc. Thus, the researcher will interview 12 participants.

3.4.4 Instrumentation and data collection

3.4.4.1   Instrumentation

Instrumentation concerns the designing and structuring of instruments or tools necessary to collect data (Miles, Huberman & Saldana, 2013). Thus, instrumentation comprises specific methods for collecting data and assists a researcher to get information that is required to answer the research question. Observations, interviews, documents, artefact collection and other supplementary techniques are often used to collect qualitative data (McMillan & Schumacher, 2014).

In this qualitative case-study the interviewer will use semi-structured face to face interviews with open ended and close ended questions to collect data. The face to face interviews will be used to collect data from teachers and principals at schools that have been part of the Project in Gauteng. This research tool will assist the researcher to get rich information on how the implementation of digital media in selected schools during the Project impacted on the stress levels of teachers.

In qualitative research it is important to understand that the human person, that is the researcher, is the primary collection instrument (Creswell, 2013; Key, 1997; Merriam & Tisdell, 2015). Thus, qualitative researchers mention amongst other characteristics, the researcher as key instrument of qualitative research. Additionally, Creswell (2013) when defining qualitative research indicates that the qualitative researcher builds a complex holistic picture, analyses words and reports detailed views of informants as the study proceeds. The researcher will be the key, primary or active instrument/tool that will design, collect and analyse data and report on the data. This will allow the researcher to have full control of the study by responding to the contextual environment through maximisation of opportunities for collecting and producing meaningful information (Merriam & Tisdell, 2015).

However, Bogdan and Biklen (2007) and Merriam and Tisdell (2015) warn that being the primary human instrument in the qualitative research may introduce biases, subjectivity and observer effects in data collection, analysis and reporting. This would adversely affect the quality of the study results. The researcher would, however, avoid or reduce the biases, subjectivity and observer effects by being sensitive to the context and data, and practising ethical measures and good communication skills during the proceedings of the qualitative study (Bogdan & Biklen, 2007; Merriam & Tisdell, 2015).

Thus, it is important for the researcher to focus on developing skills as a case study investigator, training for a specific case study, developing a case study protocol, conducting a pilot case, and gaining any relevant approvals (Yin, 2014). Preparation should also aim to identify any relevant issues in the case study design and/or the team composition, and endeavour to address any such issues before starting the data collection stage. Before proceeding further, the researcher should also reach an agreement with the case study organisation/participants regarding any limitations on the disclosure of data, identities, and findings (Darke et al., 1998). Potential participants should also be informed about the research timeframe, the proposed nature of their involvement, and the expected practical outcomes.

3.4.4.2   *Data collection*

Data collection involves following the case study protocol, using multiple sources of evidence, creating a case study database, and maintaining a chain of evidence (Yin, 2014). Miles et al., (2013) similarly recommend that multiple sources of evidence should be used, that a case study database should be used to store relevant evidence, and that an auditable chain of evidence (also referred to as an "audit trail") should explain how any conclusions have been drawn.

According to Yin (2014), one major difference between survey-based studies and case studies is that surveys capture indirect perceptions and attitudes about events and behaviours, whereas case studies collect direct evidence. Furthermore, in case studies,

data are analysed as they become available, and the emerging results are used to shape the next set of observations, or the next data collection activity.

Theoretical sampling, which differs from statistical sampling, originated with the development of grounded theory (Glaser & Strauss, 1967, Baskarada, 2014). In contrast to statistical sampling, the goal of theoretical sampling is not to undertake representative capture of all possible variations, but to gain a deeper understanding of the cases in order to facilitate the development of theories. Theoretical sampling implies that the researchers guide their data collection activities on the basis of providing theoretical ideas (Boeije, 2002; Baskarada, 2014). Thus, it enables answering of questions that have arisen from the analysis of and reflection on previous data, since each piece of analysed data provides indications about where to look next. Theoretical reasons for sampling cases include revelation of something unusual/unexpected, seeking replication/falsification, elimination of alternative explanations, and elaboration of emerging theory (Eisenhardt & Graebner, 2007; Baskarada, 2014). Selecting extreme case-pairs (e.g., good vs. bad) is a common theoretical sampling approach. As such, the theory is continually modified as a consequence of further research. Such a comprehensive data collection approach helps ensure that key aspects have not been missed, the associated flexibility provides an ability to collect the most relevant data, and multiple sources of evidence lead to enhanced validity and reduced bias (Eisenhardt & Graebner, 2007; Baskarada, 2014). In addition, the ability to search for disproving evidence may lead to a reduction in confirmation bias and maintaining a chain of evidence allows for stronger justifications of any conclusions.

In addition to investigator bias that may result from personal values and assumptions, and which can unduly influence data collection and analysis, potential effects of the investigator on the behaviour of the case study participants also need to be taken into consideration (Darke et al., 1998, Baskarada, 2014). For instance, "double hermeneutics" refers to the situation where researchers influence the interpretations of the study participants (Giddens, 1984, Baskarada, 2014). Arguments that such type of bias may be minimised by building rapport between the investigators and the participants (Miles et al., 2013) are questionable. The researcher explicitly

acknowledges any such aspects and critically reflects on how meanings may have been socially constructed.

Relevant data may be collected through documents, archival records, interviews, direct observations, and physical artefacts (Yin, 2014; McMillan & Schumacher, 2014). According to Yin, when reviewing documents, researchers should bear in mind that they may not always accurately reflect reality (e.g., policy and process documents may be out-of-date). Archival records are arguably more reliable, as they are usually used for record keeping purposes.

A case study database allows investigators to develop an audit trail from data collection, through analysis, to final conclusions. According to Yin (2014), any interested reader should be able to link the conclusions presented in the case study report to the underlying analyses, the supporting evidence, the case study protocol, and the original research questions. A case study database may include interview transcripts, investigator notes, documentary evidence, preliminary analyses, and the like. As such, the use of a case study database enhances the reliability of the study. All items in the database should be categorised, indexed, and cross-referenced in order to facilitate easy retrieval.

Before data collection is completed, researchers should ensure they have collected enough confirmatory evidence for most of the main study topics, and that the evidence included attempts to investigate major rival hypotheses or explanations. According to Yin (2014), any case study findings are likely to be more convincing and accurate if [they] are based on several different sources of information. Baskarada (2014) states that the selection of appropriate instances/cases, triangulation, and the search for disproving evidence are the key features of case studies. The next section focuses on a discussion of interviews.

Interviews are guided conversations that are usually one of the most important sources of case study evidence (Yin, 2014). However, "they should only be used to obtain

information that cannot be obtained in any other way" (Darke et al., 1998, p. 283 in Baskarada, 2014). For instance, information about organisational functional areas, reporting structures, and roles and responsibilities can be obtained from a range of internal documents (e.g., policies and procedures), public documents (e.g., annual reports), and websites. Even though the interview conversation has been described as a "pipeline for transmitting knowledge" (Silverman, 1997, p. 113 in Baskarada, 2014), effective interviewing remains a very difficult undertaking (Fontana & Frey, 1994).

Interviews can be structured, semi-structured, or unstructured (Baskarada,2014):

- **Structured interviews** involve asking pre-defined questions, with a limited set of response categories. The responses are coded by the interviewer based on an already established coding scheme (Miles et al., 2013), thus being somewhat similar to written surveys.

- **Semi-structured interviews, or focused interviews** (Dane, 2010), can be more flexible and allow the researcher to better understand the perspective of the interviewees (Daymon & Holloway, 2002). In semi-structured interviews, a researcher can refocus the questions, or prompt for more information, if something interesting or novel emerges.

- **Unstructured interviews**, on the other hand, do not impose any predefined answer categories (Fontana & Frey, 1994). They utilise open-ended questions, thus allowing for even more flexibility. While such interviews are least efficient, they may generate rich data and uncover surprising/unexpected evidence (Daymon & Holloway, 2002).

This study will use semi-structured interviews to collect information rich data from teachers who had to introduce digital media in their classrooms during the Project, in order to examine the impact on teachers' stress levels.

Interview questions focus on experiences or behaviours, opinions and values, feelings, knowledge, sensory perceptions, and the individual's background or demographic

information (McMillan & Schumacher, 2014). Qualitative interviewing requires effective open-ended questions. Dichotomous response questions, which elicit yes/no answers or short phrases in response should be avoided. When these occur, the interview assumes an interrogative rather than a conversational tone. It is recommended that interviewers use probes and pauses, be genuine, maintain eye contact, and convey that the researcher hears and connects with the person to establish trust and elicit more valid data, instead of using a more rigid approach. The experience of an interviewer with regard to technique and subject matter expertise is a key factor in identifying and maximising the collection of relevant information (Creswell, 2013; McNamara, 1999). The researcher will follow Kasunic's (2010) interview process as shown in Table 1.

Table 1: Interview Process, adapted from Kasunic, 2010

Orientation	Introductions and exchange of contact details. Description of the study and the interview process. Clarification of any expectations regarding non-attribution, sharing of data, and any other issues.
Information Gathering	The interviewer uses a questionnaire to guide the interview and digital recorder to record responses
Closing	The interviewer reviews the key points, any issues, and/or action items, and confirms accuracy with the participant. The interviewee is invited to provide feedback on the interview process. The interviewer thanks the interviewee and seeks permission for any future contact.

Some common pitfalls that can threaten an effective interview include: misinterpretation/misunderstanding of questions and answers (perhaps due to personal prejudices or convictions), leading/loaded questions and interjecting comments that can bias the response, listening only to what is easy to understand, and making assumptions about what the interviewee may answer based on prior responses. Furthermore, it has been observed that posing of *why* questions may create defensiveness on the part of the interviewees, and that *how* questions are usually a better choice (Yin, 2014; Creswell, 2013).

Additionally, as interviewees may be biased, have poor recall, or poor articulation, it is usually necessary to corroborate such data with information from other sources. For

instance, Yin argues that interviewing people with different perspectives can be a valuable approach. If possible, views of individuals from all relevant sections of the organisation should be obtained, and the views of more senior officials should not be given greater weight than views of less highly placed persons (Eisenhardt & Graebner, 2007; Baskarada, 2014). Interviewees themselves may also suggest other persons to interview, or other sources of evidence that may be of interest (Yin, 2014).

Any interview questionnaire used should include topic areas that address important issues; however, interviewers should preferably not read the questions but memorise the first few and refer to the instrument only occasionally (Creswell, 2013; Kasunic, 2010). Interviewers should use eye contact and a confident manner to set the tone for the interview and help establish rapport with the participant. When tempted to omit a question because they think they already know the answer, interviewers should confirm their assumptions with the interviewee. Also, when an answer is too brief or vague, the interviewer should try to elicit more detail. This can be done by employing the silent probe (i.e., pause and wait), using overt encouragement (e.g., saying "uh-huh" or "okay"), asking for elaboration, asking for clarification, repetition (verify understanding by paraphrasing interviewee responses), and so on (Kasunic, 2010).

Using recording devices is a matter of personal preference. However, most interview methodologists do not think that mechanised recording is a good idea as recording may make interviewees uncomfortable as well as introduce additional transcription and analysis related complications (Yin, 2014). For instance, in the case where the recording device malfunctions and the interviewers haven't been taking notes, the whole interview (or series of interviews) may be lost. Additionally, participants may struggle to say things in a socially acceptable way (Kasunic, 2010). As complete transcription and analysis of recorded interviews can be expensive and very time consuming, it may be argued that conducting more non-recorded interviews instead could be a more productive approach (Walsham, 2006). McMillan & Schumacher (2014) on the other hand, say that the primary data of qualitative interviews are verbatim accounts of what transpires in the interview session. Thus, tape or digital

recording the interview ensures completeness of the verbal interaction and provides material for reliability checks. The use of a digital device to record the interviews will be made and the researcher will also make notes.

In order to bring the interview to a closure, the interviewer should review any actions and issues that were identified during the meeting. Upon the completion of the interview, the researcher completes and types the handwritten records or transcribes the tape. The interviewer should also review the interview transcript and annotate it as needed (e.g., abbreviations, incomplete thoughts, etc.) (Kasunic, 2010). Any clarifications should be followed up with the interviewees as soon as possible.

This study will make use of face to face interviews. An '*interview*' is typically a face-to-face conversation between a researcher and a participant involving a transfer of information to the interviewer (Cresswell, 2013). Interviews are primarily done in qualitative research and occur when researchers ask one or more participants general, open-ended questions and record their answers. Often audiotapes are utilized to allow for more consistent transcription (Creswell, 2013). The researcher often transcribes and types the data into a computer file, in order to analyze it after interviewing. Interviews are particularly useful for uncovering the story behind a participant's experiences and pursuing in-depth information around a topic (Creswell, 2013; McNamara, 1999).

In qualitative research specifically, interviews are used to pursue the meanings of central themes in the world of their subjects. The main task in interviewing is to understand the meaning of what the interviewees say. Usually open-ended questions are asked during interviews in hopes of obtaining impartial answers, while closed ended questions may force participants to answer in a particular way (Creswell, 2013). An open-ended question gives participants more options for responding.

One on one face to face interviews will be applied. Although these interviews can be time consuming and costly, they are most common in educational research (Creswell,

2013; McNamara, 1999). The advantages are that the interviews are completed one participant at a time and are suitable for participants who are not hesitant to speak. Furthermore, the interviewer has better control over the types of information that they receive. They can pick their own questions. If worded effectively, questions will encourage unbiased and truthful answers (Creswell, 2013; McNamara, 1999).

Participant-observation refers to a special kind of observation where the investigator is not purely a passive observer, but an active participant in the events being studied (e.g., when the investigator is a staff member in the organisation being studied) (Yin, 2014). However, participant-observations can be biased as the investigator is not an independent party. Also, such observers may find it difficult to think "outside of the box" and, as such, adopting a novel perspective may be challenging. The researcher is an educator at a school that was selected for the Project, and as such any bias of the researcher is acknowledged.

Annexure D gives the interview schedule, which consists of the question types with corresponding examples for use in the investigation on the perceived stress levels of teachers during the implementation of digital media in Gauteng classrooms during The Project. The researcher will transcribe verbatim the collected data from the face to face interviews and attach the participants' non-verbal expressions to the corresponding words, phrases or sentences. The transcription will be qualitatively analysed as described in section 3.4.5. The purpose of this analysis is to make sense of the massive data collected in the investigation.

3.4.4.3 Data Processing

The preceding paragraphs concentrated on the collection of data from the sample schools in Gauteng for the purpose of conducting face to face interviews with their teachers. However, Richards (2005) remarks that researchers need to goad data into saying things because they [data] do not speak for themselves. Researchers do this by conducting data processing in their studies. Data processing, through data analysis,

makes sense of the collected data and finally finds an answer or answers to the research question (Merriam & Tisdell, 2015; McMillan & Schumacher, 2014).

Data processing in qualitative studies consists of interwoven and integrally related processes of data recording and management, analysis and interpretation (Marshall & Rossman, 2016; Miles et al., 2013). This implies that there are no firm boundaries between them (Miles et al., 2013). However, the researcher discusses them as separate processes to show their central importance in the investigation on how the implementation of digital media in Gauteng classrooms during the Project impacted on the perceived stress levels of teachers.

3.4.4.4 *Data recording and management*

This qualitative case study will collect mounds of data on the implementation of digital media in Gauteng classrooms during the Project and the impact of this on the perceived stress levels of teachers. The researcher will manually and electronically record and manage this data for analysis and report writing. Miles et al. (2013) advise researchers to put in place careful data management plans for them to arrive at genuine data analysis and writing. Thus, data management aims at organising and making data easily retrievable and manipulatable (Marshall & Rossman, 2016) to align those [data] towards the solutions of the research problem.

Through a manual approach, the researcher will label the digital recordings and transcribe the interviews, code/index and categorise data segments (McMillan & Schumacher, 2014; Marshall & Rossman, 2016; Miles et al., 2013). The electronic approach is mainly for typing, formatting, saving, creating backups and printing hard copies of the manually transcribed data. The researcher will safely store the study notes, transcripts, digital tapes, hard copies and backups for future references and data verification. In this way, the researcher is convinced that the collected information on the implementation of digital media in Gauteng classrooms during the Project and its

impact on the stress levels of teachers will be well organised and easily retrievable for data analysis and interpretation.

3.4.5 Data analysis and presentation

The analysis stage relies on theoretical propositions and other strategies, considers and employs analytic techniques, explores rival explanations, and displays data (facts) apart from interpretations (Yin, 2014). Bogdan and Biklen (2007) view qualitative data analysis as working with data, organising it, breaking it into manageable units, synthesising it, searching for patterns, discovering what is important and what is to be learned, and deciding what one will tell others*.*

Miles et al. (2013) succinctly regard qualitative data analysis as consisting of three concurrent flows of activity: data reduction (i.e. selecting, focusing, simplifying, abstracting, and transforming the data), data display (organising, and compressing data), and conclusion drawing/verification (drawing conclusions from verified data). Other qualitative researchers distance themselves from defining qualitative data analysis but instead give its purpose and objectives. For example, Bogdan and Biklen (2007), and Rossman (2016) state that data analysis is the *process* of bringing order, structure and meaning to the mass of collected data. Glesne and Peshkin (1992) state that data analysis involves organising what one has seen, heard, and read so that one can make sense of what one has learned.

Creswell (2013) believes that this process of data analysis and interpretation can best be represented in as a spiral image – the data analysis spiral. Marshall and Rossman (2016) vehemently believe that qualitative data analysis must not proceed in linear form. Thus, McMillan and Schumacher (2014) state that data analysis is an ongoing, cyclical process that is integrated into all phases of qualitative research. These authors divide the process of data analysis into interim and inductive data analysis and give the general process of inductive data analysis as in

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Figure 2. This figure illustrates the interdependence of inductive analytic phases and also shows the data analysis process beginning at the first stage of data collection (i.e. recording in the field) and ending with narrative and/or visual data presentation.

McMillan and Schumacher (2014) add that interim data analysis occurs during data collection when making data collection decisions and identifying recurring topics/codes. Researchers carry out the processes of data coding and categorisation, after the completion of data collection, through inductive data analysis. Merriam and Tisdell (2015) adds that data analysis becomes more intensive as the study progresses, and once all the data are in.

Figure 2: General process of inductive analysis, adapted from McMillan & Schumacher (2014)
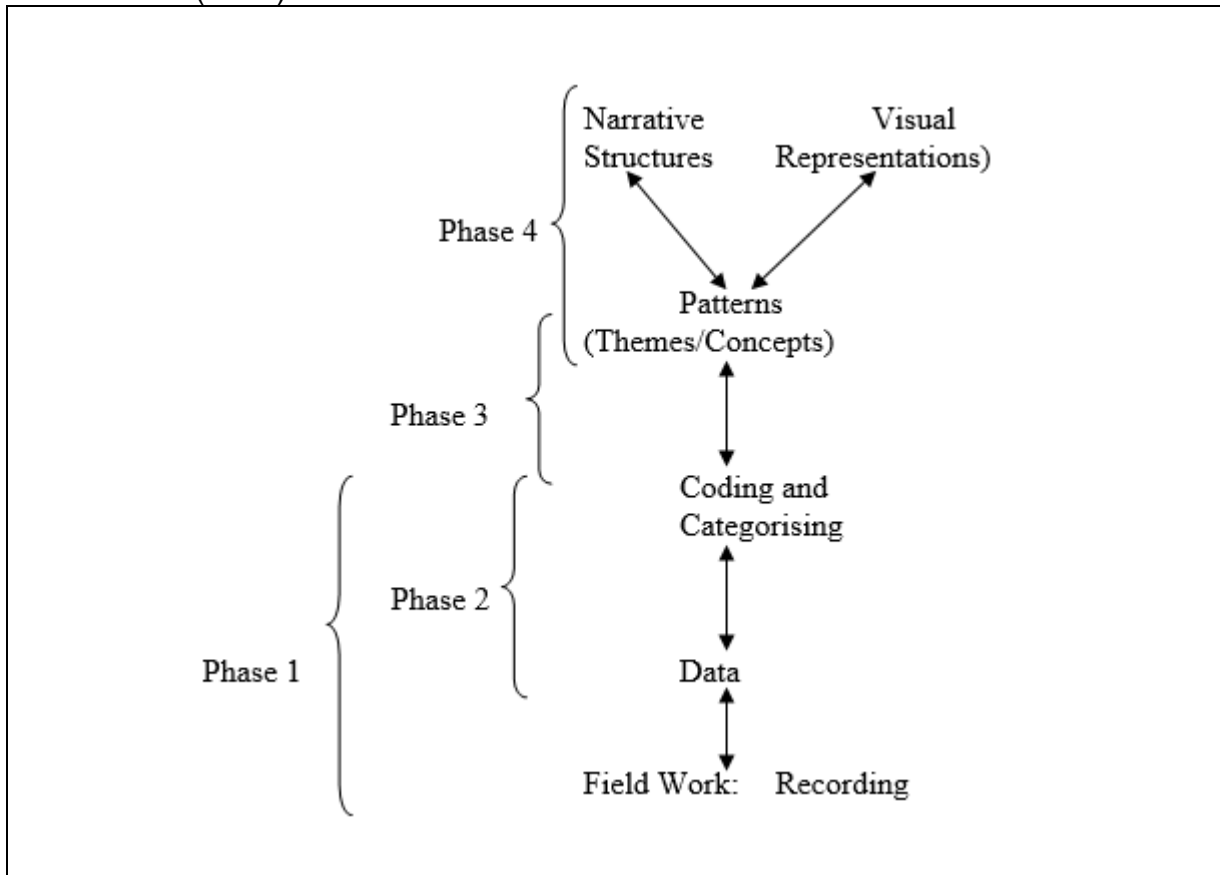
Consequently, the researcher will conduct data analysis during and after data collection, and optimise inductive data analysis only when all data from the selected schools are in. This approach to data analysis will assist the researcher to investigate how the sampled schools within Gauteng during the Project implemented the use of digital media in classrooms and the impact this has had on the stress levels of teachers.

Creswell (2013) maintains that there are different data analysis forms inherent in each of the five traditions of qualitative inquiry (namely biography, phenomenology, ground theory, ethnography and case study). This author says that a qualitative case study researcher may analyse data by making a detailed description of the case and setting, seeking a collection of instances from the data through categorical aggregation, looking and drawing meaning from a single instance through direct interpretation, establishing

patterns or developing naturalistic generalisations. The researcher will use a combination of these data analysis forms to analyse and gather rich findings on how the selected schools in Gauteng implemented the use of digital media in the classroom and the impact this has had on the stress levels of teachers.

3.4.5.1 *Data analysis methods*

Creswell (2013) presents and discusses three analysis strategies in qualitative inquiry. First is a general review of all information, often in the form of jotting down notes in the margins of text (e.g. observational fieldnotes, interview transcriptions, and notes about photographs or videotapes). Second is the reduction of data to develop codes or categories and to sort text or visual images into categories. Finally comes making preliminary counts of data and determining how frequently codes appear in the database.

However, Marshall and Rossman (2016) give a continuum of [qualitative] analysis strategies (

Figure 3) and posit that *nearly as many analysis strategies exist as qualitative researchers,* implying that qualitative analysis strategies are numerous and non-exhaustive. Thus, McMillan and Schumacher (2014) remark that qualitative researchers develop analytical styles, but rarely make explicit all of their data analysis strategies.

Figure 3 shows a continuum of idealised analytic styles from prefigured technical to emergent (McMillan & Schumacher, 2014; Marshall & Rossman, 2016).

Figure 3: Continuum of analytic styles, adapted from McMillan & Schumacher (2014)
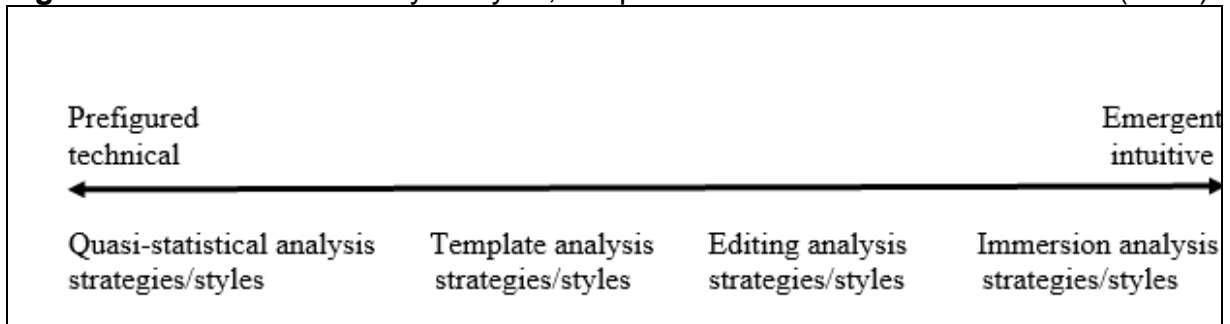
The prefigured technical/quasi data analysis styles are technical, scientific and standardised and are on the extreme left of the continuum. A researcher who analyses data through these means assumes an objectivist approach to the research and does stipulate categories in advance. On the extreme right of the continuum are the emergent/intuitive analytic styles in which categories are not predetermined. The template and editing analysis strategies stand along the continuum, with the template processes more prefigured and stipulative than the editing processes (McMillan & Schumacher, 2014; Marshall & Rossman, 2016).

In this qualitative case study, the researcher will apply both template and editing strategies to conduct data analysis. This approach will allow the researcher to use both predetermined and non-predetermined categories during the ongoin process of data analysis. Marshall and Rossman (2016) give seven typical procedures through which these data analysis strategies/styles could be utilised to answer the research problem. These procedures are organising the data, immersion in the data, generating categories and themes, coding the data, offering the interpretations through analytic memos, searching for alternative understandings and writing report or other format for presenting the study. For the purposes of this case study, the researcher will discuss data reduction together with data organisation, data coding/indexing, categories and themes generation, data interpretation and reporting.

Data reduction is the process of selecting, focusing, simplifying, abstracting, and transforming the [voluminous qualitative] data that appear in written-up field notes or transcriptions into manageable chunks (Miles et al., 2013; Marshall & Rossman, 2016). It is a part of data analysis that occurs continuously throughout a qualitative study. The

researcher will apply it throughout the analytic procedures in the study. In this way, the researcher will try to arrive at the right answers to the research question. Qualitative researchers engage in a data reduction process to pick up relevant data, to tell a sensible story, and to bring meaning and insight to the responses of the participants in the inquiry.

Richards (2015) describes qualitative data reduction as a process that unfolds through three stages. The first stage occurs in the research event (i.e. during data collection) when the researcher decides what to record, note or remember. The second stage is during the making of the record when deciding what to transcribe. The third is during data analysis when off-topic or irrelevant information is discarded. The data reduction process is important in data organisation as well as in other data analysis procedures.

The organisation of data in the study will be informed by the research question, interview guide, study literature, researcher's experiences in implementation of digital media in the classroom, and the gathered data (McMillan & Schumacher, 2014). The gathered data will be organised manually and electronically as discussed under 3.4.5. In the study, the researcher will log the types of data according to sites (i.e. selected schools), informants (i.e. principals or teachers), dates and times (Marshall & Rossman 2016). Well-organised data are imperative in this qualitative research as they will render vital information retrievable during the ongoing process of data analysis. Qualitative researchers use codes to organise and make data retrievable.

Miles et al. (2013) state that coding is analysis through which codes are attached to *chunks* of varying size-words, phrases, sentences, or whole paragraphs, connected or unconnected to a specific setting. Thus, Marshall and Rossman (2016) regard coding data as the formal representation of analytic thinking.
However, McMillan and Schumacher (2014) maintain that the descriptive name for the subject matter or topic is called the code. Put in simpler terms, codes are tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study. Marshall and Rossman (2016) and Merriam and Tisdell (2015) state

that codes may be in the form of abbreviations of key words, coloured dots, numbers or a combination of these. Words as used here include phrases, letters, sentences and paragraphs in the transcriptions of an interview. The researcher will regard codes as tags/labels that attach meaning to the informants' words found in the transcriptions of the interview.

Codes are classified as descriptive, interpretive or pattern (Miles et al., 2013). Descriptive codes entail little interpretation as compared with interpretive codes, and pattern codes are more inferential and explanatory. Researchers use pattern codes to bring together lots of material into more meaningful units of analysis, thereby identifying emergent themes or explanations. Miles et al. (2013) advise qualitative researchers to create a start list of codes prior to fieldwork, revise codes, conduct checking-code (where two researchers code the same data), create operational codes, and finally to regard coding as an ongoing analytic process. In this study, the coded data will serve as a base for generating categories (i.e. categorising the various chunks), so that the researcher can cluster the segments relating to the research problem.

The researcher will generate categories and themes through reading and re-reading of the data – the text and noting patterns expressed or used by participants (Marshall & Rossman, 2016). McMillan and Schumacher (2014) maintain that generation of categories forces the researcher to think with analytic depth and to search for what people really mean, regardless of the terms they use. The identified categories would become buckets or baskets into which segments of text are placed. Furthermore, they will be internally consistent and distinct from one another.

Marshall and Rossman (2016) note that generating categories becomes more difficult, complex, ambiguous, creative and fun for researchers that rely on editing or immersion data analytic strategies. McMillan and Schumacher (2014) advise researchers to ask basic questions when engaged in generation of categories. Basic questions are those that begin with who, what, when, where, how and why. This approach to generation of categories will oblige the researcher to analyse segments of text, compare the data

with similar or improbable situations, and to treat all pieces of information as important to the study.

3.4.5.2   *Data interpretation and reporting*

Creswell (2013) says that a final step in data analysis involves making an interpretation or meaning of data. Marshall and Rossman (2016) add that interpretation of data, often referred to as "telling the story", follows the analytic processes of categorisation and coding of data. Data interpretation brings meaning and coherence to the themes, patterns and categories, developing linkages and a story that makes sense and is engaging to read. This implies that in order to attach significance to what was found, making sense of the findings, offering explanations, drawing conclusions, extrapolating lessons, making inferences, considering meanings, and otherwise imposing order, the researcher has to read and re-read the data (Marshall & Rossman 2016). Part of interpretation is evaluating the data for their usefulness and centrality. Thus, Creswell (2013) notes that when qualitative researchers use a theoretical lens, they can form interpretations that call for action agendas for reform and change. For example, on the implementation of digital media in Gauteng classrooms during the Project, the interpretation of the data could inform the policy makers on the importance of taking cognisance of the effect of this on the stress levels of teachers.

Creswell (2013) maintains that interpretation in qualitative research can take many forms, be adapted for different types of designs, and be flexible to convey personal, research-based, and action meanings. For example, Creswell (2013) lists and discusses four different forms of data analysis that may be applied in a case study. These forms are direct interpretation, establishing patterns, naturalistic generalisations and description of the case.

Qualitative researchers may use: first, categorical aggregation to seek a collection of instances from the data, hoping that issue-relevant meanings will emerge; second, direct interpretation to look at a single instance and draw meaning from it without looking for multiple instances: third, establishing patterns to look for correspondence

between two categories; fourth, developing naturalistic generalisations to draw generalisation from the case either for themselves or for applying it to a population of cases; and lastly, detailed description to develop generalisations about the case in terms of the patterns and how they compare and contrast with published literature on the same topic in different sites.

In this multi-site qualitative case study, the researcher opts to use direct interpretation, detailed description, and naturalistic generalisations to interpret data gathered from the selected schools. In the study, the instance is the implementation of digital media at selected Gauteng schools. The three opted forms of analyses will enable the researcher to make sense of the data in two broad ways: first by drawing meanings from a single instance, comparing and contrasting the results with those found in studied literature, and second by drawing generalisations from which the provincial and national government can be informed on how the Gauteng department of education should implement the use of digital media in the classroom, so as to reduce the stress levels of teachers.

Creswell (2013) states that the final step in data analysis involves making an interpretation or meaning of the data. This then implies that data analysis ends with data interpretation. This contrasts with Richards (2015), Marshall and Rossman (2016), and Bogdan and Biklen (2007), who maintain that data analysis continues into data reporting or writing through data interpretation. For example, Bogdan and Biklen (2007), and Richards (2015) state in categorical terms that analysis and interpretation continue into the writing stage through which researchers refine and justify the analysis. Marshall and Rossman (2016) add that writing about qualitative data cannot be separated from the analytic process. Thus, the researcher will continue with data analysis throughout the writing up of the intended dissertation. The latter will comprise the following five chapters.

3.5   TRUSTWORTHINESS OF THE STUDY

The quality of any empirical studies, including case studies, depends on construct validity, internal validity, external validity, and reliability (Edmonds & Kennedy, 2012). Although there is broad agreement to use pertinent research terms for qualitative research, disagreement occurs over the names of specific concepts (McMillan & Schumacher, 2014).

Qualitative researchers who are in support of the rejection of the use of reliability and validity as [traditional] criteria for research quality and accuracy in qualitative research have introduced alternative terms to both reliability and validity (Miles et al., 2013; Key, 1997; Morse et al., 2015; Marshall & Rossman, 2016). Their alternative criteria for evaluating qualitative research and the traditional quantitative criteria are listed in

Table **2:** .

Table 2: A list of traditional criteria for evaluating quantitative research and alternative criteria for qualitative research

TRADITIONAL CRITERIA FOR EVALUATING QUANTITATIVE RESEARCH	ALTERNATIVE CRITERIA FOR EVALUATING QUALITATIVE RESEARCH.
Internal validity	Credibility/Authenticity
External validity	Transferability/Fittingness
Internal Reliability	Dependability/Auditability
External Reliability/Objectivity	Confirmability
Rigor	Trustworthiness

Morse et al. (2015) remark that the introduction of new terminology [as alternatives for reliability and validity] has resulted in a confusing situation that reduces the ability to actually discern research rigor. Thus, Morse et al. (2015) argue that the introduction of the alternative terms to reliability and validity deprive qualitative research of rigor. Some researchers refer to rigor in qualitative research as trustworthiness (Key 1997, Merriam and Tisdell, 2015; Morse et al.,2015). Morse et al. (2015) conclude that the

introduction of the parallel terminology marginalizes qualitative research from mainstream science and scientific legitimacy. These authors maintain that without rigor, research is worthless, becomes fiction, and loses its utility. For them, rigor could be introduced in qualitative inquiries by using verification strategies.

Verification strategies ensure both reliability and validity during the course of the research process. Morse et al. (2015) maintain that reliability and validity remain appropriate concepts for attaining rigor in qualitative research. Morse et al. (2015) list and discuss the following verification strategies: methodological coherence, sampling sufficiency/appropriateness, developing a dynamic relationship between sampling, data collection and analysis, thinking theoretically, and theory development. Morse et al. (2015) argues that the continued use of these verification strategies brings qualitative research into the mainstream science and scientific legitimacy.

In this qualitative case study, the researcher regards the use of verification strategies during the course of the research study as a way of attaining, enhancing and maintaining reliability and validity. Morse et al. (2015) maintain that in the broadest sense, reliability and validity address issues about the quality of data and the appropriateness of the methods used in carrying a research project and state that reliability and validity are bridged by trustworthiness of data.

3.5.1 Validity

Niemann (2000) states that both qualitative and quantitative researchers can determine the degree of validity by asking the following question: *Are the researchers really measuring or observing what they think they are and to what degree have the findings also been tested or refined by other research?* Creswell (2013) describes [qualitative] validity as a strength of qualitative research and is used to determine whether the research findings are accurate from the standpoint of the researcher, the participant, or the readers of an account (i.e. consumers of the research). Validity in qualitative

research, refers to the degree of congruence between the explanations of the phenomena and the realities of the world (McMillan & Schumacher, 2014).

The above presentations on validity imply that validity deals with the appropriateness of the methods (i.e. methods for collecting, analysing and interpreting data) to the research question. For example, in this study, will the face to face semi-structured interviews with the participants, transcription of the recorded voices of participants and analytic interpretations of data, be appropriate to the research question? That is whether they [study methods] will yield the desired answer to the research question: *Can the use of digital media such as Tablets in the classroom influence perceived stress of teachers?*

Qualitative researchers need to identify and explain potential threats to validity in a research. McMillan and Schumacher (2014) refers to validity threats, for example history and selection, as particular events or processes that could lead to invalid research conclusions or results. Niemann (2000) refers to these particular events or processes as systematic errors that need to be avoided or eliminated or controlled or ruled out (Creswell, 2013) to validate the results.

In a qualitative research, validity threats or systematic errors might be controlled or ruled through various means. For example, Merriam and Tisdell (2015), Niemann (2000) and McMillan and Schumacher (2014) list triangulation of methods of collecting and interpreting data, saturation of data, comparison, member checks or participant validation and guarding against researcher bias and reactivity/reflexivity, and observance of ethical behaviour as measures/strategies to combat validity threats or systematic errors.

Baskarada (2014) distinguishes three forms of validity, namely construct, internal and external validity. Unlike in quantitative studies, the use of internal and external validity, and hence validity, in qualitative studies is debatable. Thus, some qualitative researchers have developed alternative terms to internal and external validity (see

Table 2). However, the researcher regards the terms internal and external validity appropriate for evaluating the strength of this qualitative case study.

3.5.1.1   Construct Validity

Construct validity, which is especially challenging in case study research, deals with concept operationalisation. Operationalisation is the process of defining a concept through a set of attributes/variables in order to make it measurable through empirical observations (Loseke, 2012). Numerous threats to construct validity have been identified, including inadequate explication of constructs, construct confounding, mono-operation bias, monomethod bias, confounding constructs with levels of constructs, treatment sensitive factorial structure, reactive self-report changes, reactivity to the experimental situation, experimenter expectancies, novelty and disruption effects, compensatory equalisation, compensatory rivalry, resentful demoralisation, and treatment diffusion (Baskarada, 2014; McMillan & Schumacher, 2014).

According to Yin (2014), three strategies for improving construct validity include using multiple sources of evidence, having key informants review the case study report, and maintaining a chain of evidence. Employing multiple sources of evidence can contribute to construct validity by providing multiple measures of the same phenomenon. Designing the case study so that the chain of evidence is maintained should allow reviewers to trace from conclusions back to the initial research questions, or from questions to the conclusions (Sarker & Lee, 1998, Baskarada, 2014). The corrections made through reviews by key informants may enhance the accuracy of the case study as well as identify a range of competing perspectives.

3.5.1.2   Internal validity/credibility

Miles et al. (2013) state that some qualitative researchers prefer the use of the terms credibility or authenticity in judging the quality of a qualitative research for internal

validity. However, Merriam and Tisdell (2015) and Niemann (2000) describe the criterion for the validity of a qualitative research in terms of internal validity. Despite these differences in terminology for the criteria for judging the quality of a qualitative research, the author of the study prefers to use them interchangeably. Consequently, the researcher describes internal validity, credibility or authenticity as validity criteria that involve establishing that results of qualitative research are credible, authentic, sensible or congruent to reality.

Niemann (2000) states that researchers enhance the internal validity of their results study by guarding against bias and reactivity, striving towards a representative investigation and saturating data. The use of a digital recorder and face-to-face face to face semi-structured interviews with knowledgeable twenty-one participants (teachers) in the study will enhance the internal validity of the study. It has also been argued that pattern matching may be used to enhance the internal validity, whereby, involving qualitative but logical deduction, an empirically based pattern is logically compared against a predicted pattern (Yin, 2014).

3.5.1.3 External validity/transferability

External validity deals with the problem of knowing whether the findings are generalisable to other cases (Miles et al., 2013; Merriam and Tisdell, 2015) . Threats to external validity include interaction of the causal relationship with units, interaction of the causal relationship over treatment variations, interaction of the causal relationship with outcomes, interaction of the causal relationship with settings, and context dependent mediation (Baskarada, 2014). However, it has been argued that the use of one case is similar to the use of one experiment, in the sense that neither one is sufficient to reject or disprove propositions, and that several are necessary to demonstrate accuracy of a theory (Eisenhardt & Graebner, 2007; Lee, 1989; Yin, 2014). In other words, case studies, like experiments, are generalisable to theoretical propositions and not to populations or universes. In this sense, the case study, like the experiment, does not represent a sample, and the investigator's goal is to expand and

generalise theories [analytical generalisation] and not to enumerate frequencies [statistical generalisation] (Yin, 2014). Nevertheless, it is worth noting that the methodological literature provides little consensus regarding how exactly analytical generalisation may be achieved (Halkier, 2011; Baskarada, 2014).

3.5.2 Reliability

Reliability is concerned with demonstrating that the same results can be obtained by repeating the data collection procedure. In other words, other investigators should in principle be able to follow the same procedures and arrive at the same results under similar conditions. Two strategies for ensuring reliability of case studies include creation of the case study protocol, and development of a case study database (Yin, 2014). The case study protocol contributes to the reliability by standardising the investigation. Relevant documents may include an overview of the project, field procedures, guiding questions, and a report outline.

In addition to construct/internal/external validity and reliability, data quality is also a key validity criterion. Research has identified a range of relevant data quality dimensions, including accuracy, objectivity, believability, reputation, interpretability, ease of understanding, concise and consistent representation, relevancy, value-added, timeliness, completeness, amount of information, accessibility, and access security (Wang & Strong, 1996; Baskarada, 2014). In relation to these dimensions, data may become corrupted during collection, transmission, storage, integration, retrieval, and analysis (Baskarada, 2014).

In this qualitative case-study the researcher regards the use of verification strategies as a way of attaining, enhancing and maintaining reliability and validity. The researcher will attain rigor by being creative, flexible, sensitive and skilful in applying the set research design. This approach will allow the researcher to use research methods coherently, select appropriate samples, collect and analyse data concurrently,

reconfirm ideas from data in new data and develop theory during the course of the research to establish reliability and validity of the study (Morse et al., 2015).

The researcher will limit random errors by triangulating data, recording interviews (i.e. mechanisation), transcribing and making printouts of the recorded interviews (i.e. auditing). Reliability and validity will be ensured by interviewing teachers from three schools, which had to introduce the use of digital media in their classrooms during the Project in Gauteng.

3.5.3 Strategies for improving trustworthiness

Key (1997) and Morse et. al (2015) list strategies for establishing the trustworthiness of qualitative research as credibility, transferability, dependability and confirmability. Miles et al. (2013) add that trustworthy qualitative results are also replicable, reliable, reasonable, probably true, significant, accurate, compelling, precise, legitimate, non-biased and empowering. This indicates that it is not easy for researchers to obtain trustworthiness of results in a qualitative study. However, qualitative researchers do take appropriate measures throughout their studies to ensure the trustworthiness of their results.

The researcher will employ ethical behaviour, triangulation, comparison, mechanisation and minimisation of researcher bias to ensure the trustworthiness of the study results. The researcher is fully confident that the use of these techniques in data collection and analysis will make the results reliable and valid (Merriam and Tisdell, 2015; McMillan & Schumacher, 2014), thereby making them trustworthy.

3.5.3.1 Ethical behaviour

Chapter 2 Merriam and Tisdell (2015) maintain that ethical behaviour in qualitative studies is important to protect the identity and privacy of the participants but is also important for the promotion of researcher-participant relationship. Good

researcher-participant relationship builds up mutual trust between researcher and participants and, more importantly, enhances validity and reliability of qualitative results (McMillan & Schumacher, 2014). Merriam and Tisdell (2015) show that establishing validity and reliability brings about trustworthiness of the results. Thus, the researcher will conduct the study in an ethical manner in an attempt to establish trustworthiness of study results. The researcher will discuss appropriate guidelines for ethical behaviour in this study under section 3.5.

3.5.3.2   Triangulation

McMillan and Schumacher (2014), describe triangulation as a way of collecting research data from different sources and settings, and analysing the same data by applying different analytical techniques. For example, in this study, the author will employ face-to-face face to face interviews and documentation to collect data and analyse the latter by applying both template and editing techniques (section 3.4.6) to ensure trustworthiness of findings.

3.5.3.3   Comparison

In this multi-site qualitative case study, the researcher plans to collect data from two different selected Gauteng schools. The analysis of these data will bring about results that are either similar or different. The researcher will compare them to highlight possible commonalities and differences amongst the results (Richards, 2015). However, the researcher will consider all study findings and results equally important and not discard the less frequent ones (Richards, 2015). The differences in results will prompt the researcher to revisit the sites or confirm the findings with participants, thereby making the emerging results more confirmable. Richards (2015) and McMillan and Schumacher (2014) refer to the confirmation of results with participants as *member checking* or *participant validation*. Thus, the use of member checking or participant validation will ensure the trustworthiness of the study results (Key, 1997).

3.5.3.4   Mechanisation

Mechanisation refers to the use of a digital device to capture the voices and essence of the informants. Tape recorders provide accurate and relatively complete records (McMillan & Schumacher, 2014). In this study, a digital device (viz. Huawei cell phone) will be used during the face-to-face face interviews to capture the voices of teachers at the selected Gauteng schools. This will ensure the correctness or credibility of the data. The captured data will be transcribed verbatim and analysed. The researcher will revisit the voices on the cell phone during data analysis should there be a feeling that the transcript or part thereof does not express the anxiety or other emotions heard during the interview (Richards, 2015). This will confirm the captured responses of participants and finally promote the trustworthiness of the study results.

3.5.3.5   Researcher bias

McMillan and Schumacher (2014) state that researcher bias is what researchers bring to the research from their own background and identity. According to this view, researcher bias poses threats to a research design and thus needs to be eliminated. In opposition to this traditional view, Glesne and Peshkin (1992) postulate that researcher bias is valuable for qualitative research in forming a study basis. These two views of researcher bias are applicable to this research design.

The knowledge and experience gathered and gained through the literature review by the researcher, who is the primary research instrument, about the implementation of digital media in Gauteng classroom during the Project, poses a threat to the research design. Firstly, from the literature review, the researcher learned that the implementation of digital media in classrooms is both advantageous and disadvantageous in schools. Secondly, the researcher is a teacher at a Gauteng school where digital media was implemented in classrooms. This may introduce researcher bias into the research design that, if not controlled, might affect the study

results adversely. These two possible negative effects of researcher bias, if not controlled, will reduce the trustworthiness of the study results. These effects of researcher bias will be reduced by applying mechanisation and probes during the face-to-face interview with the interviewees and employing data analytic strategies.

3.6 ETHICAL ISSUES RELATED TO THE STUDY

In order to collect data for a qualitative research project, the intention of the researcher is to get an in-depth account of the phenomenon which may require the participants to talk about their private experiences. This implies that trust is very crucial between the participants and the researcher. The following are ethical issues that McMillan and Schumacher (2014) suggest that a qualitative researcher should anticipate and which this study acknowledges:

3.6.1 Informed consent as a dialogue

The researcher will follow the protocol of informed consent to be signed by each participant. The researcher will explain the time required for participation and the non-interfering, non-judgemental role of the researcher will be explained to participants (McMillan & Schumacher, 2014).

3.6.2 Confidentiality and anonymity

The researcher will make every effort so that the settings and participants should not be identifiable in print. Thus, the locations and features of settings will be disguised and the study will use code names of people and places (McMillan & Schumacher, 2014).

3.6.3 Privacy and empowerment

Deception violates informed consent and privacy. The researcher will negotiate with participants so that they understand the power they have in the research process

(McMillan & Schumacher,2014). Creswell (2013) talks about voluntary participation, which enables the participant to withdraw from the study at any time and also their right to refuse to participate.

3.6.4 Caring and fairness

Although this study will not result in physical harm to informants, some persons may experience humiliation and loss of trust. Justifying the possible harm to one individual because it may help others is unacceptable. A sense of caring and fairness will be part of the researcher's thinking, actions and personal morality (McMillan & Schumacher, 2014). This will be achieved by engaging in open discussions and negotiation with participants.

Permission to conduct the research will be requested from the Gauteng Department of Education (Annexure B) and the principals (Annexure F) of the selected schools. An ethical clearance certificate will be requested from the university (Annexure A). The participants will be requested a consent form giving permission for their participation (Annexure H).

3.7   CONCLUSION

This chapter discussed the research design and methods necessary to investigate how the introduction of digital media in classrooms during the Project in Gauteng impacts on the stress levels of teachers. The adopted research design is a specific and highly flexible exploratory multi-site qualitative case-study design that will point the researcher towards the collection of relevant and rich data (Yin, 2014).

Central to the description of the study research design will be data collection and data processing methods that are essential to answer the research question. The chapter explains that purposeful, non-probability sampling will be employed to select schools for the study and face to face interviewing techniques will be used to gather the

experiences of teachers on the implementation of digital media in Gauteng classrooms during the Project in Gauteng. The chapter further indicates that, data collection and data processing will be conducted in a manner that will ensure trustworthiness of the emerging study results. Finally, the chapter states that data analysis continues into the writing up of the dissertation (Marshall & Rossman, 2016).

In the next chapter, the researcher will present the verbatim transcription of the study data and compare the study results on the implementation of digital media in Gauteng classrooms with those found in the literature.

CHAPTER FOUR
DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 INTRODUCTION

The previous chapter provided the research design and methods necessary to investigate how the introduction of digital media in classrooms during the Big Switch On Project (hereafter referred to as The Project) in Gauteng impacts on the stress levels of teachers. Chapter 3 outlined the research methodology followed in this study and the strategies required to ensure credibility of the data gathered, as well as to establish trustworthiness of these research findings.

This chapter will present and discuss themes emerging from the data on the impact of the introduction of digital media in classrooms on teacher stress, during The Project. As already indicated in chapter 3, semi-structured interviews were conducted with all levels of teachers and the principals at two schools. An interview schedule was used which comprised of a series of open questions focusing on the impact of the introduction of digital media on teacher stress in Gauteng classrooms during The Project. All responses to open-ended questions in the interviews were processed through content analysis, to develop meaning to the responses of participants, in order to answer the research questions. The data was processed by transcribing all the interviews and analysing the responses. The main aim of the study as described in Chapter 1 can be divided into the following sub-aims:

- To determine how teachers can be involved in the decision-making process on the implementation of the digital tablets in Gauteng public schools, and reduce their stress.
- To determine how the introduction of digital tablets in the classroom has contributed or lessened the perceived stress levels of teachers?

- To determine in which way the introduction of digital tablets in the classroom has enhanced the quality of learning and teaching in schools, and reduced stress of teachers.
- To determine ways in which the dissemination of digital tablets can be undertaken to empower teachers and reduce stress among them.

The presentation from the analysis of the data are supplemented with direct quotations and discussed in the context of the literature reviewed in Chapter Two. This chapter contains analysis of the responses of teachers to the questions posed in the semi-structured face to face interviews. The data was also categorised into themes that were derived from and in accordance with the questions in the questionnaire. The relevant sub-themes were derived from recurring codes.

The chapter unfolds as follows: Firstly, background information on the case is presented. This is followed by an analysis of the responses of teachers with regard to the introduction of digital media in the classroom in terms of:

- Initial awareness and response
- Resources and training received by teachers
- Benefits of the introduction of digital media in the classroom
- Teacher workload
- The quality of learning and teaching
- Learner discipline
- Challenges experienced with the introduction of digital media in the classroom
- How can the implementation of digital media in the classroom be improved?
- Is the use of digital media in the classroom stressful?

Finally, the relationship between theory and data is presented.

4.2   THE RESEARCH PROCESS

Data was collected using face to face semi-structured interviews. One interview schedule was used to conduct all twelve interviews (**Annexure D**). Fifteen questions were asked in the interviews. I tried to adhere to the interview schedule to obtain a consistent set of data, however, I found teachers addressing challenges and benefits from the outset of the interviews. I did not want to interfere in their thought process so I allowed them to talk as long as it was relevant to the research. These questions were grouped into four sections to compartmentalise the data into main sections that were derived from the sub-aims outlined in Chapter One These sub-aims were expanded upon as the data was collected to include a broader look at the reality of what is taking place in terms of the introduction of digital media in the classroom and teacher stress. There did seem to be an obvious overlap of questions in the interview schedule. It became apparent that the participants felt they had answered the questions posed in a previous question as the questions were quite closely related with very slight differences. I explained as the interviews progressed that to ensure that I had the relevant data, I needed to pose the questions quite close in content to one another. These interviews took place in August 2018. The schools were chosen using purposeful sampling.

I first contacted the principles of School X and School Y and sought permission from them to conduct interviews at the respective schools. When I arrived at the schools, I asked the principles to read the principle information sheet (**Annexure E**) and to sign the consent form (**Annexure F**). I showed them the research ethics clearance certificate from UNISA (**Annexure A**), the GDE research approval form (**Annexure B**) and the Approval letter from the district director (**Annexure C**).

To begin each interview, I thanked the participant for their time, explaining that I knew that their time was very precious and was most grateful for the sacrifice they were making. I informed the interviewee that the interview would be recorded and asked the participant to read the participant information sheet (

Annexure G) and to sign the letters of consent (**Annexure H**). I explained that the interview and identity of each school is confidential. The interview then progressed with most of the interviews taking under one hour. I concluded each interview with an appreciative thank you.

After the participant agreed to the recording and signed the consent forms the researcher set up two recording devices (2 cell phones) and the interview commenced. The anxiety I experienced prior to each interview decreased significantly the more interviews were undertaken. The participants were gracious with their time and an hour seemed more than enough time to get through all the questions in the interview schedule. Participants gave detailed answers citing many examples.

The interviews were transcribed by me and although a lengthy and time-consuming activity, I found it to be most beneficial as the emerging themes were identified. Every attempt was made to give as much detail in the transcription as possible. Word for word records took place and my own words were recorded as well. I found that participants wanted acknowledgement for what they said by saying, 'You know?' and I responded by saying 'Yes' or 'Ok'. I did not record every 'Yes' and 'Ok' that I uttered in the transcripts. The transcript for Participant H is in **Annexure I**.

All of the participants took their time to read the participant information sheet before the interview. Once the interview began, the participants relaxed and it was evident that the participants felt comfortable and peaceful. Part of this was due to the conversational tone I set during the early phases of the interview.

Trustworthiness of data was ensured by implementation of the following strategies. Interviews were transcribed by me to ensure that the words said, and the correct meaning was represented in the transcription. Reliability of data was enhanced as participants were asked to review the transcript on what was heard during the. None of the participant's reported any fault with the data transcription. I was in the field long enough to ensure that my data is credible. I made sure that certain measures of

trustworthiness of this research were observed throughout the study. This assisted in avoiding bias or distorting the data collected. Detailed notes were obtained as the interviews were recorded and detailed transcription took place. The interviews were recorded using the participant's own words. I have documented the research procedures with as much detail as possible. An outside person should be able to follow the steps used in this study.

This was a multiple case study of two schools that were part of The Project and had a full ICT rollout. Five teachers and a principal from each school participated, giving a total of 12 participants that responded. In attempting to analyse the data from the interviews, I decided to use the actual number of participants in order to indicate the degree of agreement or disagreement amongst the participants, even though the number of participants was relatively small. I would like to reiterate that the results of this study are applicable to the research case of two schools and does not necessarily reflect on the wider teaching fraternity.

4.3   DATA PRESENTATION AND ANALYSIS

4.3.1 Introduction

In-depth face-to-face interviews were conducted with the participants selected for the study. The participants include a sample of school principals and teachers whose schools were chosen for The Project in Gauteng. This section presents the data obtained from the interviews.

The results obtained from the interviews have been arranged according to themes and in sequence with the responses received from the questions in the interviews. The sequential order of the questions has been adhered to as far as possible. Participants did speak about challenges from the onset of the interview and I arranged the data under the relevant headings.

4.3.2 Biographical data of participants

Table 3: Number of participants per school

School	Teachers	Principals	Total
X	5 (A, B, C, H, K)	1(G)	6
Y	5 (E, F, I, J, L)	1(D)	6
Total	10	2	12

Table 3 shows that research was conducted at two schools and five teachers and the principal at each school were interviewed. A total of twelve participants responded to the interviews.

Table 4: Gender of participants

School	Male	Female	Total
X	1	5	6
Y	2	4	6
Total	3	9	12

Table 4 illustrates gender distribution and suggests there were more females than males in the schools selected for the study.

Table 5: Number of years' experience

Experience	Frequency	Percentage
0-5 years	2	16,6
6-10 years	3	25
11-15 years	2	16.6
16-20 years	1	8,3
21+ years	4	33,3
Total	12	100

Table **5** clearly shows that teachers with varying years of experience were interviewed The data are arranged thematically to highlight key themes as they relate to the introduction of digital media in the classroom to ensure the richness of data that is sought in qualitative research.

4.3.3 Analysis of data obtained from interviews

The data are arranged thematically to highlight key themes as they relate to the introduction of digital media in the classroom during The Project and its impact on teacher stress.

Qualitative data uses words rather than numbers to explain how the introduction of digital media in the classroom during The Project in Gauteng has impacted on the perceived stress of teachers. The research was conducted in the natural environment of the participants. This design is rich and holistic as it focuses on the lived experiences of the participants. Qualitative research is itself interactive as the method of obtaining information involves one-on-one interactions between the researcher and the participants.

4.3.3.1   Initial awareness and response

This section required the participants to recall when they first heard that their school had been selected for The Project. Participants were also encouraged to explain their initial feelings when they heard that they would have to use digital media in their classrooms.

At School X, the principal (Participant G) said that he became aware of The Project at a principals' meeting. Participant B who was not at the school at the time of the introduction of The Project, said that she became aware of The Project because of all the preparations in terms of infrastructure, and that the learners also informed parents and community members, as she lived in the surrounding area of the school. Participant J said he started teaching at the school recently, but he was aware of The Project

through the media. All the other teachers at School X said that they were informed about The Project by their principal. The teachers at School Y indicated that GDE officials themselves came to inform them about The Project.

The principal at School X (Participant G) said, *'In 2014 we got 100 percent pass rate and the MEC identified us as one of the under-privileged township schools and put us on his project, which is fully ICT.'* The principal was proud that School X was recognised for its results and that the school was being rewarded by being part of The Project.

I chose a table format to highlight the words and phrases used by the participants to illustrate the participants' initial feelings when they heard that digital media was going to be introduced in their classrooms.

Table 6: Participants initial feelings on the introduction of digital media in the classroom

Participant	Words used to describe initial feelings on the introduction of digital media in the classroom
A	Shocked, worried, impossible
B	Exciting
C	Excited, scared, nervous, adjust
D	Hesitant
E	Quite happy, worried
F	Life was going to be easy
G	Excited, worried, new, prepare for change
H	Excited, happy, worried
I	Shivering, shocked, nervous, worried
J	Easier, quite happy, sceptical
K	Nervous, happy, scared, both feelings
L	Excited

After reading the above, it becomes apparent that teachers' views range from happy to worried, from exciting to scared. Each participant had to think about how they felt when they heard that digital media would be introduced in their classrooms. It is clear that

participants used contradictory words like 'nervous' and 'happy' so they did have mixed feelings.

Participants B, C, G, H and L all used the word 'excited' to express their initial feelings when they heard about The Project. However, participants C, G and H immediately expressed reservations and concerns as well by saying that they were worried too.

Participant G went further than just saying that he was worried, he said:

> *'I was worried. As with anything new, people have to be prepared for the change. The Department had to sell this new concept to the teachers and I don't think they did it very well. They literally forced teachers to use smartboards and tablets in the classroom.'*

Participant I indicated that she experienced negative feelings when she said, *'I was shivering. I was shocked. I was really nervous because it was the first time I was going to use the smartboard.'*

Participant B expressed mixed feelings by stating:

> '*I was really glad that the Department of Education recognised our hard work. After all, it is because our school consistently gets 100% pass rate in the matric exams that our school was chosen for this project. It upset me that no one asked my opinion on the matter and we were just told to use the computers and tablets in the classroom.'*

Participant D used the word 'hesitant' to describe her feelings and then elaborated, *'I have my way of teaching, I have my style and it works for me, and this new change meant I had to adjust, especially at a time when I have settled down into the teaching profession.'*

Participants A, E, G, H and I all used the word '*worried*' to describe their feelings about The Project. Participant E elaborated further, '*I was worried about myself. I know it sounds selfish but I am old school. They cannot expect us to change overnight to a new system.*' Participant F used the words, '*I was worried, scared and nervous. I knew that if I didn't master it before it came to the classroom, I would look like an idiot in front of the learners and the lessons would be a disaster.*'

Participant H said that he was worried about all the extra administrative work that would be involved with The Project:

> '*I was happy but also worried. Happy for the learners who were going to be able to learn in what they called future classrooms. Happy for the school because the results of the school have been recognised by the Department. I was worried about all the extra admin work that would be involved and new lesson planning that would be involved around using the digital media.*'

In expounding on the feelings of the teachers, I am hoping to get a clear understanding of the influence of digital media use in the classroom on teachers' stress. Many of the participants showed optimism and expressed reservations as well about the introduction of digital media in the classroom. The participants used both positive and negative words to express their feelings.

4.3.3.2   Resources and training received by teachers

Part of the implementation of digital media in the classroom is the importance placed on resources and the training received by teachers. To have a fully functional future classroom, the classroom would require the necessary hardware and software. Teachers have to be trained in the use of digital media for the implementation of digital media in the classroom to be effective. The MEC for education alone having this vision cannot accomplish the physical and mental change that needs to take place. Getting teachers to be connected with the MEC's vision is vital to the success of The Project.

The following sub-categories have been derived from the questions posed in the questionnaire:

a) *Training prior to implementation of The Project*

A table is used to record the words used by participants to describe the training prior to the implementation of The Project.

Table 7: Words used to describe training prior to the implementation of The Project

Participant	Words used to describe the initial training
A	Weak, impressive, not well prepared, timing inappropriate, scary
B	Sufficient but limited, training should have been longer, more subject specific, more grade specific
C	Training allowed us to use the smartboard more effectively
D	Very basic, not sufficient, general, not thorough, superficial, not in-depth, more time should have been allocated
E	Not enough, taught the basics
F	Not so good, should have used a user analysis, have special training for basic, intermediate and advanced users, training is generic, training is not tailor made
G	Training was ok, not bad, too short, not subject specific
H	Training was too soon before the smartboards arrived at the school, training was on weekends which impacted on personal time
I	Not enough, ineffective, training while using the smartboards would have been better
J	Good, during my free time, aspects that were poor, trainers themselves were not well versed with the hardware and software
K	Wasn't very helpful, not meaningful, ineffective, not intensive
L	Not enough training, not extensive enough, disorganised

Participant A's nervousness and uncertainty is clear when she says:

'Seeing the smartboard for the first time, touching it and feeling it, I was wondering if I am going to be able to do it in the classroom. On the second day

the facilitator wanted to show us something on the internet, but the WIFI network was down. This already made me wonder what would happen in schools if there was no WIFI or electricity.'

Participant D gave a good comment when she said, '*Different subject teachers and different grades should have been given training on different days.'* Other words used to describe the initial training were; '*weak, not well prepared'* (Participant A), and '*disorganised'* (Participant L).

Participants were clear that the initial training was very basic. The participants also said that the timing of the training was inappropriate as it was too early before the smartboards were actually installed in the classrooms. Participants said that the training was not subject specific and grade specific. Participant F expressed that a user analysis should have been done whereby there should have been separate training depending on teachers' computer skills and ability.

b) Training and support after implementation of The Project

At School X, there is a technical assistant that comes in twice a week. At School Y, they have two IT interns from GDE that are at the school all the time. Both schools have formal training every week either during break or after school. Participants' descriptions for the ongoing training has been recorded in

Table 8.

Table 8: Participants description of the ongoing training

Participant	Description of the ongoing training
A	Happy, sometimes technical support assistant can't help, fellow teachers help, struggle myself
B	Assistants are knowledgeable and helpful, one needs time to engage with the assistants to benefit which we don't have
C	Sufficient for now, every week we are learning something new
D	Not enough, sometimes the technical assistants can assist, sometimes they can't, GDE support is very slow
E	Learn more on my own than from the training, for my subject the content on the smartboard is not sufficient
F	IT interns help mostly with the maintenance of the smartboard, training is sufficient, training occurs during free periods which are needed for other admin work
G	Its good, its working well, teachers are trying their best to attend after school, training is sufficient, teachers learnt from fellow teachers, need to play around with the devices and experiment
H	They shouldn't have taken everybody together, the training was not enough, I had to grapple and experiment with the devices to get what I wanted, there isn't enough time in the class to explore the benefits of this new technology
I	The assistants are not familiar with all the software, it is sufficient, I don't go to the technical assistants to ask them for help.
J	Training was after school, during my free time, training was good, there were aspects of the training that were poor, the trainers looked like they were not well versed with the hardware and software, training was not enough, technical support assistants need further assistance from GDE
K	Helpful, learning more, assistant can help with the use of the smartboard but not with a technical problem
L	I haven't asked the assistant for help so I don't know, I go for the mandatory training once a term, the training is conducted during break at school, training shows how we can explore the smartboard

Participant H expresses that she uses her own funds for internet usage and says that it is a long time that they are waiting for internet connection, '*I am using my own memory stick for my classes and the school is not paying anything for it, out of my own pocket*

and WIFI was promised and up till today…. I mean how long do we have these boards already? There is no WIFI connection.'

Participant A gives a lengthy explanation of her perception of the technical support:

> *'Even now if we attend training it is after school. We are already tired after teaching, we have marking to do and planning of the next day's lessons, so the training is ineffective because we can't concentrate. There's someone who normally comes to support us. They come in twice a week, during school hours. If I have a challenge I can quickly call the assistant or the person in charge. If I have any queries I ask fellow teachers or just struggle through it myself. Also, sometimes the problems we have in the classroom cannot be replicated for the technical support person that is sent in. With due respect, sometimes the technical support person doesn't know the answer to the question either.'*

The participants responses were varied as some found the ongoing training to be sufficient while others felt that more training is needed. Participants said that they learnt more through exploring the smartboard on their own then from the training. The participants also mentioned that training took place during school break or after school, which impacted on their personal time. All the participants agreed that they had access to technical support assistants.

c) Resources received by teachers for the implementation of The Project

Each teacher received a laptop computer and classrooms were equipped with smartboards. Each learner received a tablet. Teachers lamented that there were no printers in the classroom, so that learners could use word processing applications or spreadsheets to enhance the quality of their submissions of their portfolios. Participant D seemed to be aware that funding for The Project was limited. Teachers complained about the lack of access to the internet as the schools did not have WIFI. Participant F very clearly said, *'The government has spent a lot of money, but it seems its not*

enough. There is no WIFI and no printers in the classroom. The teachers also have to be trained properly in the use of these devices.'

Participant J, like many other participants, was very concerned about the learners' access to adult internet sites and she even made a recommendation saying:

> *'The school needs to have WIFI with a firewall, where the learners cannot access certain sites. So, certain sites can be whitelisted while all other sites should be blacklisted. Many body corporates do that. They don't allow their staff to use Facebook, for example. Each classroom should ideally have a printer. The smartboards are too small, learners can't see properly and as teachers we can put little information at a time on the smartboard. We are using smartboards as chalkboards.'*

It is clear that while participants spoke about resources that they had, they also made recommendations. The Project requires a lot of funding and participants were aware that lack of support from GDE was as a result of limited funding.

4.3.3.3 Benefits of the introduction of digital media in the classroom

In this section, I was interested in finding out the benefits of the introduction of digital media in the classroom. I phrased the question, 'How does your school community benefit from the implementation of digital media in the classroom?' The responses were varied as participants interpreted the question in different but interesting ways. Community in this context is the environment in the school. However, some teachers interpreted it as being the immediate environment outside the school. I was interested in their responses and feel that it is necessary to share them. The words used by participants to describe the benefits of The Project are tabled below:

Table 9: Benefits of the introduction of digital media in the classroom

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Participant	Benefits of the introduction of digital media in the classroom
A	Less paperwork, easy to make comparisons of two questions papers on the smartboard
B	Upliftment of the community around the school, the tablet has additional resources for enrichment for the learners who want to do extra work
C	Learners are exposed to technology that they can use in the future, the upliftment of the school will uplift the community as a whole
D	Benefits the more studious learners because there are extra resources on the tablet, school will become popular and attract learners who excel
E	Gives the learners exposure to something digital, I feel privileged to be part of this school, I am gaining skills that other teachers are not, maybe one day I could transfer skills to others
F	It does make life easy for the teachers, the quality of teaching can improve, because teachers have more access to information more quickly
G	Lessons are appealing because of games and videos, everybody is excited because they are being taught using the latest technology, we are crossing the digital divide
H	Every teacher is working on a smartboard and they love it, teaching is more enjoyable and fun because you can show learners a movie, if someone else on you tube can explain a section of work better, use them in the class to explain that section by showing the class the you tube movie
I	The classes are clean, there is no chalk dust from the chalk board, learners are able to share with their friends anything new immediately, teachers who knew nothing about computers have become computer literate, improves both learners and teachers' skills in terms of technology
J	Learners don't have to carry heavy textbooks as all the textbooks are loaded on their tablets
K	The school saves on purchasing of textbooks
L	The lessons become interactive, learners get the feel and the tone of a poem when an audio is downloaded from the internet, pronunciation of both learner and teacher improves when they listen to an audio, learners can visualise bygone eras

Participant G made an interesting observation when he said:

'A good school is an asset for a community. But a good school is not only made up of state of the art technology. It encompasses good teachers, good management, committed learners, good parental involvement, a strong SGB and overall good relations. So, one aspect alone is not going to make this school an asset to the community.'

Participant K did not agree with Participant G and looked at the benefits to the wider community when she said:

'I don't know if the wider community can benefit from something like this. Its not like a new company that comes into an area, where more jobs are created and the level of poverty decreases. This is a school where the government has already decided where they going to buy from, and who it's going to give support to, so the community cannot benefit from something like this.'

Participant I said, '*Learners are able to share with their friends anything new they discover immediately. Teachers who knew nothing about computers also have been forced to become a bit computer literate.'*

However, Participant F had some optimism but was realistic that things in the community would improve over time. His words were:

'Remember a state of the art school as they call it makes the community look good. It can't uplift the community immediately. Maybe over time we can see more learners showing an interest and going to universities and colleges and the standard of life improving generally. But not immediately.'

Participant D made an interesting observation when she said:

''Because it is a school whose classrooms are geared for the future, and there has been so much media attention given to it, many parents want to bring their

children to this school. I would like to think that we can attract learners who excel and have a high IQ.'

Participants did say that the introduction of digital media in the classroom has benefitted teachers and the learners because they have acquired technological skills that they may not otherwise have had the privilege of being exposed to. As I reflect the question was not framed accurately, and I could have asked about the school to avoid misinterpretation of the concept 'community'.

4.3.3.4   Teacher workload

Participants' responses were varied when asked if the introduction of digital media in the classroom had increased their workloads. The responses of the participants have been recorded in a table.

Table 10: Participants' responses for teacher workload

Participant	Participants' responses for teacher workload
A	Definitely increased
B	New change will increase the workload
C	About the same
D	Workload is the same, your workload hasn't decreased, the initial workload definitely increased
E	It has increased
F	There's still a lot of paperwork
G	No, it didn't affect the workload, the workload increased in the start
H	Still the same
I	For me it's still the same, I don't see any change, the initial preparation requires a lot of time and work
J	The workload has decreased, learning something like this will just increase the workload
K	The paperwork did increase which takes up a lot of our time, more meetings and training, the lessons require a lot of planning and time
L	Its reduced a great deal

Participant A elaborated on the reasons why the workload had increased and said:

'All lesson plans have to incorporate the use of digital media. So, our old lesson plans are obsolete. What we used to write on the board, has to be done the night before on a memory stick and then we can use that in class. It's so difficult to choose different ways of doing things because there are so many apps out there. Also, we work with the learners towards high stake exams, like the matric exam, so sure, it's nice to be able to rotate 3 dimensional objects, but in the final matric exam they write on a flat piece of paper. 3 dimensional objects are represented on a flat piece of paper, so the learners need to know how to answer those questions. We don't have time to waste in class to show them how smart the new technology is, already we are working hard to complete syllabus. Time, time, time…. '

Participant B and C both recognised that anything new required extra effort from the people required to implement the change. Participant B expressed the workload in terms of change management and said:

'Any new change must increase the workload of the people expected to implement that change. You can't expect the workload not to increase. We are expected to use the new technology, familiarise ourselves with it, and get on with the most important job of the day, that is, making the learners ready for exams. We still have to follow the ATP's (annual teaching plan) and complete syllabus. I think I have a fairly good knowledge of computers but it was still something new in the classroom that needed adjustment from my side.' (Participant B)

'Remember this is a transition phase for us, so once we really get into it, it won't slow us down anymore.' (Participant C)

It is interesting to note that Participant J gave contradicting statements by earlier saying the workload decreased and then later on saying that the workload for The Project did increase the teacher workload. I did not probe this response as I picked up the contradiction during transcriptions.

Participant D made an important statement; *'You still have to sift and filter.'* She did agree that the initial workload increased and further said that once lesson plans were saved on a computer, they could be used from year to year, provided the teachers allocation of subjects remained the same.

4.3.3.5   The quality of learning and teaching

Here the participants responded by differentiating between the quality of learning on the one hand and the quality of teaching on the other hand. Participant K, F and E spoke separately about the quality of learning and the quality of teaching. The responses of teachers with regard to the quality of learning and teaching has been tabulated.

Table 11: Participants responses with regard to the quality of learning and teaching

Participant	Response with regard to the quality of learning and teaching
A	It has improved for the good learners who pay attention
B	There hasn't been much improvement in the results
C	No, it hasn't improved; it has decreased a bit
D	I think it's more or less the same
E	I feel to some extent it has failed, because learners are more focused on their tablets and the things that they are doing on the tablets are not school related
F	It has declined; large percentage of matriculants are responsible, so the matric results are good; the lower grades are not responsible, so their results have dropped
G	After the implementation of The Project, the pass rate at our school went down to 88% from 100%; the decline cannot be attributed only to the tablets; maybe learners spent more time on social media
H	My quality of teaching is better; learners use the tablets for other things

I	The quality of learning and teaching has gone up; it has improved
J	I think that it is decreasing based on the fact that not every learner uses the tablet for academic purposes; I work slower on the smartboard so my teaching cannot improve
K	I think it has improved slightly; if not that big of an improvement; we are getting better matric passes; getting more Bachelors' passes
L	It is twofold; on the educators' side, we are doing justice to content; lessons can be executed effectively and efficiently; on the learners side, it has a negative effect

Participants made important observations when they said:

'The quality of learning is dependent on the calibre of learner. A committed and focused learner will make the best out of a bad situation. The quality of teaching similarly depends on the calibre of the teacher who with passion and determination will make the best out of a bad situation. These resources cannot make the quality of learning and teaching better.' (Participant K)

'The quality of learning is deteriorating because learners do not share knowledge and do not share experiences. The quality of teaching can definitely improve because teachers have more access to information, more quickly. The quality of teaching can improve if teachers are implementing the use of the technology in the right way and using it properly. Like I said if you use the smartboard like a chalkboard then what's the use of having something so expensive in the classroom.' (Participant F)

'Digital media is only a means to make education better. A calculator doesn't make better mathematicians, it only speeds up certain calculations. Similarly, the computers and tablets are not going to give us better teachers and learners. The quality of learning attained is dependent on the calibre of learner and the quality of teaching attained is dependent on the teachers' knowledge of their subject and how the teacher can project that knowledge to the learner. I feel that learners no longer go search for information. They are getting lazy with instant

access to information. Libraries are becoming redundant and obsolete and it is sad to see this.' (Participant E)

Participants addressed the challenges in the classroom and how it impacts negatively on the quality of learning and teaching:

'With the limited amount of information that can go on the smartboard I am working slower than I used to, so how can this improve teaching? It cannot. The learners put their own sim cards with data on their tablets so during teaching time they are chatting with friends, playing virtual games and basically doing what they want to. As a teacher, you can't keep an eye on all 40 learners in a classroom at one time. Sometimes we have to be very careful what we say or how we react, our learners can take videos of us and before we know it the video is gone viral. If as a teacher you can't be normal then the quality of teaching also deteriorates.' (Participant J)

Participant I and H clearly said that any improvements in the quality of learning and teaching cannot be attributed only to digital media, they said:

'You cannot attribute any improvement in the results of the learners to the use of digital media in the classroom, because there are always other factors to take into account. The kind of teachers in a school, their level of experience and expertise.' (Participant I)

'The tablets cannot make a strong learner out of a weak learner. The smartboards cannot make a teacher who doesn't know their subject content suddenly know it. These devices cannot provide initiative to better oneself, all that comes from within.' (Participant H)

Participant D, G and L said the same thing as Participant H and I but gave an interesting insight into the relationship between teacher and learner when they said:

'Digital media in the classroom can only make the quality of learning and teaching better. The media is not learning and teaching. There are many aspects to learning and teaching. This is just one device. The value of a good teacher cannot be substituted with a tablet or smartboard. If the learners can overcome the distractions that come with the tablets and use the tablets properly they can definitely benefit. The teachers who use too much media also don't interact with the learners a lot and you can lose the special bond that is created between learner and teacher. We spend more time with the learners than we do with our own kids, we give off our best in the classrooms, when we go home we are tired and irritable with our own families. The tablet can't replace the teacher. As the saying goes, one good teacher is worth a thousand priests.' (Participant G)

'The technology that has been introduced is merely a tool to enhance teaching. It cannot replace the teacher. A teacher has many roles to play in the life of a developing child. The teacher doesn't only teach subject content but also reminds learners about their behaviour, their manners, their conduct and their appearance. The tablet can't give the recognition and acknowledgement and praise for a job well done, to the child. Like all other educational tools, it can only improve the quality of learning and teaching if it is used properly, by both teacher and learner. In a perfect environment where all people are playing their part properly, yes, maybe, the quality of education and learning can be enhanced. But, we have to be realistic. The department can try to make the school a perfect environment but learners and teachers may come from homes that are not so perfect and that may impact on their school work. The socio-economic status of all stakeholders has to be taken into account too. Honestly I don't think that the quality of teaching and learning has improved with the digital media.' (Participant D)

'This technology is a tool that is supposed to enhance learning and teaching, it cannot replace a good teacher. The technology can give instant access to

information for the learners, but it also makes them lazy. They don't use their imagination anymore, they can't think out of the box, they can't grapple with maths problems, they want instant solutions. This technology can do more harm than good.' (Participant L)

Participants used interesting analogies to describe the influence of the use of digital media use in the classroom and its impact on the quality of learning and teaching:

'These things are not like an injection that you can inject knowledge into the child. They must still work hard and study. The quality of teaching can only improve if teachers know how the new technology works and they know the content of their subject. Failing which it can be a disaster.' (Participant C)

Participant B said that it was very important to look at results from across all the grades and not only at matric results. She said:

'The best thing to answer this question is the results of the learners. We still have high flyers, average learners and the ones who struggle through school. The department will say that the quality of the passes has improved, but seriously, I feel that there hasn't been much improvement in the results. Because our schools are results orientated, we don't allow learners to go to matric if we feel that they are at risk to jeopardise our matric pass rate. So really, we should be looking at the pass rate from grade 8 to 11 and whether that has improved. And if we look at these grades then we will realise that the results have actually declined and so therefore, the quality of learning and teaching is not really enhanced with digital media in the classroom.'

Participant A gave a concise summary of his opinion of the quality of learning and teaching and the use of digital media in the classroom:

'I think I must address these two separately. The quality of learning can only improve if learners are willing to use the devices for the purpose for which it has been given. For this I always say the learners need academic maturity. Sometimes the learners use the devices to download music and pornography and violent videos. This cannot enhance the learning experience. Learners who use the devices for educational purposes will learn more, but those that don't will not learn more. As for the quality of teaching, the teacher has to buy that this system is good for them. If teachers are not happy and satisfied they are going to use the smartboard as a chalkboard. For the implementation of technology to be effective and for effective teaching to take place, the teacher must know their subject material well, they must also know how technology works.'

It is interesting that participants chose to separate the aspect of learning from teaching. Most of the participants said that the smartboard has enhanced their teaching methods but they felt that the distraction caused by the tablets has caused a decline in learning. So, of course, it is a two-way relationship: for the quality of learning and teaching to be better, teachers must be prepared for the change, know their subject and technology and learners must also be willing to take responsibility for their learning. The introduction of The Project cannot improve the quality of learning and teaching when there are many other factors that contribute to effective learning and teaching.

4.3.3.6   Learner Discipline

Managing learner discipline in the classroom has become a daunting and demanding task. There are many aspects that lead to enhanced learning and teaching in the classroom; one of these aspects is learner discipline. I found it important to address the influence of digital media use in the classroom and its impact on the issue of learner discipline. The words used by participants to describe discipline has been tabulated.

Table 12: Words used by participants to describe learner discipline

Participant	Description of learner discipline with the introduction of digital media in the classroom
A	It has improved for those who are into learning, who are good, I can't say discipline has improved, the challenges still remain the same
B	Yes, in a way discipline has improved, those who are rude and have no classroom manners are still the same
C	Discipline in terms of quietness, to a certain extent, it keeps them busy, I still find learners coming late to class, laughing for no reason, talking out of turn in the class and being generally disruptive
D	We've made things worse now, theft has really increased, they are stealing from each other
E	No, not at all, in some instances the level of discipline has decreased
F	It has become worse, constant fights as a result of these gadgets
G	Not really, sometimes a discipline issue would arise from the child looking at the tablet and not focusing in class
H	I can't say anything is better with discipline, I don't see that it got better really
I	No improvement, not at all, it has a bad impact on them, cyber bullying taking place, different forms of discipline issues
J	I think that discipline has improved, learners talk less because they are engaged with the tablets, but then tablets have brought on other discipline issues
K	In certain instances yes, but we still have a lot of discipline problems, and it seems like it's getting a bit worse
L	No, all the same old challenges we have, instead it creates more problems because now we have to deal with thievery, the discipline has not improved

Participant E and L said that relief periods were easier but cited that other discipline issues still continue when they said:

> *'During a relief period, learners will sit quietly with their tablets and be busy with music or whatever. But we still have learners experimenting and taking drugs, learners still belong to gangs, they still smoke, they still don't do homework, etc.*

Digital media in the classroom is not a magic wand that takes away all the ills of society.' (Participant E)

'Learners are more quiet during their free time because they are engaged. Engaged in playing games or talking on whatsapp to a friend that is sitting next to them. But they still misbehave, they laugh out loudly, cause disruptions in class, don't follow the schools' rules and code of conduct. If they could sit and only do work, then the school won't need teachers and managers, the learners still need guidance and assistance.' (Participant L)

The following responses were elicited from various participants:

'I really don't know how the tablet in a child's hand is going to improve discipline. Children are children. They still going to be naughty and they still going to challenge the adult.' (Participant F)

'I still find learners coming late to class, laughing for no reason, talking out of turn in the class and being generally disruptive. Most of the kids are good kids but the one or two disruptive learners are still problematic.' (Participant C)

'The school environment will always have all kinds of children, just like the world will have all kinds of people. For example, giving a learner a tablet is not going to stop late coming or bunking of classes.' (Participant D)

'We had good children and we had naughty children. Naughty in the sense that they are playful, immature and not interested in their studies. We still have good and naughty learners.' (Participant G)

'Learners still need guidance and nurturing. The teaching profession has never been one of subject content only. We teach children values, morals and good behaviour. Sometimes they listen and sometimes they don't.' (Participant H)

'Where learners used to bully each other, there is now cyber bullying. The consequences and effects of cyber bullying have lasting effects. Learners have access to adult sites and undesired sites so it's a different form of discipline issues.' (Participant I)

'No, discipline has not improved. With all the violence that learners are exposed to in the media and now all the violent videos that they download, the learners are becoming desensitized to all the violence. They speak rudely and aggressively too. They have no respect for older people.' (Participant K)
'No, discipline cannot change with technology. In fact, because of technology, learners are more impatient, less tolerant and quickly react aggressively and even violently towards classmates.' (Participant J)

'if you have a spoilt child who is rude and unmannered, by buying them new toys are they going to get better? No, I don't think so. Those who are rude and have no classroom manners are still the same. Maybe they more engaged now, but again sometimes they are doing their own thing. I wish new technology had solutions to old problems.' (Participant B)

Participant A gave a good insight into the promises made when teachers were told to introduce digital media in the classroom and the challenges that still existed. Participant A reiterates what the other teachers have said that discipline did not improve. Participant A's response is quoted:

'You know when these tablets were given to the learners at first, it was a new toy. They sat for hours sharing how to download apps and how to use the devices. But the novelty of anything new wears off after a while. We were told when the learners were given these tablets that if they are doing something in the class that is not what the teacher is teaching, we will be able to switch off their tablets, but, we can't do that. The kids do things sometimes that we are not

doing in class, it is very difficult to control that. Also, with the large numbers in our classes, we can't see all the kids at the same time. I can't say that discipline has improved. The challenges still remain the same. Uniform indiscretions still continue, they still click their tongues and roll their eyes at teachers. To motivate them to do homework is still a challenge and if we can say that learners have completely stopped taking drugs or drinking alcohol, then sure discipline has improved. But none of these has happened so in essence, discipline hasn't improved.'

Every one of the participants agreed that the introduction of digital media in the classroom did not improve learner discipline. Furthermore, they went on to say that the use of digital media in the classroom brought on new challenges and demands on the teacher. These new challenges and demands certainly impact on the perceived stress of teachers.

4.3.3.7 Challenges experienced with the introduction of digital media in the classroom

The challenges experienced by teachers with the introduction of digital media in the classroom can be categorised in the following broad categories: challenges with time constraints, hardware and software, learner discipline, subject specific challenges, challenges for teachers unfamiliar with the new technology and the safety of learners. Once again, I chose to tabulate participants responses.

Table 13: Words used by participants to describe challenges

Participant	Words used by participants to describe challenges with the introduction of digital media in the classroom
A	The biggest challenge is that I can't control what the learners are doing on the tablets and they sometimes do other things then what we do in class
B	Instant access to knowledge makes the children lazy and also doesn't encourage them to think or use their imagination, sometimes they have information overload and can't hone in on important aspects, need more

	manpower for distribution and collection of tablets, more technical support for the learners
C	When swopping classes, the new smartboard does not have the required textbooks for the teacher's subject
D	I would rather the learners didn't have the tablets because in their free time they play games or listen to music or look at pornography
E	Learners not using the tablets for education, teachers not familiar with the technology, theft from each other, exposure to outside criminals
F	When a learner's tablet is stolen, the learner doesn't have access to textbooks, the school doesn't replace the stolen tablet, professional thieves steal from the kids and won't hesitate to hurt the child
G	Lack of WIFI and internet access, upkeep and maintenance of learner tablets, learners using the tablets for other things besides school work
H	Boards are not being used at their best because there is no WIFI, learners not doing what they supposed to with the tablets
I	They chat on WhatsApp while you are teaching, while you are teaching they start laughing, the explosion of information on the net and choosing appropriate content, it increases instead of frees up my time
J	Learners don't have a tablet when their tablets are lost or stolen
K	The learners are not using the tablets for what they supposed to, not having WIFI, impacts on my vision and gives me dry eyes
L	Smartboards need to be monitored constantly, learners were watching porn in the classroom using the smartboard, learners were playing games with a play station console on the smartboard

The following sub-themes were derived from the codes generated by participants' responses:

a) *Challenges with time constraints*

Participant J said,

> *'Anything new needs time. As teacher, we are constantly grappling with time as it is, then trying to implement something new poses additional challenges to already very little time. The time was not enough.'*

b) Challenges with hardware and software

Participant I spoke about challenges with time and software, she said:

'I think the biggest challenge for me is the explosion of information on the net and choosing appropriate content. The software is so vast that it increases instead of frees up my time. Time is very precious for us teachers.'

Many participants complained that the textbooks loaded on the smartboard did not match the textbooks loaded on the tablets of the learners. Participants also complained about expired e-book licenses on their laptops which did not allow them to access textbooks on their laptops.

c) Challenges with learner discipline

Participant A, D, G and H mentioned problems with learners doing other tasks and said:

'For me the biggest challenge, as I have mentioned is that I can't control what the learners are doing on their tablets and they sometimes do other things then what we do in class. Also, the adjustment from chalkboard to smartboard took some time.' (Participant A)

'Learners not doing what they supposed to do with the tablets would be the biggest challenge for me.' (Participant H)

'The biggest challenge would be the learners using the tablets for other things besides school work. You know if they use it for recipes, or puzzles, or for other hobbies, one can understand but the learners don't use it for downloading intellectually stimulating content. The high flyers, the ones that do really well, they not interested in the tablets, they are still book smart.' (Participant G)

'I would rather the learners didn't have the tablets because if they have free time instead of reading set-works, they play games or listen to music or even worse look at pornography. Previously, they used to even put their heads down and sleep if they were bored, not any more. They are engaged all the time. But most of the time in what they fancy or find an interest in.' (Participant D)

d) *Subject specific challenges*

Participant B and C spoke specifically about challenges for their subjects. They said:

'As an Afrikaans teacher, I feel that kids have instant access to the dictionary so it is good. But there are also apps that convert a whole essay from English to Afrikaans. I don't like this. This instant access to knowledge makes the children lazy and also doesn't encourage them to think and use their imagination. Sometimes they have information overload and can't hone in on important aspects.' (Participant B)

'As an English teacher, I have to constantly check for plagiarism, because the learners just cut, copy and paste things from google. Unfortunately, they sometimes don't even read if what they put into their work is relevant. They also can't sift out what is important and what is not. I truly prefer hard copies of books and would encourage them, the kids, to read more and write more.' (Participant C)

e) *Creating lazy teachers*

Participant D was very vocal when she said:

'It benefits the lazy educators, because I can just connect my laptop to the smartboard, display the notes and ask the learners to copy the notes. So, as

long as they have notes, I have taught, while in reality I just put the notes up and relaxed in class.'

This means that lessons are not interactive and takes away the traditional role of teacher as guide and nurturer of knowledge.

f) Safety of learners

Participant F gave a new insight on the safety and security of the learners and expressed concern when she said:

'Mostly I worry when a learner's tablet is stolen. The child then doesn't have textbooks. The school doesn't replace the stolen tablet. When learners used to carry textbooks maybe a fellow learner used to steal their textbook, but now there is a market out there for tablets and the learner's security is compromised because professional thieves and crooks steal from the kids and they won't hesitate to hurt the child either.'

Challenges can create stress for teachers if they are not identified and dealt with. Participant L gave a brief summary of all the challenges that he encountered, which encompasses the challenges presented by the other teachers. He said that the hardware resources are not everything that is required; the teachers need more time for training; the teachers need access to the internet; the classrooms should have a printer; the smartboard is too small and allows a limited amount of information; the number of learners in a class are too many for this whole project to be effective; the learners are using the tablets as toys; to prevent the learners from accessing unsuitable sites, a firewall should be created; the expectations from everyone with regard to matric results are high, and the school may not be able to meet those expectations.

4.3.3.8　How can the implementation of digital media in the classroom be improved?

Participants responses for this question were as a result of the challenges that they were presented with on the use of digital media in the classroom. Participants shared their thoughts which have been tabulated.

Table 14: Participants recommendations on the implementation of digital media in the classroom

Participant	Participants recommendations on the implementation of digital media in the classroom
A	The department should train the learners as well as the teachers, teachers should learn at training institutions, should not be given as a merit or reward to learners as it will demotivate learners who don't get the tablets, more control over learners' devices, more time to adjust to the new technology
B	More time in the training, computer training during tertiary studies, start at grade R, direct link between learner and educator
C	Make the boards larger, attend a full-time course, more free time for improvement
D	I think they have done a good job in terms of resources provided, the license should be issued for a period of 5 years, the learners do not appreciate the tablets for free, GDE should subsidise the tablets and ask parents to pay, time is important, the right training, typing courses, computer courses, using WORD, etc.
E	Introduce a mechanism from blocking out some sites, more time for training, more one on one support for teachers, subject specialists showing how to use the digital media for specific subjects, blocking entrance to certain sites for the learners
F	I wouldn't give the learners gadgets for free, no sense of appreciation, no sense of responsibility, give a learner a tablet in grade 8 and they must use it throughout, if the tablet gets lost then the parents have to be accountable, whole thing should start in the smaller grades, training for teachers should start at colleges and universities

G	The security aspect has to be put into place to protect the resources, more training with the learners and parents on how to protect these devices and the usage of it, implement it slowly, no time to learn or think, should have been given to learners who displayed maturity towards their studies first, this would encourage grade 8 and 9 learners to work harder so they can be in the better performing classes, more time for teachers on training
H	I can't see a problem with how they did it, it would have been nice if the boards were here and they trained us at the school, they can start at primary school and the lower grades, should be implemented at grade one and not at matric level
I	Learners must not be allowed to put their own sim cards in, implementation should have been phased in, teachers should have received computers first, the learners should have got the tablets a year later, teachers should receive certificates based on certain assessment criteria, if teachers want to use the devices in the classrooms then those classrooms should be transformed, it should start with the lower grades first
J	Give it to grade 12's only because they are more mature, the grade 8's and 9's they find it to be a play thing, if only grade 12's have it then it will motivate the younger ones to work hard to get to grade 12, the best way to improve it is to take it away
K	Should be implemented from grade1 upwards, teachers should be allocated more time for training, more individual attention instead of group training
L	Start it at primary school, then they grow with it, teachers need more time for training, teachers need access to the internet, classrooms should have a printer, smartboard is too small, number of learners in the class are too many, a firewall should be created so that learners do not have access to unsuitable sites

Participant C, D and E made reference to training. Participant E said, *'More time for training',* while participant D added, *'The right training: Typing courses, computer courses, using word, etc.'* Participant B said, *'If I had more time in the training or if I had a whole course on computer training during my tertiary studies, it would have helped a lot.'*

Participant K and H highlighted the grade at which The Project should have been implemented:

> *'It should be implemented from grade 1 moving upwards. The teachers also should be allocated more time for training. The resources provided should be comprehensive, for e.g. how can you give a laptop and a smartboard without a cable to connect them.'* (Participant K)
>
> *'I think it should be implemented from grade one and not at matric level. The learners grow with the devices and as they grow they learn more complex things that can be done with the tablets.'* (Participant H)

Participant A acknowledged that it was personal challenge, '*I feel I wasn't sufficiently ready for the implementation and therefore I couldn't do my best.'* Participant A like many other participants expressed, *'I would like to have more control over the learner's devices.'*

Participant G explained that the tablets should have been given as a reward or merit for learners to motivate them to do well:

> *'Personally, I think they should have implemented it slowly. It was too quick. There was no time to think or learn. Also, maybe it should have been given to learners who displayed maturity towards their studies first, this would encourage and motivate the grade 8 and 9 learners to work harder so that they are in the better performing classes. It should have been given as a reward to the better performing classes and not as charity to all the learners. For the teachers, also more time should have been spent on training.'*

Participant F and I made interesting suggestions that The Project should have started in the lower grades and training for teachers should start at university or college:

'You know first of all I think this whole thing should start in the smaller grades. The younger learners are more scared of their teachers and will do what is expected of them from the use of the tablet. By the time the learners get to the higher grades they can use the technology to create beautiful assignments and use it to submit their assignments. Secondly, I think the classrooms should have the smartboards and the teachers' laptops but the learners should not have been given the tablets. The tablets are a distraction for them. Thirdly, I think the training for the teachers for the use of digital media in the classroom should have started at teachers training colleges and universities not now when teachers are under pressure to complete syllabus and get the work done.' (Participant F)

'I think that first of all this whole implementation of digital media in the classroom should have been phased in. Teachers should have received computers first then the learners should have got the tablets maybe a year later. The department of education should have set goals for core subjects like Maths and English. Maths and English teachers should have been sent for training and should receive certificates if they meet certain assessment criteria. Once teachers get certification and if they want to use the devices in their classrooms then those classrooms should have been transformed. I also think it should start with the lower grades first.' (Participant I)

Participants responses highlighted the need for more training, the need for more time, introducing digital media in the lower grades, teachers having access to the internet but creating a firewall for learners so that they don't have access to unsuitable sites. Participants emphasized that training for teachers for the use of digital media in the classroom should start at tertiary institutions. Some participants expressed that the tablets should not have been given for free, as it makes the learners and parents unaccountable and irresponsible.

4.3.3.9   Is the use of digital media in the classroom stressful?

One of the overarching themes that has presented itself in this study is highlighted by all the participants when asked if the use of digital media in the classroom is stressful for teachers. Participants responses were recorded in a table.

Table 15: Participants responses with regard to whether The Project was stressful

Participant	Participants response with regard to whether The Project was stressful
A	Stressful in the beginning, but got better with time
B	No, it didn't need to be
C	Yes
D	No
E	It is stressful
F	Nah, it's not stressful
G	No, it's not stressful
H	Not to me because I like it
I	No, not stressful
J	It is partially stressful, it has been a stressful adventure
K	No. initially I was stressed
L	No, not at all

Most participants said that The Project was not stressful. Participant A and K said that it was stressful in the beginning but got better as they used the smartboard in the classroom.

Participant J who was initially happy with the implementation of digital media in the classroom expressed that in the end it was a stressful experience. He said:

> *'Although I was initially happy, it has been a stressful adventure, with lots of gremlins and hiccups cropping up along the way. It hasn't been a smooth ride, and it has been very stressful.'*

'Well, yes I would say I did because it was something new and something I was unfamiliar with. It felt like I was thrown in the deep end of a swimming pool and asked to swim. Lucky, I can swim! [Laughs]' (Participant A)

'It was stressful for me because I knew nothing about computers and I had to start right from the bottom. I am still not too confident with the use of the technology and sometimes the learners help me. This is when I feel I am no longer in control of my classroom. You know the teacher must always be in control of the class otherwise learners don't have respect for you. I try the best I can under the circumstances.' (Participant E)

Participant H who always used computers and projectors for her lessons said that she found using the technology for herself not to be a difficult adjustment, however, the learners having tablets in their hands was stressful for her. Participant G said that once the initial hurdles were overcome the implementation of digital media in the classroom became easier. Their actual words were:

'Because I used projectors and my computer I didn't find it stressful, in terms of my teaching and lesson plans, but the learners each having a tablet in their hands was a bit stressful for me.' (Participant H)

'There are certain aspects that are stressful, like the learners' attitudes. But, in terms of lesson planning and delivery I feel that once you are over the initial hurdles it's much easier, less writing on the board and less talking too.' (Participant G)

Participant L concisely adds that the use of digital media in the classroom brings on new challenges and stressors when he said that the teaching profession has its own challenges without digital media in the classroom and that these devices have brought on added challenges and stressors.

4.4 DATA INTERPRETATION

4.4.1 Introduction

It is exciting to observe how closely the data collected from the participants interviews mirror the literature review. The data is interpreted according to the expansion of the sub-aims outlined at the beginning of the chapter.

4.4.2 Teachers' involvement in the decision-making process

The first observation was discovered early on in the interview process as all the participants indicated that they were told that digital media would be introduced at their schools in their classrooms. It is clear that teachers were not part of the decision-making process.

Participant F brings to light the plight of teachers when she says that no one asks teachers what they want and need. This echoes the work of Van der Merwe (2013) and Lemmer and Van Wyk (2010). Ward (2015) also warns that policies and technologies promising to dramatically revolutionize teaching and education has led to a decline in teacher morale. This is evident when Participant B said that she was '*upset*' no one asked her opinion on the matter and she was just told to use the computers and tablets in the classrooms. Participant G said that teachers were '*forced*' to use tablets and smartboards in the classroom. Carl (2005) succinctly put it that teachers should be regarded as partners in the process of curriculum change and should be given an opportunity to make an input during the initial curriculum development processes. Carl goes on further to say that teachers' direct involvement will determine the level of success of any new implementation policy.

Van Der Merwe (2013) believes that school stressors include a lack of proper direction from the Department of Education in the face of continuous change, which causes uncertainty when dealing with important curriculum related decisions. This is evident when Participant K said, *'The things were done so fast and I didn't know if I would*

manage it. I was stressed out when we went on the training sessions and we didn't have the boards yet.' It is important then that there is constant collaboration and communication among all the stakeholders in the process of including digital media in the classroom (Chai et al. 2014).

4.4.3 Benefits and challenges for teachers of the introduction of digital media in the classroom

In answering one of the sub-questions posed in Chapter One, we look to the data collected from the teachers who were part of The Project. I found it necessary to highlight the benefits that the teachers derived separately from the challenges experienced on the introduction of digital media in the classroom. The points listed below were found to be prevalent among many of the teachers in varying degrees. In order to prove this point, some examples of the practical application of these points were given. It is also important to note that what is a benefit for some teachers is a challenge for other teachers. For example, Participant I was happy that he no longer had to deal with the chalk and chalk dust which affects his throat, whereas Participant K said that the glare of the smartboard screen impacts on her eyes and gives her dry eyes.

a) *Benefits for the school community*

The greatest benefit cited by the participants is the increased exposure to computer technology for both learners and teachers (Pilgrim et al. 2012). Participants brought to light the findings of Chai et al's (2014) TPACK framework. Participants agreed that the more knowledgeable an educator, the more easily he/she could formulate an ICT integrated lesson. If the educator possesses more knowledge of the pedagogy, technology and content as well as the interrelated knowledge, he/she will be able to design more appropriate artefacts for ICT in education. This is mirrored by Participant G when he said, '*…and it depends on the teachers also, designing the lessons and making sure the lessons are appealing.'* Participant C also said the same thing using

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different words, *'The quality of teaching can only improve if teachers know how the new technology works and they know the content of their subject.'*

I found it very interesting that the chrono-level which examines the change in the teacher over time and also the change in the classroom environment, is so prevalent in this study (Chai et al, 2014). Participants all spoke about their feelings initially and how they adjusted and adapted to the implementation of digital media in the classroom over time. Participant K expressed how she stayed after school for long hours and figured things out for herself. She said, '*I'm still playing around with it every day and discovering things for myself.'*

Participant G outlined Bronfenbrenner's (2005) ecological approach, to consider how different levels of context could impact on teachers' TPACK. Participant G clearly indicated:

> *'A good school is an asset for a community. But a good school is not only made up of state of the art technology. It encompasses good teachers, good management, good parental involvement, a strong SGB and overall good relations.'*

This statement focuses on the five rings of interconnected systems in Bronfenbrenner's ecological approach. The ecological approach places the child at the centre of the system and consists of the micro-system (i.e. the teachers in the classroom and the parents), the meso-system (i.e. the link between the school and the parents), the macro-system (i.e. the social community and the SGB), the exo-system (i.e. overall good relations) and the chrono-system (i.e. the change in the child over time and in the environment in which the child lives).

Participant E said, *'I feel that I am privileged to be in this school and that maybe I am gaining skills that other teachers are not and that maybe one day I could even transfer skills to other teachers and become a subject specialist.'* Other benefits cited by

participants included a feeling of pride to be associated with a prestigious school; less textbooks to carry for the learners; quick access to information on the smartboard and quick comparisons of information on the smartboard.

b) Challenges for teachers

The challenges experienced by teachers on the implementation of digital media will be discussed according to the themes generated from the codes.

Participants did acknowledge the limitations of the TPACK framework when they said that socio-economic issues negatively impact the implementation of digital media in the classroom (Chai et al,.2014). Participants brought to light the theft of the learners' tablets which is a socio-economic issue. Participants said that learners who did not have a tablet could not access textbooks and this impacted negatively on learning and teaching.

Participant H said that the expectations from parents, the department of education and the media had increased and everyone wanted to see the results of the first matriculants who had smart classrooms. This highlights the results of Vandeyar (2013) who says that principals, school governing bodies and communities are demanding a higher return on investment on ICT (other than for administrative purposes), that ICT needs to enhance teaching and learning. Motshekga (2015), the Minister of Education also expected that results in schools' part of The Project should improve considering the massive investment in The Project.

Participant J felt embarrassed that learners would laugh at him if he didn't know how to do something on the smartboard. He said, *'Sometimes I feel I don't have control over the class then.'* This is clearly articulated by Schulze and Steyn (2007) when they say that inadequately trained educators lack self-confidence, doubt their ability to communicate with learners and feel disempowered.

Participant K said, '*I stayed after school for long hours.*' This mirrors the sentiment of Beth Hughes who '*spends hours each night*' *(*Rosenburg, 2016). Ditzler et al. (2016) have elaborated on the fact that teachers find difficulty in choosing appropriate teaching content from the multitude of content available on the internet.

All the participants highlighted Oigara and Ferguson's (2017) concern that iPads caused learner distraction and allowed off-task behaviours in the classroom. Participants expressed that the smartboards were excellent in the classroom but the learners having the tablets posed a challenge. The participants said that learners were inserting their own sim cards in the devices and accessing websites that did not promote academic learning. Learners also used the tablets to download movies, music, pornography and violent videos. Participants expressed that the tablets brought new discipline issues into the classroom.

Inadequate training to meet the demands of teaching content and methodology, continuous learning and grappling with the ever-changing curriculum and professional development owing to time constraints (Adams, 1999; Steyn & Van Niekerk, 2012) were challenges that all the participants expressed. Participant F expressed these challenges when she said, '*The training was generic and not tailor made. You find that the levels of ICT understanding among trainees differs a lot.*' Mashaba's (2016) observation that teachers were given training but had not been given enough time to adjust and familiarise themselves with the technology was highlighted by participants.

The participants said that the initial training was very basic and should have been conducted based on a needs analysis. Participant B said the '*training was too little and too quick.*' Participants felt that the training was conducted during weekends, after school and during breaks which impacted on their personal time. Kyriacou (1998) warns that professional demands on teachers in terms of heavy workloads and too little time may cause stress. However, most participants were quick to add that they were willing to sacrifice their personal time to learn something new, that promised to make their lives easier in the long term. Participants complaints echoed Du Plessis and Webb's (2012) findings that revealed barriers that include limited resources (lack of WIFI

connection, lack of e-book licenses, no printers in classrooms), time constraints, large classes and lack of support from the Gauteng Department of Education.

Most participants expressed that they used the smartboard as a chalkboard or as a projector. The participants were honest when they said that they were not using the smartboards optimally and making the best use of the features of the smartboard. This brings to light the study of Sabieh (2011) who said that the IWB is seen in the classroom as an expensive board being used in the traditional sense to visually transmit content.

The challenges found in a study conducted by Tallvid et al, (2014) were all presented by the participants in this study. Participants' expressed that there was insufficient or inappropriate material on the smartboards, laptops and tablets; they had a diminishing control of learners and a lack of time. Olivier and Venter (2003) warn that poor discipline and behaviour problems among learners are important predictors of stress among educators. Other notable challenges that participants experienced were high expectations from stakeholders; concern for the safety of learners; GDE did not replace tablets of learners lost or stolen and learners did not have access to textbooks.

Furthermore, ICT in education requires taking into account teacher capacities, which are defined as a combination of competencies, motivation and the characteristics of teachers' working environment. Addressing this challenge involves a cultural change for teachers which cannot always happen rapidly (UNESCO, 2011). A cultural change for participants was expressed in many diverse ways. Participant D said, *'We were all used to the chalk and the chalkboard'* and Participant E said, *'I still like the chalkboard and old-fashioned teaching methods.'* Participant D said, '*Learners and teachers come from homes that are not so perfect, and that may impact on their school work. The socio-economic status of all stakeholders has to be taken into account too.*

While participants cited benefits of the use of digital media in the classroom, they cited more challenges. This echoes a UNESCO (2011) warning that while there may be

potential value of ICT in education, many countries face significant challenges in transforming the promises of technology into tangible benefits for learning.

4.4.4 The impact of the introduction of digital media in the classroom on the quality of learning and teaching

Many participants responded to this question by relating how in their opinion the exam results at their school have improved or deteriorated. It is interesting to note that six participants felt that the quality of learning and teaching based on exam results have actually declined. This echoes the observation of a principal from Soweto who blamed the drop in matric results on the introduction of the tablets (Mashaba, 2016). Pinker (2015) clearly said that many kids use their devices to play games, troll social media and download entertainment. This resulted in an adverse effect in reading and math scores.

It is interesting to observe the responses of the language teachers. Participant L said that he felt that when he downloaded an audio from the internet, it improved the pronunciation of both the teacher and the learners' words. Participant L also said that an audio for a poem downloaded from the internet enhanced the feel and tone of the poem. According to Howard Gardner's theory of multiple intelligences, students learn in a variety of ways including through listening or auditory input. Some students are better auditory learners than others and may see more academic improvement when audio aids are used in the classroom (Klaus, 2018).

On the other hand, Participant B and C who also teach languages said they found learners got lazy because they just *'cut, copy and paste'* and learners don't use their imagination anymore. *'They don't understand the concept of plagiarism.'* (Participant C). This echoes the warning of Taras (2017) who says that the act of plagiarizing cheats students out of opportunities for authentic learning. Writing assignments, for example, do not exist to keep all the fun out of kids' lives; they are designed to teach efficiently. Writing a good essay requires a great deal of analyzing and thinking outside the box.

Cheating makes it unnecessary to do so. Plagiarizing undermines students' intellect, creativity and confidence by removing the learning experiences that were meant to develop and encourage those natural traits.

Participant B felt that the quality of learning and teaching improved with digital media in the classroom, whereas Participants C, D, E, F, G, J all agreed that the quality of learning and teaching has deteriorated. This highlights the results of a UNESCO document (UNESCO, 2011) that there is no consensus regarding the actual benefits of digital media in the classroom in ensuring quality learning.

Three participants felt that the quality of learning and teaching was enhanced for the *'good'*, *'responsible'*, and *'mature'* learners. Learners who make use of the enrichment resources on the tablets will benefit from the use of digital media in the classroom. One participant felt that the quality of learning and teaching was the same. This substantiates the finding of Carver (2016) who warned that even though schools have embraced the digital revolution, reading and mathematics scores are at about the same level they were 40 years ago.

Participants L and H both felt that the quality of teaching has improved with the use of technology in the classroom, however, they said that the quality of learning has been impacted negatively. Participant J highlighted the negative impact of having large classes as identified by Steyn and Van Niekerk (2012). Participant J said, *'As a teacher you can't keep an eye on all forty learners in a classroom at one time.'* He said that some of the learners play games during teaching time and it's difficult to control this as the classes are too crowded. He also said that this cannot improve teaching and learning.

Participant K said, *'I won't attribute the improvement in the results to the tablets. We work hard with the learners here. We have classes after school, we come in on Saturdays, we put in that extra. It's the intervention strategies that we have in place at the school.'*

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It is evident that the introduction of digital media in the classroom has not decreased the workload of teachers in terms of intervention strategies which are necessary for consistency in achieving good results at schools.

4.4.5 Dissemination of digital tablets to empower teachers and reduce stress among teachers

In exploring this sub-aim of the study, I focused on recommendations that participants made based on the challenges that they experienced. I also focused on the challenges themselves as the challenges present stressful situations. Participants were vociferous with their recommendations.

Participant A and D expressed that the tablets should not have been given to the learners for free. They felt that the GDE should have subsidised the tablets and this would have made learners more responsible and the parents accountable. This echoes Pinker's (2015) study which highlights that being charitable to students from struggling families will widen the class divide and have an adverse effect on the quality of learning and teaching. This is contradictory to the expectations from the Minister of Education who envisioned that technology would assure equity to any learner and would break '*the recurring shackles of poverty'* (Motshekga, 2015).

Motshekga (2015) said that The Project is standing on six pillars namely: connectivity; devices; e-learning content; training and development (teachers and learners); support, security and maintenance; and refurbishment and renovation. Participant A expressed that the Department should have trained the learners as well. Training and development for teachers and learners is one of the six pillars of The Project (Motshekga, 2015). However, no training was provided to learners when tablets were handed out to them. Another pillar of The Project is connectivity. All the participants agreed that a fully functional ICT school needed WIFI or an internet connection which the teachers of neither School X nor School Y had access to at the time of the

interviews. Participant D said that the e-learning content on the laptops had expired licenses while some participants expressed that the content on laptops, smartboards and tablets did not match, or had material that they could not be use. Participant D and G both said that the support from GDE *'was slow.'* Participant G said that they are spending a lot of money on security. It is unclear whether the school is funding the security, or the security is funded by GDE. Furthermore, participants expressed concern about the safety of learners within and outside the school with the theft of the tablets. It seems that whilst a lot of money has been spent on The Project, there are many shortcomings to what has been promised and what has been delivered.

In order to empower teachers, it is important to listen to and address their concerns (Carl, 2005). Nine participants felt that the experience of introducing digital media in the classroom was not stressful. Two participants felt that it was stressful, and one participant felt that it was a partially stressful experience. This result brings to light the approach of Abraham et al. (2016) who says that the engineering or stimulus-based approach accounts for the fact that individuals are affected differently by the same stressor. It accounts for the fact that what is a stressor for one teacher is not necessarily a stressor for another. However, we must highlight the definition of stress as indicated by Kyriacou (2001), who says that teacher stress is commonly defined as the experience by a teacher of unpleasant emotions resulting from aspects of the work as a teacher. All the participants expressed unpleasant emotions about different aspects of the introduction of digital media in the classroom. Of noteworthy importance is the off-task behaviour displayed by learners when using the tablets. One has to question then whether the strain caused by the stressor did not produce a greater reaction from some participants as it did from others?

When deciding to choose between the 'fight or flight' option (Selye, 1955; Abraham et al, 2016), all the participants decided to 'fight'. This is highlighted by all the participants who are using the smartboards in the classroom. Participant A used an analogy to describe the fight or flight option that she faced, '*It felt like I was thrown in the deep end of a swimming pool and asked to swim. Lucky, I can swim!'* If anyone did leave the work

environment because of The Project, they would be part of the attrition statistics, which was not part of the scope of this study.

Participant K highlighted the triphasic physiological response to The Project (Selye, 1955; Curtis, 2000; Abraham et al, 2016). Participant K described how she experienced the initial alarm stage, followed by a phase of resistance, which was followed by a final stage of exhaustion. She described her initial feelings as *'I felt a bit nervous about it.'* (alarm stage). Later she said, *'I just didn't take much note of it. I thought it's something that's just not going to happen.'* (resistance stage). Towards the end of the interview she said, *'I stayed after school for long hours and I figured things out for myself.'* (exhaustion stage).

The three types of stress categories described by Steyn and Van Niekerk (2012) can easily be recognised by participant's responses. Some participants expressed eustress, which is described as a positive stress and has a positive impact on the individual. Eustress is seen as a motivator and is reflected in the words of Participant C, *'But I was up for the challenge.'* Distress is the form of stress that is harmful to the individual and is reflected in the words of Participant F, *'This whole thing gave me panic attacks, I used to wake up in the middle of the night and start to wonder how I was going to cope.'* Hypostress is too little stress and may lead to boredom and reduced effectiveness of staff. Hypostress is reflected in the words of Participant D, '*It benefits the lazy educators, because I just connect my laptop to the smartboard, I display the notes, so, there's no writing anymore. So, lazy educators will pick up on this. I can put the notes on the board as long as my children have notes in their book, its means that I have taught. So, it's making teachers lives easier.* Although participants expressed challenges that the introduction of digital media brought into the classroom, overall, most participants felt that the challenges did not make them feel stressed.

4.5 CONCLUSION

This chapter began with a brief introduction to the purpose of the study, outlining the questions presented in Chapter One. The research process was explained, the procedure followed described and the steps to ensure trustworthiness defined. The data analysis explaining what the data collected from the interviews contained followed. This section started with the biographical data obtained from the participants. Thereafter the data analysis was presented in the form of ten subsections outlining the main themes of the data collected. The participants own words were used as much as possible in order to improve the trustworthiness of the study. The interpretation of the study followed the analysis of the data. This section was broken up into four headings which were formulated from the four sub-questions posted in Chapter one and reviewed at the beginning of this chapter. The empirical findings of the study were compared to the literature review conducted in Chapter two.

It became increasingly evident as the interviews progressed that teachers were aware of the benefits of digital media in the classroom. However, teachers were also critical of how digital media was introduced in Gauteng classrooms and were unhappy that they were "never part of the decision-making process".

Teachers were unanimous that their workloads have increased in the sense that they have to learn how the new technology works, but some hope that as time progresses and they become accustomed to the new technology, the workload will decrease. Teachers felt that the quality of learning has declined, as it is entirely dependent on the work ethic and attitude of the learner. Teachers felt that the quality of teaching has improved as it is dependent on the individual teacher and how the teacher envisages and optimises the use of digital media in the classroom. Most teachers felt that the discipline among learners did not improve with the introduction of digital media in the classroom and that learners *'abused'* the devices. Generally, teachers felt that the introduction of digital media in the classroom has not been a stressful experience.

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It is with great excitement that I relate the empirical findings to the literature read. Teachers expressed that they had and still have challenges with the introduction of digital media in the classroom. However, most teachers felt that the challenges did not create stress for them.

Chapter 5 summarises the study and draws up the conclusion of the study. The findings of the study are discussed, recommendations are made and ideas for future studies are outlined.

CHAPTER FIVE
SUMMARY, FINDINGS AND RECOMMENDATIONS

5.1   INTRODUCTION

In the previous chapter, the content analysis and identified categories were discussed. This chapter presents a summary of the most important aspects of the dissertation. A summary of the main aspects of each chapter is discussed with the limitations of the study being listed. Thereafter, the findings of the research are discussed in line with the four sub-aims of the study which are:

- To determine how teachers can be involved in the decision-making process on the implementation of the digital tablets in Gauteng public schools, and reduce their stress
- To determine how the introduction of digital tablets in the classroom has contributed or lessened the perceived stress levels of teachers?
- To determine in which way the introduction of digital tablets in the classroom has enhanced the quality of learning and teaching in schools, and reduced stress of teachers.
- To determine ways in which the dissemination of digital tablets can be implemented to empower teachers and reduce stress among them.

Recommendations are formulated resulting from the literature as well as the empirical investigation and the chapter concludes with suggestions for further research.

5.2   SUMMARY OF THE STUDY

The purpose of this section is to give a summary of the most important aspects of the different chapters of this research. In Chapter 1, an introductory orientation to the research was provided by presenting the background and rationale for the study

(cf.par.1.1). The rationale for the study (cf.par.1.2) provided the reasons why it is important to conduct a contextual study that explores the perceived stress factors experienced by teachers that were part of The Project. The preliminary literature review (cf. par.1.4.) provided empirical evidence supporting the premise that the introduction of digital media in the classroom could have an influence on teacher stress and impact the quality of learning and teaching, but the research problem needed to be answered through research (cf.par.1.3). The research problem was posed and discussed (cf.par.1.3) with the aims and objectives of the research being outlined (cf.par.1.3.2). A brief discussion of the research design and methodology followed, indicating a qualitative research approach which included population and sampling, instrumentation and data collection techniques as well as data analysis and interpretation (cf.par.1.5). Thereafter, followed the credibility and trustworthiness of the research (cf.par.1.6), the research ethics (cf.par.1.7) and the limitations and delimitations of the study (cf.par.1.8). Finally, a definition of key concepts was clarified (cf.par.1.9). These included the following: Stress (cf.par.1.9.1); Tablets (cf.par.1.9.2); Digital tablets in the classroom (cf.par.1.9.3) and The Big Switch On (cf.par.1.9.4).

Chapter 2 presented an overview of literature on existing and relevant knowledge on the use of digital media such as tablets in the classroom. The findings led the researcher to a better understanding of the problem and previous work done in the field of teacher stress, teachers perceptions on the use of digital media in the classroom and the impact on the quality of teaching and learning with digital media in the classroom.

The chapter started with an introduction into the implementation of ICT in classrooms (cf.par.2.2.1). this was followed by the policy agenda of ICT education policy and practices in South African classrooms (cf.par.2.2.2). The Big Switch On project that was introduced in Gauteng classrooms was described in detail (cf.par.2.2.3). Thereafter, the history of digital media in the classroom was discussed (cf.par.2.3.1). The theoretical framework established for the study of digital media in the classroom was expanded upon in the TPACK framework (cf.par.2.3.2). the TPACK framework

was unpacked as follows: An understanding of the TPACK framework (cf.par.2.3.2.1); and the expanded TPACK framework (cf.par.2.3.2.2). of boys (cf.par.2.8). These all guided the researcher to reach various conclusions.

The historical development on the perspective of stress (cf.par.2.4) explored the different theoretical approaches to stress and the different theories of stress. The following approaches to stress (cf.par.2.4.2) were explained: The engineering or stimulus-based approach (cf.par.2.4.2.1); the response based or medico-physiological approach (cf.par.2.4.2.2) and the psychological or interactional appraisal approach (cf.par.2.4.2.3). A criticism of these approaches followed (cf.par.2.4.3). Thereafter, the modern view of stress was presented (cf.par.2.4.4). A discussion of the three theories of stress was presented as follows: The interactional (transactional) theories of stress (cf.par.2.4.5.1); person-environment-fit theory (cf.par.2.4.5.2) and the job demand/decisions-latitude theory (cf.par.2.4.5.3).

The types of stress in the school context (cf.par.2.4.6) were explained followed by the causes of stress in the classroom (cf.par.2.4.7). A discussion of the different stressors for teachers were examined and these included: life events (cf.par.2.4.7.1); personal factors (cf.par.2.4.7.2); work-related stress (cf.par.2.4.7.3); home/work interface (cf.par.2.4.7.4) and creation of stress by managers (cf.par.2.4.7.5). Teachers' reactions to stress in the school context (cf.par.2.4.8) were elaborated upon.

The study encompassed the influence of the use of digital media in the classroom and therefore it was necessary to explain teachers' stress and digital media (cf.par.2.5). This sub-topic expanded on teacher stress (cf.par.2.5.1) and stress and digital media in classroom (cf.par.2.5.2). It was important to observe previous studies done in this field (cf.par.2.6), which included both local studies (cf.par.2.6.1) and international studies (cf.par.2.6.2).

Chapter 3 addressed the research design and methodology used in this research. The research paradigm (cf.par.3.3) was discussed. An introduction of the research design

(cf.par.3.4.1) as well as the rationale for choosing the qualitative research method and in particular, a qualitative case study design (cf.par.3.4.1.1 & 3.4.1.3) was detailed. in The research approach (cf.par.3.4.2) was presented. Thereafter, followed population and sampling (cf.par.3.4.3) where the selection of participants from the population and sampling (cf.par.3.4.3.1) were explained and justified. Instrumentation (cf.par.3.4.4.1) was then explained followed by the data collection procedures (cf.par.3.4.4.2), data processing procedures (cf.par.3.4.4.3), data recording and management procedures (cf.par.3.4.4.4) and the data analysis and presentation (cf.par.3.4.5), the data interpretation and reporting procedures (cf.par.3.4.5.2) of the data.

The very important aspect of trustworthiness of the study (cf.par.3.5) which reflects on validity (cf.par.3.5.1) and reliability (cf.par.3.5.2) was considered. Strategies for improving trustworthiness were examined (cf.par.3.5.3). The chapter concluded with reference to the ethical issues related to the study (cf.par.3.6), then a short conclusion of the chapter was provided.

Chapter 4 dealt with the presentation, analysis and interpretation of data collected during the qualitative research process (cf.par.4.2). This chapter presented the empirical design for the study in detail and guidelines on how the data was collected and analysed as well as methods for data analysis presentation and discussion (cf.par.4.3) were also provided. This included the biographical data of participants (cf.par.4.3.2). The analysis of the data obtained from the interviews (cf.par.4.3.3) was explained in relation to the categories generated in accordance with the questions posed in the questionnaire. The data interpretation (cf.par.4.4) were explored according to the four research sub-aims.

Chapter 5 presents a summary of an integrated interpretation of the research. It also presents the findings of the literature review, reported in Chapter 2 as well as the findings from the data analysis made in Chapter 4. This chapter presents an in-depth examination of all the themes identified as well as recommendations from the findings.

5.3   FINDINGS FROM THE STUDY

5.3.1 Introduction

The findings that follow are made on the basis of the literature review as well as the analysis of the empirical data collected. The findings of the study will consequently be discussed according to the four sub-aims raised above.

5.3.2 Findings with regard to research sub-aim one

Research aim one was to determine how teachers can be involved in the decision-making process on the implementation of the digital tablets in Gauteng public schools and reduce their stress (cf.par.1.3.2). From the interview data, it is apparent that teachers and principals were 'told' that they would have to implement the use of digital media in the classroom (cf.par.4.3.3.1). The principals were informed at a principals' meeting. Officials from GDE came to School Y to inform them that their school had been selected for The Project and the principal at School X informed the teachers about the decision. Teachers were not part of the decision-making process and had to mandatorily use digital media in the classroom.

It is interesting that participants were told that their particular schools were selected for The Project because the schools were among the under-privileged schools that achieved a hundred percent pass rate in the matric exams. This stance from GDE already made some participants 'buy' into the concept of having digital media in the classroom, as participants felt that they were being rewarded and recognised for the hard work that they put in so that their schools could achieve a hundred percent pass rate.

Some participants used the word 'excited' and 'happy' to express their initial feelings when they were told that their school was chosen for The Project (cf.par.4.3.3.1). However, among those that were excited, there were participants who expressed mixed

feelings. Three participants felt worried, nervous, scared and hesitant too. GDE provided initial and ongoing training for the teachers which took place during breaks, after school or during weekends. The training helped participants to overcome initial fears even though it was basic and not subject specific. Participants expressed that they were willing to sacrifice personal time so that they could acquire new skills which would enhance learning and teaching and make their lives in the classroom easier in the long term.

Significant research has been conducted around the world on the impact of change management and the introduction of ICT in the workplace. The consensus was by building positive relationships and including teachers in decision-making processes, curriculum changes will be easily adopted by teachers in the classroom.

From the available research, it is evident that teachers must be given an opportunity to be part of the decision-making process. If teachers are not part of the decision-making process, the process of change must be managed so that teachers 'buy' into the process, because teachers are the implementers of any curriculum changes in the classroom, and the success of any new policy will be determined by how the teachers implement the change.

5.3.3 Findings with regard to research sub-aim two

The findings discussed below arise from the qualitative (Chapter 4) data collected during the study. Research aim two was to determine how the introduction of digital tablets in the classroom has contributed to or lessened the perceived stress levels of teachers (cf.par.1.3.2). It is important to distinguish between the benefits (which will lessen the perceived stress levels of teachers) and the challenges (which will increase the perceived stress levels of teachers) during The Project. The following main findings from the analysis of data were made:

5.3.3.1   Benefits of The Project

The first benefit cited by participants is the exposure to the smartboard (cf.par.4.3.3.3). Many participants were knowledgeable with computers but it was the first time they were interacting with a smartboard. Participants felt that they were acquiring skills and knowledge relating to something new. Participants reflected on how easy and quick it was to gain access to information and to compare papers. Participants said with the aid of the smartboard the visual and auditory skills of learners could be used to teach and explain many concepts that learners are unfamiliar with. Using movies and lessons from the internet made lessons more fun and interesting.

Participants felt that the tablets benefited the 'good' learner because it has past papers and enrichment material loaded on it. However, they did say that the studious learner was still 'book smart' and was not interested in the tablets. They also said that few learners used the enrichment material on the tablets. Participants agreed that during relief periods learners sit quietly with their tablets and they are engaged (cf.par.4.3.3.6). However, it is clear that learners are not always engaged with academic work related to school.

Participants were in agreement that the initial workload did increase with the introduction of digital media in the classroom. They hope over time when lesson plans are put in place and they have become accustomed to the new technology, their workloads will decrease (cf.par.4.3.3.4).

Some participants were of the opinion that a good school is an asset for the community and that eventually the upliftment of the school will uplift the community. Participants agreed that it is a good feeling to be associated with and be a part of a school that has been upgraded by GDE and that the government has spent so much money on.

5.3.3.2   Challenges of The Project

The first challenge encountered by the participants was the initial training (cf.par.4.3.3.2.i). Participants felt that the training was too early before the smartboards arrived at the school. Some participants felt that the training was 'one size fits all' and this rendered the training ineffective. Participants felt that there should have been a user analysis and basic, intermediate and advanced training should have been offered to the participants based on their level of ICT knowledge. Participants' reflections and recollections included the fact that training was disorganised, superficial, not thorough, not subject and grade specific and that more time should have been allocated to the initial training. The training was conducted during weekends which impacted on participants personal time.

The second challenge that participants expressed was with regard to the ongoing training (cf.par.4.3.3.2.ii). Participants felt that sometimes the technical support assistants were unable to help and the issue had to be reported to GDE. They felt that GDE support was 'slow'. Once again participants felt that they did not have enough time to engage with the technical support assistants. Ongoing training took place after school or during break which again impacted on participants personal time. The ongoing training took place when participants were already tired from lesson delivery in school and when they had marking and lesson planning to worry about for the next day. Participants said that they learnt more from exploring the smartboard on their own than from the training. Participants responses were varied as some found the ongoing training to be sufficient while others felt that more training is needed.

The third challenge that participants were exposed to is the lack of WIFI or internet connection (cf.par.4.3.3.2.iii). Many participants said that they used their own internet connection thus spending their own money. Participants complained that the e-book licenses on their laptops were expired and they could not use the textbooks on their laptops (cf.par.4.3.3.7). Participants said that the smartboards did not have all the resources loaded on them so if they changed classrooms, they would need hard copies

of textbooks. The participants expressed ongoing software and hardware challenges with the resources provided.

The fourth and biggest challenge posed to participants was the learner discipline issues arising from learners having tablets (cf.par.4.3.3.6). Most participants did not allow learners to use the tablets in the classroom. Participants said that learners engaged in off-task behaviour and that the large numbers in the classrooms did not allow teachers to keep an eye on each and every learner for every moment of the lesson. Participants expressed that learners used the tablets for downloading music, movies, pornography and violent videos. Learners also used the tablets to access social media websites like Facebook, WhatsApp and Instagram. Learners did not use the tablets for academic purposes. Participants explained that old behaviour problems like taking drugs, disrespectful attitude and non-conformance to school rules still exist. In fact, new discipline issues have arisen from the tablets like theft and cyber-bullying.

Some participants explained that GDE should not have given the tablets to learners for free (cf.par.4.3.3.8). They said that learners did not appreciate the tablets and 'abused' the tablets. The participants said that when tablets were stolen or lost they were not replaced by GDE and learners did not have access to learning material for the rest of the year. However, the following year each learner received a new tablet irrespective of whether they replaced or paid for a lost or stolen tablet. This created a culture of entitlement among the learners and their parents.

Other challenges participants expanded on were: subject specific challenges, where participants felt that learners were plagiarising text and not using their own creative skills; creating lazy teachers who either show learners videos and just put videos explaining concepts to learners; the safety of learners was a concern to participants who felt that learners were exposed to criminals within and outside the school and participants were of the opinion that expectations from all stakeholders would increase with regard to matric results because a lot of money has been spent on The Project (cf.par.4.3.3.7).

Some participants were weary that they would have a fully functional ICT school. They cited a reason for this being that GDE had limited funding or that funding has been depleted. Participants would have liked to see the tablets loaded with word processing apps so that learners could use the tablets for submissions of well written and executed portfolios.

5.3.4 Findings with regard to research sub-aim three

The findings discussed below arise from the qualitative (Chapter 4) data collected during the study. Research aim three was to determine in which way the introduction of digital tablets in the classroom has enhanced the quality of learning and teaching in schools, and reduced stress of teachers (cf.par.1.3.2). It is interesting to note that six out of the twelve teachers interviewed expressed that the quality of learning and teaching has declined, two teachers felt that the quality of learning and teaching has improved and one teacher felt that it has remained the same (cf.par.4.3.3.5). Teachers preferred to express their opinions based on the quality of teaching separately and the quality of learning separately. The following main findings resulted from the analysis of data:

5.3.4.1   The quality of teaching

Some of the participants felt that the quality of their teaching has improved. Participants now have instant access to information, they are doing justice to content and lessons can be executed effectively and efficiently. Participants agreed that digital media in the classroom is merely a tool to enhance the delivery of content. Participants were quick to add the importance of a teacher in acknowledging good work, nurturing the child and guiding the learner. Participants used excellent analogies to describe the role of digital media in the classroom.

Many participants agreed that it is important to know how to use the digital media effectively in the classroom as well as know subject content and together deliver a lesson that is interesting for the learner. If the educator possesses more knowledge of the technology, pedagogy, and content, as well as the interrelated knowledge, he/she will be able to design more appropriate lessons in the classroom (cf.par.2.3.2.1).

There were participants who felt that the quality of their teaching has deteriorated and they cited reasons being: the smartboard is too small and not enough content can be put on the board; the smartboard is too slow; the content on their laptops, the learner tablets and the smartboard do not correlate and the hardware and software challenges that they experience are dealt with very slowly by GDE.

5.3.4.2   The quality of learning

All participants lamented that the tablets in the learner's hands have resulted in the quality of learning declining and deteriorating. Participants agreed that most learners are distracted with the tablets and do not focus on learning. However, participants highlighted that the studious learner can benefit from the tablet as the tablet has enrichment resources loaded on it. Participants stressed that learners who were studious were not interested in the tablets and were still book smart.

Peer learning which is an important aspect of learning has declined because learners are engaged with the tablets and do not share knowledge and experiences. Similarly, educators who put videos on for learners all the time, do not interact with the learners and this impacts negatively on learning. Participants were of the opinion that learners are getting lazy and losing their creative thinking skills. They expressed that the instant access to knowledge also encouraged plagiarism.

Participants highlighted that there were many factors to take into account for learning to improve: the socio-economic status of learners; the calibre of learner and the calibre

of teacher. Participant A spoke about *'academic maturity'* for learners if they want to benefit from the use of digital media in the classroom.

5.3.4.3   The quality of exam results

Participant B explained very clearly that exam results answer whether the quality of learning and teaching has improved with the implementation of digital media in the classroom. It is clear that both School X and School Y still have high flyers, average learners and learners that struggle. Both schools had a decline in matric pass rates in the year after The Project was implemented at the schools. Participants felt that the results from grade 8 to grade 11 have declined. The schools had a better quality of passes with more learners achieving Bachelors passes in their final matric exams, but participants were quick to add that this was due to intervention strategies at the schools and the hard work that the teachers put in.

5.3.5 Findings with regard to research sub-aim four

The findings discussed below arise from the qualitative (Chapter 4) data collected during the study. Research aim four was to determine ways in which the dissemination of digital tablets can be undertaken to empower teachers and reduce stress among them (cf.par.1.3.2). The following main findings resulted from the analysis of data.

The first reference made by participants to improve the dissemination of digital media in the classroom, was with regard to training (cf.par.4.3.3.8). Participants expressed that training for using digital media in the classroom should start at tertiary institutions and should encompass the right kind of training which would include typing and computer courses. Participants again complained that more time should have been spent on training.

Some participants felt that learners should be given tablets from grade one so that they 'grow' with the tablets. Other participants felt that the tablets should be given as a merit

or reward to learners in the better performing classes to motivate other learners to do well. Participant I said that core subjects like Mathematics and English teachers should have been sent for training first, teachers should then receive certificates if they meet certain assessment criteria, and those teachers' classrooms should be transformed first.

Most participants expressed the need for control over the tablets that the learners have. Participants suggested that tablets just switch off if the sim card is removed from the device or a firewall is created that disables learners from accessing unsuitable sites. Participants would like to see more accountability and responsibility on the part of parents and learners for the tablets.

Recommendations with regard to the findings will be made in the next section of the study.

5.4   RECOMMENDATIONS FROM THE STUDY

5.4.1 Introduction

The main objective of the study was to determine the influence of digital media use in the classroom on teacher stress in Gauteng schools. Furthermore, the study aimed to establish how teachers can be part of the decision-making process on the implementation of digital media in the classroom, how has the introduction of digital media contributed to or lessened the perceived stress levels of teachers, whether indeed the quality of learning and teaching has improved in the classroom with the introduction of digital media in the classroom and finally how can the dissemination of digital media be undertaken so as to empower teachers and reduce stress among them.

In light of the findings from the data gathered from the empirical and qualitative case study through a convenience and purposeful sampling process, recommendations can

now be proposed. The following suggestions indicate that the researcher achieved the main objective of the study 'To determine the influence of digital media use in the classroom on teacher stress in Gauteng schools.'

5.4.2 Recommendation with regard to research sub-aim one

Research aim one was to determine how teachers can be involved in the decision-making process on the implementation of the digital tablets in Gauteng public schools and reduce their stress (cf.par.1.3.2). It was revealed through the study that it is important that teachers are part of the decision-making process for the implementation of The Project. The research revealed that if teachers are not part of the decision-making process they need to 'buy' into The Project (cf.par.4.3.3.1).

RECOMMENDATION: For The Project to have a positive effect, the process of change management must be well managed and driven by superb support structures and good planning (cf.par.2.2.1). However, it does require significant input by teachers as well as a firm belief by teachers in the new system. It is essential that GDE establish good relationships with the teachers and that GDE builds an excellent understanding, rapport and knowledge of their teachers' needs and concerns.

5.4.3 Recommendation with regard to research sub-aim two

Research aim two was to determine how the introduction of digital tablets in the classroom has contributed to or lessened the perceived stress levels of teachers (cf.par.1.3.2).

RECOMMENDATION: The study revealed that the challenges (cf.par.4.3.3.7) encountered by teachers outnumbered the benefits (cf.par.4.3.3.3). However, most teachers expressed that the implementation of The Project was not stressful. It must be noted that challenges lead to frustrations which can lead to stress. In order to combat the challenges experienced by the teachers and reduce stress with regard to those

particular aspects of The Project which posed a challenge, teachers challenges have to be addressed. Participants experienced challenges with: a shortage of time for training and time for adjusting to The Project; the initial training being basic and not taking into account the level of technological competency of the teachers; the vast amount of web apps from which teachers can choose resources; slow support from GDE; hardware (which included freezing of smartboards) and software (which included expired e-book licenses) related issues; subject specific challenges; learner discipline and off task behaviour; the glare from the smartboard affects the eyes; high expectations from all stakeholders; concern for the safety of learners and teachers being unfamiliar with the new technology.

Participants felt that the benefits of The Project included: the acquisition and exposure to technological skills by both learner and teacher; having a sense of pride of belonging to a school that uses digital media; future upliftment of the community because of the school; benefit to the studious learner who uses the extra enrichment material on the tablets; the school can attract learners who want to excel; clean classrooms (no chalk dust); easy and instant access to information for both teachers and learners; lessons are appealing and exciting because of the videos and games; learners don't have to carry heavy textbooks; the school saves on purchasing of textbooks and can use that money for other equipment and resources in the school; learners can use auditory and visual skills to learn.

5.4.4 Recommendation with regard to research sub-aim three

Research aim three was to determine in which way the introduction of digital tablets in the classroom has enhanced the quality of learning and teaching in schools, and reduced stress of teachers (cf.par.1.3.2).

RECOMMENDATION: The study revealed that participants felt it necessary to differentiate between the quality of teaching separately and the quality of learning separately (cf.par.4.3.3.5). Furthermore, participants revealed that their perception of

the quality of learning and teaching is derived from examination results. Participants who felt that exam results improved attributed it to the intervention strategies adopted by the school. Participants who felt that exam results deteriorated attributed the decline in results to the distraction caused by the tablets. One participants felt that the quality of passes has improved with more Bachelors' passes being obtained in the matric examination. Participants added that grade 8 to grade 11 results have shown a decline.

Participants were of the opinion that teaching strategies have improved with the use of the smartboard, however, most participants said that they used the smartboard as a chalkboard or projector and did not use the features of the smartboard optimally. Those who did use many features of the smartboard spend a lot of their personal time exploring the smartboard on their own and making sure they attend all training sessions.

Participants observed that the tablets had a negative impact on learning. Most learners 'abused' the tablets and did not use the tablets for the purpose for which they were intended. The very few studious learners had access to enrichment material on the tablets but they were not interested in the tablets.

It is interesting that participants made reference to the TPACK framework (cf.par.4.4.3) and acknowledge that for learning and teaching to improve teachers must have technological, pedagogical and content knowledge. The expanded TPACK framework has also been referred to as participants acknowledged that the learner is at the centre of learning and links the learner to the micro-system (i.e. the teachers in the classroom and the parents), the meso-system (i.e. the link between the school and the parents), the macro-system (i.e. the social community and the SGB), the exo-system (i.e. overall good relations) and the chrono-system (i.e. the change in the child over time and in the environment in which the child lives).

5.4.5 Recommendation with regard to research sub-aim four

Research aim four was to determine ways in which the dissemination of digital tablets can be undertaken to empower teachers and reduce stress among them (cf.par.1.3.2).

RECOMMENDATION: It was revealed through the study that through positive change management strategies and proactive action by the educators the implementation of digital media in the classroom during The Project overall was not stressful for most of the teachers (cf.par.4.3.3.9).

A significant majority of the educators felt that the implementation that The Project brought additional challenges however, participants were quick to give suggestions for addressing these challenges (cf.par.4.3.3.7). The advises are based on participants own experiences and their responses on the question '*How can the implementation of digital media in the classroom be improved?*' (cf.par.4.3.3.8). Participants made suggestions starting with the training. They recommended that training should start at tertiary level, additionally they felt that training should be more intensive, more time should be allocated to training, it should be more subject and grade specific and furthermore training should be made available to teachers, learners and parents alike. Participants expressed that tablets should be given out to learners starting at grade one so that learners can grow with the tablets academically. In order for The Project to be a fully functional ICT project there is a need for WIFI, but teachers warned that WIFI needed restricted access to certain sites. Teachers were not in favour of the learners getting the tablets for free and felt that GDE should have subsidized the tablets of the learners. Teachers requested that GDE respond quicker to their concerns especially with regard to software and hardware issues as these impact on learning and teaching.

5.5   RECOMMENDATIONS FOR FUTURE RESEARCH

The implementation of digital media in the classroom in Gauteng came with its own particular challenges for educators and the need for other strategies to be implemented to ensure that a culture of teaching and learning can exist. The researcher contends that educators feel powerless on many occasions to exercise their rights because of policies introduced by the Department of Education (cf.par.4.4.2).

The researcher argues that there is no doubt that people appreciate positive reinforcement and acknowledgement as often as possible, which makes them feel good about themselves and want to continue to deliver. This is of particular importance in the classroom scenario as to the introduction of digital media and the relationship between educator and the Department of Education. Hence, through the introduction and implementation of an effective positive management system, this need would be met and rejection of change problems potentially reduced. Therefore, the researcher contends, that by acknowledging teachers hard work and rewarding schools that achieved a hundred percent pass rate, teachers 'bought' the system. Additionally, the positive affirmation in managing the change management on the part of GDE will contribute significantly to the overall reduction of stress experienced by educators on the implementation of digital media in the classroom.

This study highlighted amongst other things the importance of addressing challenges (cf.par.4.4.3) and providing ongoing support that would assist the educator in improving the quality of learning and teaching in the classroom (cf.par.4.4.4). Furthermore, the study looked at how teacher stress can be reduced by empowering teachers in the classroom during the implementation of digital media in the classroom (cf.par.4.4.5). Several theories regarding stress and digital media in the classroom were explained and the literature review focused on the need for teachers concerns and challenges to be addressed in the digital classroom, which would ultimately make for better relationships between all stakeholders.

It is anticipated that this study will build on the existing body of knowledge in order to deepen the understanding of the implementation of digital media in the classroom in Gauteng schools and its influence on the perceived stress of educators thereby, potentially benefitting educators around South Africa and internationally as well.

However, further research on the implementation of digital media in the classroom and its impact on learning and teaching from the perspective of the learner is recommended, as this study has merely touched the surface and it is such an integral part of the development of our education system.

5.6   LIMITATIONS OF THE STUDY

The study was limited to two public secondary schools that were part of The Project. For expediency purposes, the empirical study followed a case study approach with convenience purposeful sampling utilised. The study had some limitations during the qualitative phase:

- The time lapsed from the inception of digital media in the classroom to the time when the interviews were conducted could have affected participants responses which refers to history
- The context of teachers' real life outside school had to be ignored in order to expedite the interviews
- Social, political and economic structures that affect education were not taken into account
- Possible subject effects were not taken into consideration and this refers to changes in behaviour initiated by participants in response to the research situation whereby they may have wanted to increase positive or desirable responses.

5.7 CONCLUSION

The purpose of this study was to investigate how the introduction of digital media in the classroom in Gauteng schools may influence teacher stress. The aims of the study were to determine how teachers can be part of the decision-making process; how the introduction of digital media has contributed to or lessened the perceived stress of teachers; how the quality of learning and teaching has been enhanced and how the dissemination of digital media in the classroom can be undertaken to empower teachers.

The study revealed the following solutions:

- Teachers must be made part of the decision-making process or made to 'buy' the change for them to implement digital media effectively in the classroom
- Training needs to be undertaken for teachers, learners and parents.
- Training must take into account teachers levels of competency. It must be subject and grade specific and more time must be allocated to training. The time allocated to training must not impact on teachers' personal time.
- In order to make parents and learners accountable and responsible for the tablets, the tablets should not be given for free to the learners.
- For The Project to be a fully functional ICT project, teachers and learners need access to the internet, which must have restricted access to certain sites.
- GDE must respond to software and hardware challenges and address the concerns of educators.

Moving forward, it is essential that the Gauteng Department of Education addresses the concerns of teachers as it has the potential to create a pleasurable work environment. The challenges that teachers experience can lead to frustrations which can in turn lead to stressful situations thus impacting negatively on learning and teaching.

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Annexure A: UNISA Research Ethics Clearance Certificate

UNISA | university of south africa

UNISA COLLEGE OF EDUCATION ETHICS REVIEW COMMITTEE

Date: 2018/05/16

Dear Mrs Matwadia

Decision: Ethics Approval from
2018/05/16 to 2021/05/16

Ref: 2018/05/16/54351103/02/MC
Name: Mrs Z Matwadia
Student: 54351103

Researcher(s): Name: Mrs Z Matwadia
E-mail address: 54351103@mylife.unisa.ac.za
Telephone: +27 82 921 6278

Supervisor(s): Name: Prof RJ Botha
E-mail address: botharj@unisa.ac.za
Telephone: +27 82 411 6361

Title of research:

The influence of digital media use in the classroom on teacher stress in Gauteng schools.

Qualification: M Ed in Educational Leadership and Management

Thank you for the application for research ethics clearance by the UNISA College of Education Ethics Review Committee for the above mentioned research. Ethics approval is granted for the period 2018/05/16 to 2021/05/16.

The **low risk** application was reviewed by the Ethics Review Committee on 2018/05/16 in compliance with the UNISA Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane

2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the UNISA College of Education Ethics Review Committee.

3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.

4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing.

5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.

6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.

7. No field work activities may continue after the expiry date **2021/05/16**. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

The reference number **2018/05/16/54351103/02/MC** should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.

Kind regards,

Dr M Claassens
CHAIRPERSON: CEDU RERC
modtc@netactive.co.za

Prof V McKay
EXECUTIVE DEAN
Mckayvi@unisa.ac.za

Approved - decision template – updated 16 Feb 2017

Annexure B: GDE Research Approval

GAUTENG PROVINCE
Department: Education
REPUBLIC OF SOUTH AFRICA

8/4/4/1/2

GDE RESEARCH APPROVAL LETTER

Date:	11 July 2018
Validity of Research Approval:	05 February 2018 – 28 September 2018 2018/158
Name of Researcher:	Matwadia Z.
Address of Researcher:	16 Blossom Road
	Bakerton
	Springs, 1559
Telephone Number:	082 921 6278
Email address:	jmatwadia@gmail.com
Research Topic:	The influence of digital media use in the classroom on teacher stress in Gauteng classrooms.
Type of qualification	Masters
Number and type of schools:	Two Secondary Schools
District/s/HO	Gauteng 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.

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:

11/07/2018

Making education a societal priority

Office of the Director: Education Research and Knowledge Management
7ᵗʰ Floor, 17 Simmonds Street, Johannesburg, 2001
Tel: (011) 355 0488
Email: Faith.Tshabalala@gauteng.gov.za
Website: www.education.gpg.gov.za

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1. The District/Head Office Senior Manager/s concerned must be presented with a copy of this letter that would indicate that the said researcher/s has/have been granted permission from the Gauteng Department of Education to conduct the research study.
2. The District/Head Office Senior Manager/s must be approached separately, and in writing, for permission to involve District/Head Office Officials in the project.
3. A copy of this letter must be forwarded to the school principal and the chairperson of the School Governing Body (SGB) that would indicate that the researcher/s have been granted permission from the Gauteng Department of Education to conduct the research study.
4. A letter / document that outline the purpose of the research and the anticipated outcomes of such research must be made available to the principals, SGBs and District/Head Office Senior Managers of the schools and districts/offices concerned, respectively.
5. The Researcher will make every effort obtain the goodwill and co-operation of all the GDE officials, principals, and chairpersons of the SGBs, teachers and learners involved. Persons who offer their co-operation will not receive additional remuneration from the Department while those that opt not to participate will not be penalised in any way.
6. Research may only be conducted after school hours so that the normal school programme is not interrupted. The Principal (if at a school) and/or Director (if at a district/head office) must be consulted about an appropriate time when the researcher/s may carry out their research at the sites that they manage.
7. Research may only commence from the second week of February and must be concluded before the beginning of the last quarter of the academic year. If incomplete, an amended Research Approval letter may be requested to conduct research in the following year.
8. Items 6 and 7 will not apply to any research effort being undertaken on behalf of the GDE. Such research will have been commissioned and be paid for by the Gauteng Department of Education.
9. It is the researcher's responsibility to obtain written parental consent of all learners that are expected to participate in the study.
10. The researcher is responsible for supplying and utilising his/her own research resources, such as stationery, photocopies, transport, faxes and telephones and should not depend on the goodwill of the institutions and/or the offices visited for supplying such resources.
11. The names of the GDE officials, schools, principals, parents, teachers and learners that participate in the study may not appear in the research report without the written consent of each of these individuals and/or organisations.
12. On completion of the study the researcher/s must supply the Director: Knowledge Management & Research with one Hard Cover bound and an electronic copy of the research.
13. The researcher may be expected to provide short presentations on the purpose, findings and recommendations of his/her research to both GDE officials and the schools concerned.
14. Should the researcher have been involved with research at a school and/or a district/head office level, the Director concerned must also be supplied with a brief summary of the purpose, findings and recommendations of the research study.

The Gauteng Department of Education wishes you well in this important undertaking and looks forward to examining the findings of your research study.

Kind regards

Mr Gumani Mukatuni
Acting CES: Education Research and Knowledge Management

DATE: 11/07/2018

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Office of the Director: Education Research and Knowledge Management
7th Floor, 17 Simmonds Street, Johannesburg, 2001
Tel: (011) 355 0488
Email: Faith.Tshabalala@gauteng.gov.za
Website: www.education.gpg.gov.za

Annexure C: Approval from District Director

GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

TO   : THE PRINCIPAL
                    SGB
                    DALPARK SECONDARY SCHOOL & NIGEL SECONDARY SCHOOL

CC   : MS Z. MATWADIA

FROM   : E.S. CHABALALA
                    DISTRICT DIRECTOR

DATE   : 13 JULY 2018

SUBJECT   : APPROVAL IN RESPECT OF REQUEST TO CONDUCT RESEARCH

RESEARCH TOPIC: THE INFLUENCE OF DIGITAL MEDIA USE IN THE CLASSROOM ON TEACHER
                STRESS IN GAUTENG CLASSROOM
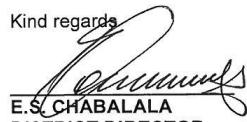
This letter serves to indicate that approval has been granted to **Ms Z. Matwadia** to proceed with research in respect of the study indicated above.

The onus rests with the researcher to negotiate appropriate and relevant time schedules with school/s involved conducting the research. Copies of this letter together with the Head Office granting her permission must be presented to both the school (Principal and SGB) confirming that permission has been granted for the research to be conducted.

Attached is a letter from Head Office which stipulates conditions that 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.

We wish Ms Z. Matwadia well in this important undertaking and look forward to examining the findings of her research study.

Kind regards

E.S. CHABALALA
DISTRICT DIRECTOR

DATE: 13/07/2018

Making education a societal priority

Office of the District Director: Gauteng East
Corner 7th Street & 5th Avenue, Telkom Office Towers Springs , 1560
Private Bag x 9, Springs, 1560.
Email: Somikazi.Chabalala@gauteng.gov.za
Website: www.education.gpg.gov.za

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Annexure D: Interview Schedule

QUESTION TYPE	EXAMPLE/S
Biographical details	How many years are you in the teaching profession? What subjects are you currently teaching and which grades?
Open-ended main questions	How did the school community become aware that this school has been selected for the implementation of digital media in the classroom?
	How did you feel when you were first informed that digital media would be implemented in your classroom?
	How do you feel about the training that you received prior to the implementation of digital media in the classrooms?
	How do you feel about the technical support that is given to teachers from the Gauteng department of Education in terms of the use of digital media in the classroom?
	Do you feel that sufficient training and support was given to teachers for the use of digital media in the classroom? Please elaborate.
	How does your school community benefit from the implementation of digital media in the classroom?
	What does your school require in order to implement digital media in the classroom?
	What capacity does your school have to manage and administer the implementation of digital media in the classroom?

Annexure E: Principle information sheet

REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT _____ SCHOOL.

The influence of digital media use in the classroom on teacher stress in Gauteng schools.

DATE:

Mr _____

The Principal

_____ School

Gauteng

Email:

Dear Mr _____

I, Zyliekha Matwadia, am doing research under supervision of Professor R J Botha, a professor in the Department of Education Leadership and Management towards a MEd at the University of South Africa. We have funding from UNISA for the completion of the research. We are inviting you to participate in a study entitled: *The influence of digital media use in the classroom on teacher stress in Gauteng schools.*

The objectives of this research are:

- To determine how teachers can be involved in the decision-making process on the implementation of the digital tablets in Gauteng public schools, and reduce their stress

- To determine how the introduction of digital tablets in the classroom has contributed to or lessened the perceived stress levels of teachers?

- To determine in which way the introduction of digital tablets in the classroom has enhanced the quality of learning and teaching in schools, and reduced stress of teachers

- To determine ways in which the dissemination of digital tablets can be undertaken to empower teachers and so reduce stress among them.

Your school has been selected because it is one of the schools that is part of the Big Switch On project, in which digital media has been introduced in classrooms. The study will entail semi-structured interviews that will be conducted individually. The duration of the interviews will be approximately 45 to 60 minutes, and will comprise of 5 educators and the principal from your school. The interview will be conducted at your school at a convenient day and time after school.

The benefits of this study are threefold. Firstly, the Big Switch On project, has been introduced in 2015 in seven Gauteng schools, and was expanded to 375 schools in the following two years. For many schools this is a first time, thereby rendering it a scarcely researched topic. The implications and effects of The Project have yet to be considered. Secondly, it is often assumed that the use of digital tablets in the classroom makes teachers lives easier and reduces their workload. The research that will be undertaken will address this question scientifically in order to make reliable and valid conclusions that go beyond assumptions. Thirdly, related research has indicated barriers and challenges to the implementation of digital tablets in the classroom. The research will address these barriers and make recommendations regarding future implementation of digital tablets in the classroom.

Potential risks are that the research may result in a certain degree of mental discomfort to the participants. A sense of caring and fairness will be part of the researcher's thinking, actions and personal morality. This will be achieved in this study by engaging in open discussions and negotiation with participants.
There will be no reimbursement or any incentives for participation in the research.

If you would like to be informed of the final research findings, please contact Zyliekha Matwadia on 0829216278 or email jmatwadia@gmail.com.

Kindly give me permission to conduct this research at your school by interviewing the teachers.

Thank you.

Yours sincerely

_____

Z Matwadia (UNISA student number: 54351103, Cell no: 0829216278)

Annexure F: Principle consent form

Title of the Study: *The influence of digital media use in the classroom on teacher stress in Gauteng schools.*

Name of Researcher: Z Matwadia

Street address 16 Blossom Road, Bakerton, Springs, 1559

E-mail: jmatwadia@gmail.com

Cell: 0829216278

Date: _____

I, _____, principal of _____school, understand

- the study and what it requires of the staff, students, and/or parents in my school,

- that the privacy and confidentiality of any staff or student will be protected,

- that I have the right to allow or reject this research study to take place in my school,

- that I have the right to terminate the research study at any time,

- that I have the right to review all consent forms and research documents at any time during the study and up to one year after the completion of the study.

- ☐ I grant permission to the researcher to conduct the above-named research in my school as described in the proposal.

- ☐ I DO NOT grant permission to the researcher to conduct the above-named research in my school as described in the proposal.

- ☐ I understand that data should be released only by the departments that maintain them. My staff and I will not release data to the researcher without prior approval from Gauteng Department of Education.

_____
Signature of Principal

Annexure G: Participant information sheet

Participant information sheet

Title: *The influence of digital media use in the classroom on teacher stress in Gauteng schools.*

Date: _____

DEAR PROSPECTIVE PARTICIPANT

My name is Zyliekha Matwadia and I am doing research under the supervision of Prof R J (Nico) Botha, a professor in the Department of Education Leadership and Management towards a MEd at the University of South Africa. We have funding from UNISA for the completion of the research. We are inviting you participate in a study entitled: *The influence of digital media use in the classroom on teacher stress in Gauteng schools.*

WHAT IS THE PURPOSE OF THE STUDY?

The study is expected to collect important information that will explore the perceived stress factors experienced by teachers in the Gauteng schools that were selected in the Big Switch On project.

WHY AM I BEING INVITED TO PARTICIPATE?

You are invited because you are a teacher from a school that has been part of the Big Switch On project. I obtained your details from your school principal.

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY?

The study involves semi-structured interviews that will be conducted face to face. Semi-structured interviews allow participants the freedom to express their views in their own terms. Semi-structured interviews can provide reliable, comparable qualitative data.

The duration of the interviews will be approximately 45 minutes to an hour. The interview will be audio-taped. The interview will be conducted at your school at a convenient day and time after school.

CAN I WITHDRAW FROM THIS STUDY EVEN AFTER HAVING AGREED TO PARTICIPATE?

Participating in this study is voluntary and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form. You are free to withdraw at any time and without giving a reason.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

The benefits of this study are threefold. Firstly, the Big Switch On project, has been introduced in 2015 in seven Gauteng schools, and was expanded to 375 schools in the following two years. For many schools this is a first time, thereby rendering it a scarcely researched topic. The implications and effects of The Project have yet to be considered. Secondly, it is often assumed that the use of digital tablets in

the classroom makes teachers lives easier and reduces their workload. The research that will be undertaken will address this question scientifically in order to make reliable and valid conclusions that go beyond assumptions. Thirdly, related research has indicated barriers and challenges to the implementation of digital tablets in the classroom. The research will address these barriers and make recommendations regarding future implementation of digital tablets in the classroom.

ARE THERE ANY NEGATIVE CONSEQUENCES FOR ME IF I PARTICIPATE IN THE RESEARCH PROJECT?

Potential risks are that the research may result in a certain degree of mental discomfort to the participants. A sense of caring and fairness will be part of the researcher's thinking, actions and personal morality. This will be achieved in this study by engaging in open discussions and negotiation with participants.

WILL THE INFORMATION THAT I CONVEY TO THE RESEARCHER AND MY IDENTITY BE KEPT CONFIDENTIAL?

Your name will not be recorded anywhere and no one will be able to connect you to the answers you give. Your answers will be given a code number or a pseudonym and you will be referred to in this way in the data, any publications, or other research reporting methods such as conference proceedings.

Your answers may be reviewed by people responsible for making sure that research is done properly, including the transcriber, external coder, and members of the Research Ethics Review Committee. Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records. A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report.

HOW WILL THE RESEARCHER PROTECT THE SECURITY OF DATA?

Hard copies of your answers will be stored by the researcher for a period of five years in a locked cupboard/filing cabinet in a safe location for future research or academic purposes; electronic information will be stored on a password protected computer. Future use of the stored data will be subject to further Research Ethics Review and approval if applicable. Information will be destroyed if necessary *(e.g. hard copies will be shredded and/or electronic copies will be permanently deleted from the hard drive of the computer through the use of a relevant software programme)*.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?

There will be no reimbursement or any incentives for participation in the research.

HAS THE STUDY RECEIVED ETHICS APPROVAL?

This study has received written approval from the Research Ethics Review Committee of the College of Education, UNISA. A copy of the approval letter can be obtained from the researcher if you so wish.

HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS OF THE RESEARCH?

If you would like to be informed of the final research findings, please contact Zyliekha Matwadia on 0829216278 or email jmatwadia@gmail.com. The findings are accessible for one year.

Should you require any further information or want to contact me about any aspect of the study please feel free to do so.

Should you have concerns about the way in which the research has been conducted, you may contact Prof R J Botha on cell number 0824116361, or email at botharj@unisa.ac.za

Thank you for reading this information sheet and for participating in this study.

_____

 Zyliekha Matwadia

Annexure H: Participant consent form

Participant Consent Form

CONSENT/ASSENT TO PARTICIPATE IN THIS STUDY (Return slip)

I, _____ (participant name), confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read (or had explained to me) and understood the study as explained in the information sheet.

I have had sufficient opportunity to ask questions and am prepared to participate in the study.

I understand that my participation is voluntary and that I am free to withdraw at any time without penalty (if applicable).

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my participation will be kept confidential unless otherwise specified.

I agree to the digital recording of the interview, which will take approximately 45 minutes to an hour.

I have received a signed copy of the informed consent agreement.

Participant Name & Surname: (please print)   _____

_____   _____

Participant Signature   Date

Researcher's Name & Surname: (please print)   _____

_____   _____

Researcher's signature   Date

Annexure I: Participant H transcript

TEACHER'S INTERVIEW TRANSCRIPT: PARTICIPANT H

Interviewer: Good afternoon, I am Zyliekha Matwadia from the University of South Africa and I am currently undertaking a research study entitled: *The influence of digital media use in the classroom on teacher stress in Gauteng schools.*

This purpose of this interview is to seek and gather information pertaining to teachers and principals' experience on the use of digital media in teaching and learning, and explore the perceived stress factors experienced by teachers in Gauteng schools that were selected for the Big Switch On project. I have chosen you to participate in this interview, because your school is one of the schools that were selected for the Big Switch On project.

I will not use your name to ensure anonymity. What you say will be kept in confidence and one other thing, I encourage you to answer all questions as this will help me to gain a better understanding of what I am researching. Remember that you are not under any obligation to take part in this exercise and in order to continue with this interview, I need your consent to proceed. Kindly fill in and sign the consent form to acknowledge your participation. One other thing is that if you don't wish to continue, you can stop as you wish.

Thank you for agreeing to participate in this interview.

Interviewer: How many years are you in the teaching profession?
Interviewee: Nearly 30 years
Interviewer: And what subjects are you currently teaching?
Interviewee: Tourism, grade ten, eleven and twelve and Geography grade 12.
Interviewer: Shew! That's a lot. Ok. Alright, so with the implementation of digital media in the classroom, how did you become aware that you would have to use digital media in your classroom?
Interviewee: Well, the principal informed us, that our school was chosen as one of the schools.
Interviewer: And How did you feel when you were first informed that there would be digital media implemented in your classrooms?
Interviewee: I was excited. Yes, very much. I was happy but also worried. Happy for the learners who were going to be able to learn in what they called future classrooms. Happy for the school because the results of the school have been recognised by the Department. Hey! I was worried about all the extra admin work that would be involved and new lesson planning that would be involved around using the digital media.

Interviewer: How do you feel about the training that you received prior to the implementation of digital media in the classrooms?

Interviewee: I felt the training was far too long before we actually had the boards. I don't know how to explain to you, because..

Interviewer: It was too early?

Interviewee: Yeah, too early. Because when you get the training you tend to forget if you not doing the things everyday. You tend to forget. The training was too short and not subject specific.

Interviewer: And how long was the initial training?

Interviewee: Yoh! O Dear!

Interviewer: Can't remember?

Interviewee: Yeah, can't remember.

Interviewer: It was much too early before the implementation?

Interviewee: Yeah, much too early. And you see the thing is that people don't actually have the boards and they getting training and I feel that its good if you got the boards at the school and getting the training.

Interviewer: That's right. Ok. And then how do you feel about the technical support that is given to teachers from the Gauteng department of Education in terms of the digital media use in the classroom?

Interviewee: Well, our WIFI is not connected. So, at this stage I must be truthful I am using my own little stick for my classes and the school is not paying anything for it, out of my own pocket, and WIFI was promised and up till today, and I mean how long do we have these boards already? There is no WIFI connection. So, teachers what they is basically doing is taking their laptops, connecting it to a board and the boards is being used as a big screen. But, I'm with the tourism, to me, using my own USB is excellent. I mean, say for instance, the matriculants they doing 45 icons, 45 world famous icons. If you talk about the Great Wall of China, you can't just tell the child there's a picture, you show a whole video. And especially with the grade elevens we doing 15 Sadek countries. You show them Swaziland, you show them Lesotho, you go to Zimbabwe, you show the Sabie pass and they love it.

Interviewer: Ok, very interesting hey?

Interviewee: Yeah

Interviewer: Ok, do you feel that the training and support given to teachers was sufficient. From the department of education?

Interviewee: In a way yes but I feel if you know a computer and you know things its er… They shouldn't have taken everybody together. The ones that's not technology equipped or ready must be taken separate from the ones that are capable of handling a laptop or computers. The training was not enough. I had to grapple and experiment with the devices till I got what I wanted. Look for tourism its an excellent tool. The learners can immediately see what you are talking about once you show them a picture or video. I like the videos, its what the textbooks don't have, but then again there isn't enough time in the class to explore all the benefits of this new technology.

Interviewer: Yeah definitely. Especially those who don't know the computer so well, they should have seen their skill levels, isn't it?

Interviewee: And I've learnt more on my own in class by clicking here and fiddling there and to me it was ok but I mean how do you, I never had any training in the laptop ever, and I do videos and all kinds of stuff.

Interviewer: So, it was all new for you when it came to the school, this digital media in the classroom?

Interviewee: No, my laptop I knew all of that. I'm good on my laptop but I mean I never had any training. But I went for the digital, for the boards. I went for that.

Interviewer: The smartboards?

Interviewee: Yeah, the smartboards. But I feel if to go there on a whole Saturday and it's the first thing that gets to teachers.

Interviewer: Yeah its giving up your private time

Interviewee: And then you somma negative from the start. If it could have been say a afternoon, teachers are more appealing to or say willing to sit on a afternoon after school and have training after school.

Interviewer: So, did you people have Saturday training?

Interviewee: Yes! yeah. We had to go in and it started at 8 until what time in the afternoon.

Interviewer: And you were not reimbursed for this time?

Interviewee: No!

Interviewer: How do you feel your school community benefits from the implementation of digital media in the classroom?

Interviewee: The community outside?

Interviewer: The community inside and outside the school.

Interviewee: Inside the smartboards is excellent because in every class where there's a smartboard every teacher is working on a board because you know we were like said, 'These boards cost a lot of money' and you can't still go on working on your plain whiteboard with the smartboard next to you. So, everybody that's got a board is working on it and they love it. I can't go without my board anymore.

Interviewer: So, you have a smartboard and a whiteboard in your classroom?

Interviewee: Yes, but my whiteboard is like when there's test dates. Its something that's got to stay there. I mean, the smartboard you put off. But the whiteboard you write test dates or notes, remember there's do this.You know when this digital media was first implemented in the classrooms, we were under the impression that there is a digital divide among the privileged and under privileged learners, but this is not the case, todays generation are very well versed with technology and with the smart phone you can do almost anything a tablet can do and more. Most learners have cell phones. I think when the tablets were given to the learners maybe one or two in every class didn't know how to use them. Maybe in the rural areas the learners are not so smart but not here by us, this is a peri-urban area and the kids are smart with technology. They know email, whatsapp, facebook, Instagram etc. Problem is they don't want to download past papers and information that is necessary for school. They use the tablet to watch soccer, but they don't want to play soccer. With all the gadgets, the learners are not active, they are lazy, they prefer to sit one side and play with their tablets than to take part in sports.

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Interviewer: What does your school require, you've got the smartboards, you've got the tablets, is there anything else, besides the WIFI that you spoke to me about for this thing to be like perfect, 100 percent?

Interviewee: Alright, the big nuisance, all the kids received tablets, but now that tablets is supposed to be used for interactive lessons, connected to the smartboard, while the WIFI and whatever.. So, I can tell you at this stage that I hate the tablet in the kids hands in class. I hate it with a passion. I wish the Department would take those tablets back and post it. Because they put their own little sim cards in and they on facebook, on whatsapp, on everywhere else, except on textbooks that's loaded on the tablet.

Interviewer: So, that is a challenge then?

Interviewee: It's one big challenge.

Interviewer: And you don't have the ability to switch off their tablets?

Interviewee: No! I mean you walk to them, they so clever, they quickly click here, and then it switches the screen.

Interviewer: So, they flip screens?

Interviewee: Yeah, and that tablet was supposed to be for interactive lessons. Like they told us that you can see when the child is online and answered the question. Nothing came of that, nothing! So, I told my kids in my class if I see a tablet I'm going to do a rain dance on it. I don't want to see it.

Interviewer: Ok, so you don't allow them to use the tablet in the classroom?

Interviewee: No. because they busy on other things. They must have their textbook and if I work on the board they take notes.

Interviewer: So, they don't use the textbook from the tablet. They bring the hard copy of the textbook?

Interviewee: Yeah

Interviewer: So, at the school you give them the textbooks loaded on the tablet as well as the hard copy of the textbook?

Interviewee: Yes, yes. And I can tell you I'm not the only teacher that feels like that about it. The government has spent millions if not billions on this project, so in terms of resources there should be no shortcomings.

Interviewer: What capacity does your school have to manage and administer the implementation of digital media in the classroom? So when I talk of capacity I mean are the teachers all computer literate?

Interviewee: Well, I think that most of them are, most of them are.

Interviewer: So, then you have good capacity.

Interviewee: yes.

Interviewer: Except for the WIFI, everything else is there?

Interviewee: Yeah, everything else is in place, if we can just.. I mean…there's so many… I'm reading a lot… I mean….I love the internet and I love getting extra info and I mean even worksheets and there's you can't believe the info resources on the internet.

Interviewer: Yeah there's a lot of resources. But does that not take up a lot of your time?

Interviewee: But the thing is it costs money, and not everybody have WIFI at home, and educators may not have the chance to do it at home. I've got WIFI at home, so I get a lot of info. Sometimes teachers

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ask me for things and even say in tourism, my learners get research work. I mean they have to find an aeroplane ticket, because they must work out a tour plan. Now, the children, the area that they live in, where do they get the time, the WIFI, the whatever, to do that research? So, what do I do? I do the research, I put together a research package for the kids, print it and say out of this booklet, you'll get the info. So, no research was done. if there was a WIFI at school, they could sit after school and maybe then on their tablets do the research.

Interviewer: That's interesting hey. Ok

Interviewee: I actually bought a projector before the school was changed to future classrooms. I used to bring my computer from home and show the learners videos from the internet. So, for me this was excellent. I was really happy. But I know teachers who at that time didn't even have a cell phone and were not interested in having to learn how computers and the new technology works, I felt really sorry for them. Even when the new smartboards were put into the classroom I was constantly called by colleagues to assist them with small things, which impeded on my teaching time. There are technical assistants, but its easier to call someone next door to your classroom then to go looking for the assistants.

Interviewer: How do you feel about the workload for yourself with the implementation of digital media in the classroom? Do you feel that the workload has increased, or decreased or remained the same?

Interviewee: Ok, they spoke about paperless schools. Ok. That's bulldust. Sorry to say it in so many words. Because they still want to see my file, they still want the marks printed. They still want to see the policy in the file, they still want … It's paper, paper, paper. So, this paperless school story is whole lot of nonsense. They told us we gonna email the marks to the department, or email this here or email this there. Its nonsense. When the department comes here, the files must be in. It's always a file, a file for this and a file for that.

Interviewer: Ok, so the paper is not stopping, the papers still carrying on?

Interviewee: No, not at all.

Interviewer: So, the workload still the same?

Interviewee: Umm…well I can't say, its not really paperless. You still have to go and print and do this. And there's always an issue with printing or getting this or that.

Interviewer: And getting used to the smartboard in the classroom, did that increase your workload in the beginning?

Interviewee: No, to me I love technology and I loved it. So, to me it wasn't a problem. No, not at all.

Interviewee: The workload didn't change for me. I still had my lessons on a memory stick and I just continued to use them. The expectations from parents, the department of education and the media increased. Everyone wanted to see the results of the first matriculants who had smart classrooms. I think the results were a bit disappointing for everyone except for us as teachers, because we knew how distracted the learners were. Management says that we had a better quality pass, even though the pass rate dropped. So, I don't know who's fooling who.

Interviewer: What is your opinion on the quality of learning and teaching attained with the implementation of digital media in the classroom? Do you feel its improved or.. if we look at it there's two aspects, one is the quality of learning, we look at it differently and the quality of teaching, we look at it differently. Do you think its improved both of them?

Interviewee: Ok, like say for instance in Geography, now mapwork, it's very difficult, and I found say a video, and I'm the type of teacher, if I cannot really do it and I can find something to teach my class how to do it correctly then I'm going to use it. And that's where I've got say a video, if I'm not sure about how to do it, then I would say, 'guys I found this, this guy's excellent, lets listen to how he's doing it.' So, to me it helped me a lot, to better my quality of teaching and children tend in today's life, I mean, everything to them is technology. So instead of showing them a picture and you show a movie, they all sit up straight and they want to see it. They enjoy it more. It makes it more enjoyable and fun, cos teaching must be fun.

Interviewer: So, you feel that the quality of learning and teaching has improved?

Interviewee: For Tourism and my Geography, definitely. Specially, Tourism. I mean tourism is a subject that has no ending.

Interviewer: Yeah, they have to see. I know for tourism.

Interviewee: The tablets cannot make a strong learner out of a weak learner. The smartboards cannot make a teacher who doesn't know their subject content suddenly know it. These devices cannot provide initiative to better oneself, all that comes from within.

Interviewer: Do you feel that discipline among learners has improved with digital media in the classrooms?

Interviewee: Ok, again back to the tablets. The tablets are being stolen, the tablets this and the tablets that and he's got my tablet and I left my tablet in the class. Can I go and fetch my tablet. A child and a tablet in school in class? No. teacher with a smartboard and resources? Yes. But not a child and a tablet. Because our school policy, they not allowed to bring a cell phone to school, but now, they've got a tablet. And I found some of them, I found tablets with very funny information and pictures on.

Interviewer: And you know the previous problems we used to have in terms of discipline, say with taking drugs and things like that, have those things gotten better, less, because they've now got tablets in their hands?

Interviewee: Ugh. They will use that, sell it for drug money. I can't say that anything is better with discipline. Sorry to say that because at this stage our main problem is grade 10's. I don't know why but grade 10's is a handful. I don't see that it got better really. I mean we from grade zero or grade R up to matric and everybody, if you put all the teachers together, and you ask them what's their problem, there's no end in discipline. And although our school is really going out of their way, we even went so far that every afternoon we now calling in parents of learners in grade 10, just to talk to them, one on one, to see if we can't do anything about it. Learners still need guidance and nurturing. The teaching profession has never been one of subject content only. We teach children values, morals and good behaviour. Sometimes they listen and sometimes they don't.

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Interviewer: What challenges does your school experience with the implementation of digital media in the classroom? So, I guess it would be all these things that you have spoken about. Is there anything else you want to talk about, in terms of the challenges?

Interviewee: I think the main challenge for me is that the boards are not being used at their best because of the WIFI. I mean if you don't have any airtime or WIFI, you can't add this, or you click here and it says go to this and this, but then you need WIFI to go there. So, you can't use the smartboard to be very smart without WIFI. I mean, I've uploaded or downloaded things because I have my own USB, with my own WIFI or airtime. There's so many things you can do with that board but because there is no WIFI, and it was promised, but it never came. Learners not doing what they supposed to do with the tablets would be another big challenge for me.

Interviewer: How does your school or how would you address the challenges that you experience with the implementation of digital media in the classroom? I think your biggest challenge is that you don't have WIFI. How would you address that challenge?

Interviewee: I bring my own.

Interviewer: Which costs you your own money?

Interviewee: Yes

Interviewer: And the challenge you experience with learners not doing what they supposed to with the tablet?

Interviewee: At a school there is a lot of bureaucracy. If I have a problem I must report it to the my HOD, who will report it to the principal, who will report it to the district. By the time things actually get done, if at all, its not worth it reporting the problem. Sometimes its better to just ignore things and carry on. No one is going to expel a learner because they doing something else on the tablet and not following the lesson in class. Its very hard to discipline learners nowadays, you can't hit them, you can't speak rudely to them, you can't make them sit on the floor or stand for the lesson. I just ignore a lot in the classroom.

Interviewer: If you were in the Department of Education and you had to implement digital media in the classroom. How would you do it? Where would you start? What changes would you make to this whole implementation?

Interviewee: I think the fact that, I can't see a problem with how they did it. But I think the training, it would have been nice if the boards were here and they trained us at our school. And I think it would be good if they can start from primary school and the lower grades as well so that kids get used to it, being taught with a smartboard. I men, if you see the interactive activities that you can do with the little ones. Say with the high school now, I've got the Africa, the map, it's broken up into pieces, I would say to the child 'right, Zimbabwe, put it in place. Where do you think Namibia goes?' And they take their fingers and they put it there or point out where's Namibia, where's Angola, where's DRC? So, not on a tablet. I'm getting them on the board. So, I'm getting them to work also on the board with me. Now with the little ones, 'put the circle in the middle' and he takes his finger and he can pull it there. So, I feel it mustn't just be higher and up. Little ones can also be part of this. I think it should be implemented from grade one and not at matric

level. The learners grow with the devices and as they grow they learn more complex things that can be done with the tablets.

Interviewer: Overall, do you find the use of digital media in the classroom stressful? If you look at it overall, the learners, your part..

Interviewee: Not to me because I like it, I love it. Yeah. There are some teachers that moan and groan because they don't even know how to work a laptop.

Interviewer: And they still don't?

Interviewee: No, no now they learnt. Because there's a lot of things we must do on our own on the laptop and hand in. yeah. And the kids they excited because they have a tablet. And the kids enjoy it. Well, because in my class we show a video or things on you tube.

Interviewer: They quite happy?

Interviewee: Yeah. Because I used projectors and my computer I didn't find it stressful, in terms of my teaching and lesson plans, but the learners each having a tablet in their hands was a bit stressful for me.

Interviewer: I think that brings us to the end of our interview. Is there anything else you would like to add on about digital media in the classroom?

Interviewee: Well, if there is say, I don't know if there can be a site on internet or wherever. Say now for tourism and we do the icons, the 45 or 41 icons we do for matric, then there would already be videos available, and clickety click..

Interviewer: And it's there. So, like a ready-made lesson plan?

Interviewee: But with resources already there. That would be wow!

Interviewer: So, do you have ready made lesson plans or you had to do all your own new lesson plans?

Interviewee: I have a CD with lesson plans and information, but I mean, its just pictures. If you have a database with videos, and all the interactive resources for the smartboard then you can just with a click away have it there. Then I mean to research, to find the correct thing, you can't just open up anything in class nowadays. You gotta be careful what you open.

Interviewer: So, you have to pre-check everything?

Interviewee: Oh yes, yes.

Interviewer: So, the CD with the lesson plans you received, was it helpful?

Interviewee: Yeah, specifically there is for 10, 11 and 12, and I use that a lot. And there's worksheets on there also.

Interviewer: So, when did these CD's come? Before the implementation? Before they brought in the smartboards in the classroom?

Interviewee: Yeah, yeah.

Interviewer: Thank you so much. I really appreciate your time.

Interviewee: It is a pleasure. I hope it was helpful.

Interviewer: Yeah it definitely was.