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# Triggers for innovative disruption In South African secondary schools

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# Triggers for Innovative Disruption In South African Secondary Schools

## DISSERTATION

November 2018

**Aveshnee Iyer**

**v 8**

**A research report submitted to the Wits Business School in the University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Management in the field of Innovation Studies**

**Johannesburg, 2018**

**Student no: 1802838**

## ABSTRACT

The public schooling system across the world, is currently based on standardisation and efficiencies of a factory model, given the influence of the industrialisation era. Larger systemic challenges posed say that the current educational system operates on outdated definitions of intelligence and the learning process.

Whilst learning systems are being redefined conceptually, how we respond and integrate technology into this interpretation becomes a key aspect of change required in the education sector. By reviewing and learning from change we start to understand the impacts and opportunities for disruptive innovation to the South African secondary school landscape.

This study will look at the triggers for disruption in the education sector and explore whether disruptive innovation can contribute to an approach for improving performance in the South African secondary education sector. The research will assess the enablers and barriers, and create a body of knowledge for application to the South African context.

Stakeholders interested in this type of research include public education policy makers, educators, provincial and national government, education theorists and think tanks.

In chapter four the data from the qualitative research is presented and in chapter five the data is explored wherein more analysis is provided. Chapter six talks to recommendations, policy changes and measurements to support.

## KEY WORDS

Disruptive innovation Education Secondary Schools

# DECLARATION

I, Aveshnee Iyer, declare that this dissertation is my own unaided work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in the field of Innovation Studies at the Wits Business School in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other University.

Signature: ……..

On this 13th day of November 2018

Aveshnee Iyer

---

Name

# DEDICATION

This thesis is dedicated to my parents, without them this would not have been possible, my family and all the children of South Africa, may you grow from strength to strength.

# ACKNOWLEDGEMENTS

I would like to thank all the participants that took part in the interviews, for so willingly giving up your time and providing such informative views on a real-life problem in South Africa (even whilst they might be travelling abroad).

May you continue to be successful in your ventures to help South Africa grow through all the things that you do.

I would also like to thank my supervisor Prof Chris van der Hoven for his leadership and time spent. Thank you Dr Diran Soumonni for your time spent in broadening our concept of sustainability as an extension of our purpose on earth.

To my family and dearest parents, thank you for all the love and support during the journeys that I am always embarking on.

God bless.

## LIST OF ABBREVIATIONS & ACRONYMS

| Terms | Description |
|---|---|
| Coursera | Coursera is a free education platform partnering with universities and organizations worldwide by offering access to online courses. The extent of people utilising Coursera range close to 10 million students. |
| DBE | Department of Basic Education |
| ECD | Early Childhood Development – education sector in South Africa. |
| Future Learn Group | Education business – digital learning solution provider for guided learning in Africa. |
| Gamification in Education | Motivate students to learn by using video game design and game elements in learning environments e.g. reward system of badges. |
| Injini | Education Technology accelerator operating across South Africa and exposure into Africa. |
| IQ1 – IQ12 | Interview question one – Interview question 12. |
| Job To Be Done (JTBD) | Highlights the human need or purpose that is being fulfilled |
| MIT | Massachusetts Institute of Technology |
| OECD | The Organisation for Economic Co-operation and Development – intergovernmental economic organisation with 35-member countries, founded in 1960 to stimulate economic progress and world trade |
| Proof of Concept (POC) | Preliminary rollout of a specific program, process, method, principle, model or idea to demonstrate its feasibility. |
| RFP | Request for Proposals |
| SACMEQ | Southern and Eastern Africa Consortium for Monitoring Educational Quality. |
| Student centricity | Customising learning material and testing methods into modules, acknowledging that students learn at different paces. |

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# 1. CHAPTER ONE: INTRODUCTION

## 1.1. PURPOSE OF THE STUDY

This study will look at triggers for innovative disruption in the education sector and whether innovation can contribute to an approach for improving performance in the South African secondary education sector. Furthermore, the research will assess the enablers and barriers and create a body of knowledge for application to the South African context.

## 1.2. CONTEXT OF THE STUDY

Coverage of case studies will include exploration of innovative models of learning systems and the enablers and barriers to entry for the South African context. For this study, Triggers for innovative disruption can be defined as the barriers and challenges faced and the changing landscape brought about by the fourth industrial revolution. By gaining an understanding of education, this study creates a body of knowledge contextualized for the South. The literature shows that the education system has been disrupted across secondary and tertiary education. It also shows that the triggers for disruption are affected by enablers and barriers to entry.

Many higher education organizations are implementing mobile learning to provide flexibility in learning (Tsinakos & Ally, 2013). Using mobile technology to reach students will benefit higher education by increasing enrolment and having a broader student population, since students in different age groups will be able to access course materials anywhere and anytime (Lowenthal, 2010). Further application of mobile learning indicates that it is not a one fit technology solution, but centred on the learner. The technology allows the learner to learn in any context (Ally & Prieto-Blázquez, 2014).

## 1.3. PROBLEM STATEMENT (refer to 1.6.)

Challenges exist in the South African school system ranging from social and family background, learning abilities, learning differences, outdated platforms and limited access to learning systems. As per Christensen et al. (2008), Disrupting Class, the public schooling system across the world is based on standardisation and predominately driven from the efficiencies of a factory model, and that is mostly due to the influence of the industrialisation era. Christensen theory in (Christensen, Baumann, Ruggles, & Sadtler, 2006) classifies online education as catalytic innovation in action due to offering the schooling system the capability to offer students courses at a fraction of the cost.

Deloitte's innovation chief John Hagel III at the World Economic Forum in Davos (2017), says "that the way we define work in the industrial era is around doing highly specified tasks, in a very standardised way, and in a tightly integrated way". He says that our focus should be on giving more people access to education and educational systems.

Hagel (2017) argues that the purpose of the classroom has become a way to teach students to follow instructions and complete tasks exactly as they are assigned – it is a system that trains us to become machines.

## 1.4. RESEARCH PROBLEM

The challenges that exist in secondary schools as identified by Christensen et al. (2008) in Disrupting Class can be broken down into two parts. The first part looks at issues prevalent in the schooling system itself:

1.4.1. The challenges experienced in the schooling system continue to persist irrespective of any advancement in the use of technology.
1.4.2. Schools do not teach educational material the way students learn it; each student learns differently.
1.4.3. The school system is based on a standardised model like a production area.

The second part of the research problem relates to issues impacting on the beliefs and performance of students in the school systems.

1.4.4. The reward and punishment system in schools is outdated and does not produce the outcomes required.
1.4.5. Established school systems will be challenged by disruptive innovation in learning systems.

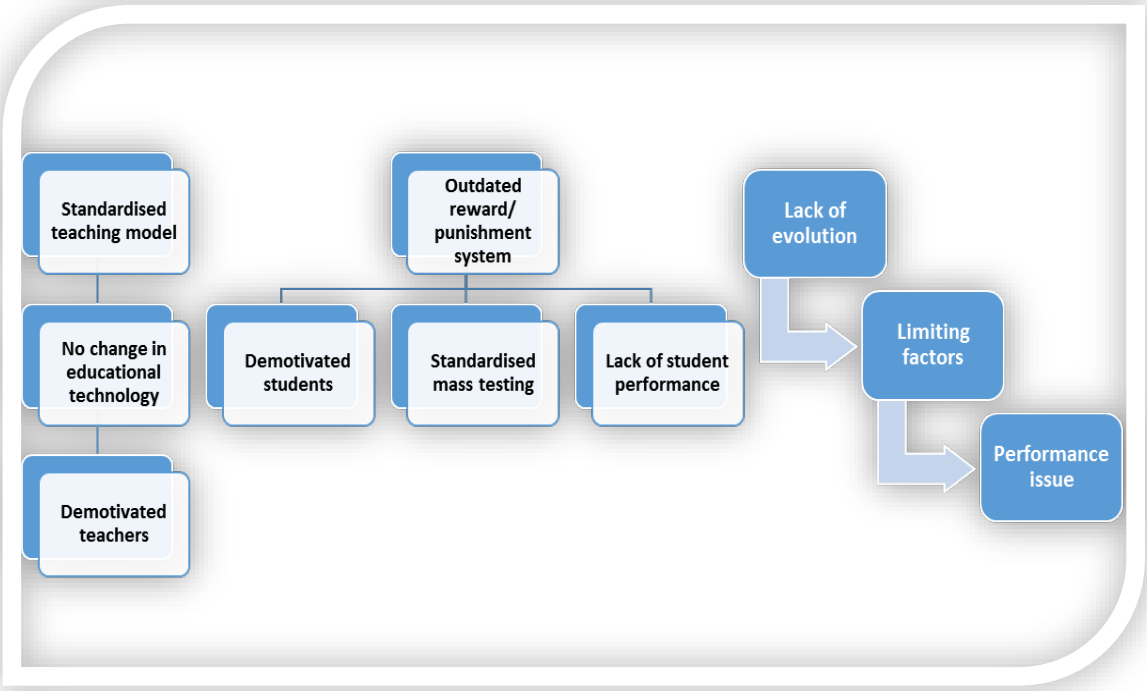



**Figure1: Researcher summarised problem statement hierarchy from Christensen et al (Christensen et al.)**

## 1.5. SIGNIFICANCE OF THE STUDY

The literature shows that the education system has been disrupted across secondary and tertiary education. It also shows that the triggers for disruption are affected by enablers and barriers to entry. This research serves to build further knowledge to an existing framework of education theories currently published by Christensen et al. (2008), Martone (2015) and Taylor (2008).

According to Christensen, there are two key enablers required for disruption to occur. Firstly, there must be a technology enabler that makes the innovation available to people previously not served by the industry. Secondly, the business model must change. To be truly disruptive, a new model must be developed. Christensen argues that disruption does not occur if an existing model co-opts an innovation to ensure its own continuation (Christensen et al., 2008).

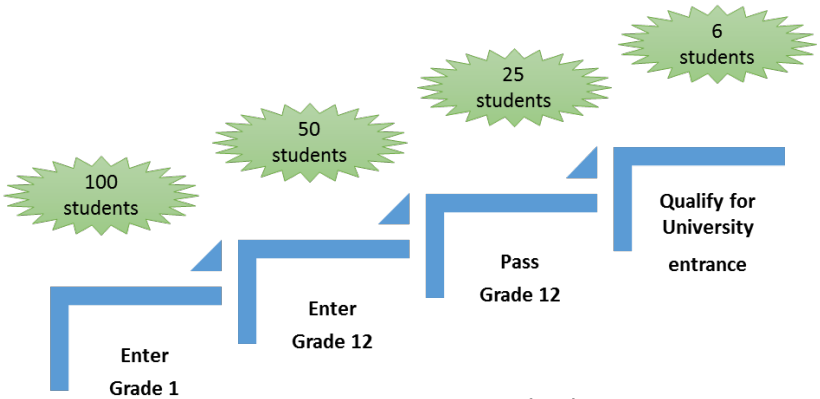
This study will look at the triggers for disruption in the education sector and whether disruptive innovation can contribute to an approach for improving performance in the South African secondary education sector. The research will assess the enablers and barriers, and create a body of knowledge for application to the South African context. Stakeholders interested in this type of research include public education policy makers, educators, provincial and national government, education theorists and think tanks.

## 1.6. FURTHER INSIGHT INTO THE PROBLEM STATEMENT

According to the Stats SA 2016 Community Survey 1996 – 2016:

1.6.1. The SA population: increased 51.8 million to 55.7 million (8% increase).
1.6.2. No of students completed secondary school: more than tripled from 3,5m to 11,9m (240% increase).
1.6.3. No of people who indicated they had no schooling: declined from 3,7m to 2,3m (38% decrease).
1.6.4. 93, 8% of Households in SA had access to cell phones. Access to landlines was down to 11, 5%.
1.6.5. 49, 3% of households make use of cell phones to access the internet.

Contrary to the statistics that completion of secondary schooling success has tripled, Spaull (2013) conducted a study on the quality of education in South Africa (1994-2011). The study was commissioned by the Centre for Development and Enterprise (CDE), an independent policy research and advocacy organisation and a leading development think tank for South Africa. In the report South Africa's Education Crisis: The quality of education in South Africa 1994-2011, Spaull (2013) points out that the annually-reported statistics from the National Senior Certificate (NSC) exam in Grade 12 are misrepresentative: -as they do not take into account students who did not complete Grade 12. The report indicates that of the 100 students that start school, only 50 make it to Grade 12, 40 passes, and only 12 will qualify for university". The throughput of students through the school system indicates that 40% of grade 1 students go on to pass Grade 12 and 12% qualify for a university entrance according to the study above.




Source: summarised from Spaull (2013) South Africa's education crisis: The quality of education in South Africa 1994-2011.

Matric results measurements do not take into account the actual throughput from grade 1 to 12, and exclude dropouts. Letseka and Maile (2008) HRSC study analysed the performance of South African schools from 1996 to 2010 in respect of grade 12 results and note the following, the actual number of students that completed grade 12 are taken into consideration and not the dropouts from grade 1 to grade 12. Dropouts are not calculated in the current performance measurement of the number of students completing grade 12. The concern is that Grade 12 performance is currently used as the main measure for the performance of schools.

Exploring the issues in school systems provides a view regarding the inflow of students entering tertiary education. In Letseka and Maile (2008) HRSC study shows that South Africa's university graduation rate of 15% is the lowest in the world, according to the National Plan for Higher Education (NPHE) compiled by the Department of Education in 2001. The Department of Education also noted wide disparities in graduation rates - with the average graduation rate for white students more than double that of black students. The National Higher Plan for Education (NHPE) set targets for university graduates, however in 2004, they were thought to be unrealistically high and were subsequently reduced in 2004 (between 2.5% to 6% per adjustment) on the basis that only a few institutions met the proposed benchmarks (Letseka & Maile, 2008). Table 1 sets out the old and new target rates.

In 2005 the Department of Education reported that of the 120 000 students enrolled in higher education. In Letseka and Maile (2008) they provide statistics in respect of the above:

- 36 000 (30%) dropped out in their first year of study.
- 24 000 (20%) dropped out during their second and third years.
- From the remaining 60 000, 22% graduated within the specified three years duration for a generic Bachelor's degree.

| QUALIFICATION TYPE | GRADUATION RATE (CONTACT) | | GRADUATION RATE (DISTANCE) | |
|---|---|---|---|---|
| | National Plan 2001 | Adjusted 2004 | National Plan 2001 | Adjusted 2004 |
| Up to 3 years undergraduate | 25% | 22.5% | 15% | 13.5% |
| 4-year or more undergraduate | 20% | 18% | 10% | 9% |
| Postgraduate up to honours | 60% | 54% | 30% | 27% |
| Masters | 33% | 30% | 25% | 22.5% |
| Doctoral | 20% | Not specified | 20% | Not specified |

**Figure 3: Benchmarks for graduation rates, 2001 and 2004 Source (Letseka & Maile, 2008)**

## 1.7. THEORETICAL FRAMEWORK

The Advocacy Coalition Framework (ACF) has a three-tiered hierarchical belief system:

1.7.1. Deep core beliefs - these are deeply embedded beliefs that require an external shock in order to be changed example economic crisis, change in political party. Weible and Sabatier (2007) describes it as normative /fundamental beliefs that span multiple policy subsystems and are very resistant to change.

1.7.2. Policy core beliefs - normative/empirical beliefs that span an entire policy subsystem.

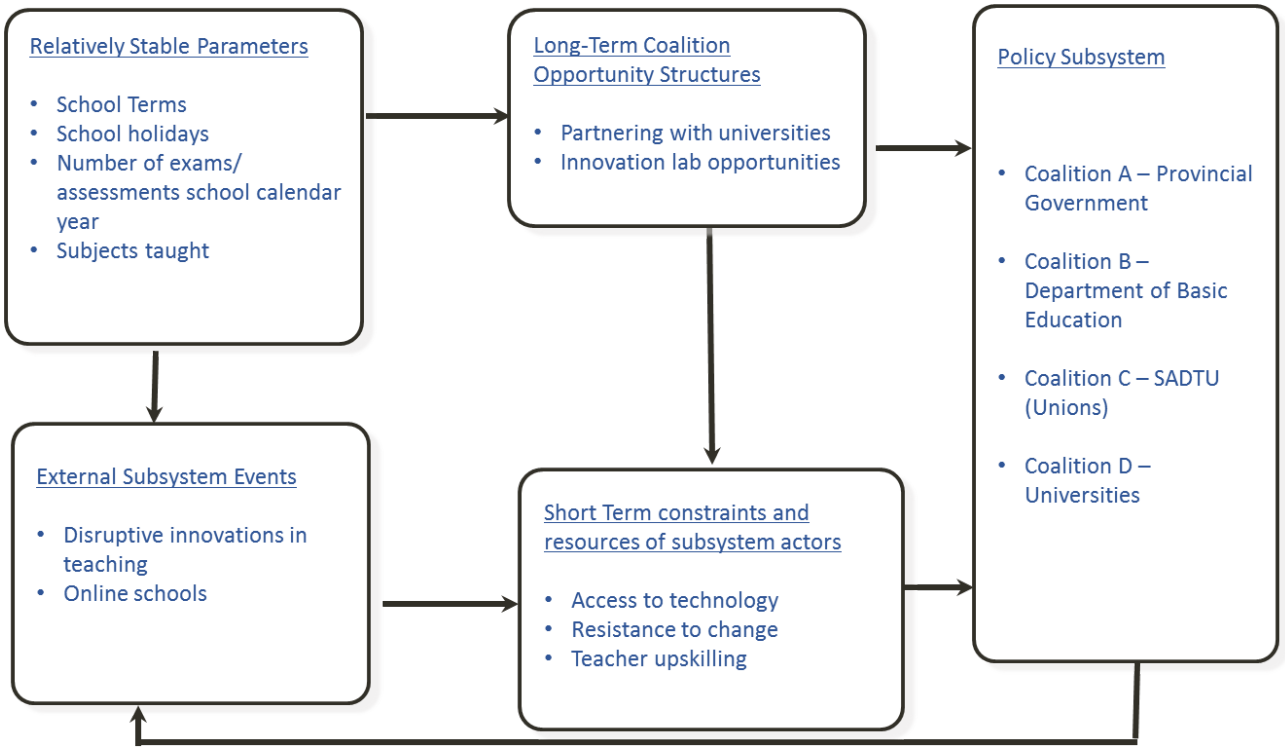
1.7.3. Secondary beliefs – these can be changed with evidence. These beliefs emphasise the environment. Weible and Sabatier (2007) advises that of the three layers of beliefs, secondary beliefs are most susceptible to change in response to new information and events.

The Advocacy Coalition Framework (ACF) is ideal theoretical framework to understand the various actors in the school system. The use of the framework is guided by Weible and Sabatier (2007). The South African political, social and economic contexts are often dominated by actors with often divergent interests. The framework is ideal for analysis of the actors and coalitions especially were contestation exists. It is important to review the different actors and their core, policy and secondary beliefs because it has resulted in the lack of technological progress in the education sector.

The view of the ACF below is based on the literature review thus far and will be revisited once the research has been completed.

Strong core beliefs have led to various constructs in how education curriculum and traditional methodologies continue to be adopted, hence this framework has been selected.

**ADVOCACY COALITION FRAMEWORK**




## 1.8. OBJECTIVES OF THE STUDY

The objectives that will help identify the core deep and policy beliefs impacted by triggers for innovative disruption are:

1.7.4. To understand challenges in student performance in schools relating to the lack of technological progress in the education sector.
1.7.5. To explore the integration or lack of integration of technology in the schooling system.
1.7.6. To understand the impact on performance in student centric models leveraging the jobs to be done (JTBD) approach.

The objectives that will help identify the secondary beliefs impacted by triggers for innovative disruption are:

1.7.7. To understand the linkages of disruptive innovation in the South African secondary school system.
1.7.8. To provide recommendations regarding opportunities and enablers for the South African secondary school system.

## 1.9. RESEARCH QUESTIONS

1.7.9. **Primary question:** To explore disruptive innovation models in education and the impact to schooling in South Africa?

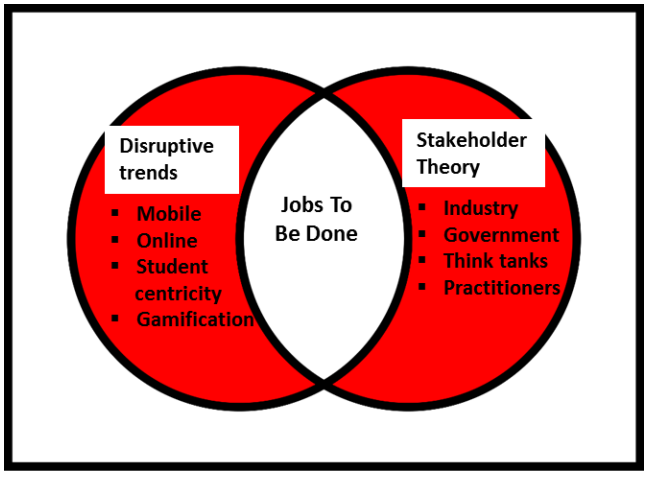
The first sub question will explore how triggers for innovative disruption impact on deep policy core beliefs.

1.7.9.1. **Sub-question 1:** Have disruptive models based on innovative learning systems positively impacted student performance?

The second sub question will explore how triggers for innovative disruption impact on secondary beliefs.

1.7.9.2. **Sub-question 2:** What are the enablers and barriers to entry for disruption in SA school education?

## 1.10. CONCEPTUAL FRAMEWORK




**Researcher compiled diagram**

## 1.11. DELIMITATIONS OF THE STUDY

1.7.10. The scope of the study includes the following elements:

1.7.10.1. Overview of the challenges in the schooling system.

1.7.10.2. Compare views on disruptive innovation in relation to schooling.

1.7.10.3. Understand the enablers and the barriers to entry for disruptive innovation SA schools

1.7.10.4. Understand the Jobs To Be Done (JTBD) for students, teachers and parents.

1.7.11. The study does not undertake to:

1.7.11.1. Understand all challenges related to the schooling system in detail but focuses on a specific path namely disruptive innovation.

1.7.11.2. Identify software applications for educational platforms and learning methods.

## 1.12. ASSUMPTIONS

The research makes the following assumptions (occurrence and potential effects on the outcomes):

1.7.12. That the sample will result in an appropriate number of respondents to draw reasonable sample findings.

# 2. CHAPTER TWO: LITERATURE REVIEW

## 2.1. INTRODUCTION

Turning an invention into an innovation is actually creating a social system that has to nurture technical ideas, make investments in risky situations, and arrange the division of benefits so that both investors and personnel are motivated to develop the competences that are needed to do all these things, and actually do them (Stinchcombe 1990). (Soumonni, 2013)

### SEVEN SOURCES FOR INNOVATIVE OPPORTUNITY

"Systematic innovation consists in the purposeful and organised search for changes and in the systematic analysis of the opportunities such changes might offer for economic and social innovation"

| Source | |
|---|---|
| The unexpected | success (Apple), failure (Ford Edsel), outside event |
| Incongruities | between reality as it actually is and reality as it is assumed to be or as it ought to be (overnight package delivery) |
| Process need | Source innovation based on process need (sugar free products, caffeine free coffee, microwave owen) |
| Industry and market structures | changes that catch everyone unawares (health care industry: changing to home health care) |
| Demographics | changes in the population (retirement homes for older people) |
| Changes in perception | also changes in mood and meaning (exercise, health and green movement) |
| New knowledge | both scientific and non-scientific (video industry, robotics) |

By Drucker, P (1994) Innovation and Entrepreneurship, Elsevier and Drucker, P (2002) The Discipline of Innovation, Harvard Business Review, Aug 2002, Vol 80,

Source: Drucker (2014)

Drucker (2014) defines innovation as the "act that endows resources with a new capacity to create wealth". Drucker defines the sources of innovation as windows of opportunity that need to be explored.

## 2.2. DISRUPTIVE INNOVATION

According to Christensen, there are two key enablers required for disruption to occur. Firstly, there must be a technology enabler that makes the innovation available to people previously not served by the industry. Secondly, the business model must change. To be truly disruptive, a new model must be developed. Christensen argues that disruption does not occur if an existing model co-opts an innovation to ensure its own continuation (Christensen et al., 2008).

Theories of disruptive innovation Christensen (Clay, 2001) (Clayton, 1997) advise that most business leaders are aware of sustaining technologies (inclusive of incremental improvements or radical, up-market technology innovations leap-frogging ahead of competitors). Disruptive technologies are ignored as they do not initially provide a better product or more profits. Disruptive innovation is key for long term growth and economic prosperity and these normally emerge as new business models being adopted via disruptive technologies.

Christensen's disruptive theories are criticised by Markides (2006), in that the original theory focused on disruptive technologies. The criticism is that the same theory has been expanded and re-used to explain all types of disruptive innovations, whereas different innovations have different competitive effects that cannot be approached in a standardised level of analysis. Christensen (2006) also acknowledges that theory building is continual and evolving, and he says that theories specific to disruptive innovation have evolved considerably through input and refinement by various scholars, including critique.

MIT Sloan's Management Review (King & Baatartogtokh, 2015) looked at three items of specific critique on Christensen's theories a) what is the right way to use the theory of disruptive innovation b) what are its core elements c) how predictive is it. The review also identifies that together with disruptive innovation we must ensure that analysis and critical thinking is applied. Other factors to consider are the nature of the competition and sources of competitive advantage when considering innovation. Furthermore, lean start up models are being adopted with a primary focus on understanding what matters to customers as per the Harvard Business Review, May 2013. Blank (2013) promulgates the "What Matters" approach a) determine what matters ultimately to the customer b) build a prototype to test before rolling out the full solution c) feedback to loop to improve on the customer solution.

## 2.3. INNOVATION IN THE EDUCATION SECTOR

Christensen et al. (2008) states that there are larger systemic challenges in that the current educational system operates on outdated assumptions of how to define intelligence, and the learning process is over laid against that definition of intelligence. In addition, teachers teach in their dominant way of learning, and hence teaching activity is dominated by this type of teaching method. Some students, having a similar learning style will respond to the teacher, however students that do not bear the similar learning style battle to grasp the concepts. Whilst learning systems are redefining these conceptually, how we respond and integrate technology into this interpretation becomes a key facet of the educational system evolution.

Education scholar Benjamin Bloom (1984) conducted a metastudy of research on students with individual instruction. (Thompson, 2011) shared the view that "Bloom found that students given one on one attention reliably perform two standard deviations better than their peers who stay in regular classroom". The impact is that a student in the middle of the mean would "shift to the 98$^{th}$ percentile".
Clayton Christensen argues that "schools are also supposed to help children to think differently and encourage the development of multiple perspectives" (Christensen et al., 2008). There are questions raised as to whether the current education systems adequately increase thinking and problem solving to positively impact the contribution of its students to promote economic growth and contribute economically and socially to a society.

Christensen et al. (2008) goes on to say that "Student centric technology in the form of computers hasn't had much impact on mainstream public education". Computers have been integrated into schools as an additional option in the curriculum and/ or to reduce the cost of textbooks. Schools have not been able to leverage computers to improve the performance of schools. Student centricity as summarised by Horn and Christensen (Christensen et al.) as the

ability to customise teaching and testing to the pace at which each student learns, shifting from the current mass teaching method currently used in schools. Technology can be used to leverage true student centricity.

Hungi (2011) and cited again in Spaull (2013), show formalised comparisons in SACMEQ II and SACMEQ III in learner performance core subjects. Taylor (2008) that indicate that there were no improvements noted in the South African Grade Six literacy or numeracy performance over the seven-year period - of which 13 African countries participated. South African students ranked 10th of the 14 education systems for reading and 8th for mathematics with much poorer countries such as Tanzania, Kenya and Swaziland ahead of South Africa, as displayed in Figure 4: Source What's wrong with South African schools (Taylor, 2008). Hungi (2011) informs us that at the student level - grade repetition, socio-economic background, students' age, and students' gender were found to be the most important factors affecting the variations in student achievement in these school systems. Irrespective of curriculum, pedagogy, culture, socio-economic status, or any other factors influencing the classroom it is Willis et al (2018) identifies that ICT should be used as a tool to reach an outcome, not as a gimmick or to fill quotas. At the school level, school resources and school location were identified as the important common factors.

## 2.4. DISRUPTIVE TRENDS IN EDUCATION

### 2.1.1 STANDARDISED TEACHING MODEL VERSUS MODULAR APPROACHES (student centric):

Standardisation refers to the monolithic mass production approach to teaching and testing. Schools were designed for mass learning and according to Christensen, C. M., et al. (Christensen et al.), the way schools are built, teachers are trained, students are taught and the curriculum designed all reinforces the mass standardisation outcomes. Yeigh, T., & Lynch, D. (2017) says that the promoting the development of practical skills and knowledge transfer as a key benefit of partnering (universities and businesses).

Modular teaching methods recognizes that all students learn differently, and at different paces. Every student learns in a different way and thereby customizing education tools to match how each child learns and test per module. A modular approach using software as a delivery approach is recommended. According to Estelami, H. (2017), partnerships are an important factor between educators and software developers.

By understanding the student centric technology, we can mediate in teaching and testing, and customize the way students learn. According Orhan-Karsak, H. G. (2017), the main way to adapt to competition is to improve the quality and change the education system. This study then goes on to reinforce the weaknesses in education related to lack of readiness levels of the pupils and lack of school buildings as some of the key challenges in this sector.

Student centric technology in the form of computers hasn't had much impact on mainstream public education" (Christensen et al., 2008). Computers have been integrated into schools as an additional course in the curriculum and in some cases to reduce the cost of textbooks. Schools have not been able to leverage computers to improve the performance of schools. Student centricity as defined by Horn and Christensen (Christensen et al.), the ability to customise teaching and testing to the pace at which each student learns.

### 2.1.2 INTRINSIC AND EXTRINSIC MOTIVATION

Disruptive innovations commence in places that the dominant system has failed to serve, and then grows to displace the traditional way of doing things (Goffin & Mitchell, 2016). The current learning system continues to be entrenched in a factory model school system that has been developed to cater for mass learning abilities and not individual learning that fosters individual development. In addition, traditional methods of teaching might not adequately transfer knowledge considering that the student population consists of a millennial generation. According to Hanushek, E. A. (2013), the focus on human capital as a driver of economic growth for developing countries becomes important. The research shows the importance of cognitive skills for economic growth and relationship to quality of schooling.

Schools currently use extrinsic pressure and therefore teachers offer the material without any intrinsic motivation. The punishment and reward system is outdated and it is important to understand what the actual Job to be Done (JTBD) for learners should be in South Africa.

**Researcher summarised views of student motivation as discussed** by (Christensen et al., 2008).

| Student Motivation | Explanation | Primary Job to be Done (JTBD): |
|---|---|---|
| **Extrinsic** | Motivation comes from outside the task – learning it will give the person access to something else. | • Student wants to feel successful and that they have achieved.<br>• Schooling should be an intrinsically motivating experience. |
| **Intrinsic** | Motivation person stays with the task because the task itself if fun & enjoyable. | |

A study from Preston et al. (2015); (Cole, K. B. (2017). describes the benefit of educational technologies as having a positive impact to student motivation. Drawbacks included a decline of literacy skills and increased workloads for teachers due to new implementations

**Teacher and Parent and Community motivations**

Furthermore, parent involvement, teacher dedication, social and economic factors in the community all impact the performance of the student and motivation cannot be viewed during school time in isolation.

### 2.1.3 CRITIQUE OF LIMITED COMPUTER USAGE IN SCHOOLS

“In every organisation, there are forces that shape and morph every new innovative proposal so that it fits the existing organisations own business model rather than fitting the market it was intended to serve” (Christensen et al., 2008). Unfortunately, in the school system computer usage has been crammed into the curriculum as an additional subject to be tested. Integration of computers as a delivery platform into the teaching curriculum has not occurred.

Currently tablets are used to replace hard copies of textbooks and reduce costs. Some public schools are looking at incorporating Google applications namely, maths applications integrated into classroom activity and a web based platform called Moodle where electronic test papers are uploaded as documents for completion during exams. However modular curriculum applications on tablets for actual student centric learning intervention has not been explored.

(Clark & Luckin) take a more practical iPads implementation outlook in their study. Research looks at the use of iPads beyond simple drill and practice games and used to support collaborative learning, and create personalised learning experiences. Monitoring and assessment is conducted digitally. The report highlights the practical limitations that can be a challenge for the school system namely, existing technical networks, ownership models, technology lifecycle, broad stakeholder preparation, on-going engagement (parents, teachers, learners, technical managers, etc.), as well as plans for capturing of student progress and evaluations.

In a study done by Solomon, K. (2018), leverages the Technology Acceptance Model (Davis, 1989; Marangunic & Granic, 2015). This was tested as a basis for examining teachers' incorporation of 1:1 technology into class work. The research shows protractors and detractors in this analysis.

Like Blended learning techniques is the Flipped Classroom concept. In the Flipped Classroom (Tucker, 2012) the idea is to shift around the instructional approach of teaching in class and students doing homework at home. Students can access teacher-created videos and interactive lessons at home before coming to class. According to Abdulkhakimova (2018), reversing the classroom means that students are able to first gain exposure to new material outside of class. Dependent on the preferred learning style this could occur through reading or lecture videos, and then use class time to do the harder work of pulling together that knowledge, perhaps through problem solving, discussion, or debates. Their research highlights that the traditional way of teaching relies on students preparing ahead of time to be able to participate and get benefit from the discussion (Abdulkhakimova, 2018). Therefore, disruptive technologies are vital to establishing the reverse classroom environment because the class becomes the place to work through problems, advance the concepts learnt at home, and collaborative learning between students.

### 2.1.4 DIFFERING VIEWS ON THE DISRUPTION IN THE SCHOOLING SYSTEM

Martone (2015) has a different view from Christensen et al. (2008). She agrees that the authors (Christensen et al., 2008) Disrupting Class have identified that there is a need to integrate technology in a more meaningful purposeful way which could change the school system. She agrees that as we live in a technology driven society, the educational system would need to evolve accordingly. Martone (2015) acknowledges that the authors have come up with a better way to support students and that is important for a nation. Martone (2015) argues that Christensen et al. (2008) have been too theoretical in their approach and failed to address practical implementation. The ability to scale up on high technology costs is a big dependency for the rollout of student centric technology into schools.

According to Hamlin, C. R. (2017), repeated change has a direct correlation to repeated failures - resulting in resistance to change (Mason, 2008). Habits of resisting change can then become entrenched in the neurons of the brain (Duhigg, 2012). Veteran educators who have experienced multiple changes have developed neuronal pathways of resistance

due to fear and perceived threat as this is one of the biggest barriers to change. Similar in the scenario of teachers showing resistance to change or participate willingly.

According to Cole, K. B. (2017), the definition of the digital divide refers to an individual's access to technology. As technology becomes more engrained, Cole (2017) argues that that potentially the digital divide theory has shifted slightly – from access to technology to adoption or the use of technology.

Reilly, A. J. (2017), attempts to explain Christensen et al (2018) theory and their predictions that by 2019 50% of high schools will be online in more developed countries like the US. The argument for and against is debatable however a proper quantitative view is not established and perhaps something to consider in 2019.

Online studies are very dependent on the assumption that students are motivated. Page 100 (Christensen et al., 2008) "online learning works best with more motivated students". Student attentiveness and commitment to finishing tasks. Considering the dependency on highly motivated students, the motivation/ reward system needs to fundamentally shift towards building intrinsic motivation or making linkages to some form of extrinsic motivation for an online student-centred model to succeed.

### 2.1.5 BLENDED LEARNING APPROACHES TESTED

Theories positioned in Disrupting Class (Christensen et al., 2008) were tested by (Horn & Staker, 2014) Blended: Using Disruptive Innovation to Improve Schools. Some students still succeed in school but due to compliance with teachers or parents or alternatively by chance, if they share a common learning style with the teachers' method of delivering the material. According to Horn and Staker (2014), "The key is to crawl into the learner's skin and see their circumstances – including their anxieties, immediate problems, and innate motivation – from their point of view". Summit Public School in the USA was used to test the blended learning method (Horn & Staker, 2014) as part of an incubation. The curriculum design is modular, online and integrated into project type experiential learning, with the teacher playing the role of coach as opposed to playing the delivery platform.

To support teacher development the model measures teachers: per assessment, content, curriculum, instruction, knowing learners, leadership, and mentoring. Teachers are placed at one of four levels: basic, proficient, highly proficient, and expert, dependent on the demonstration of their expertise. The onus is on the teachers to provide evidence of their performance – via principal evaluations, peer evaluations, and self-evaluations. This is then factored into the promotion system for teachers. In the new model, the teacher's role has changed from - delivering content to focusing on the students' development of cognitive and non-cognitive skills. A new function of the teacher is to analyse student data daily (also collected on the online tool) to collate achievements and improvements. Results are analysed weekly so that teachers can make critical changes where necessary or provide more coaching. The school also tracks student growth, achievement, and outcomes on an annual basis to help understand each student's individualized learning plan and progress.

According to Perry, W, Danhausen, T, & Johnson, C. (2017), blended learning (when implemented by districts and administrators) need to keep in mind intrinsic and extrinsic student motivation, tech literacy, basic literacy, organizational skills. Blended learning directly affects the ability of students to engage in the learning environment as well as, establishes relationships with other students and teachers.

According to Solomon, K. (2018), an educator's experiences with 1:1 technology by a student knowledge and increase both worth and assist in the greater adoption of 1:1 technology (Daniels, 2016; Moll, 2014).

As noted in the case study of Summit Public school, the blended learning approach resulted in students feeling that the school understood their needs. A shift in student motivation was noted including an increased eagerness to learn. According to (Horn & Staker, 2014) the shift in student motivation was intrinsically promoted.

"Online learning works best with the more motivated students" (p. 100 of Disrupting Class: Christensen et al. (2008)). Even with customized programs, problems can exist with students' attentiveness and ability to finish courses. Hence a combination of disruptive technology and blended learning capabilities would be ideal to pursue (Martone, 2015).

### 2.1.6 MOBILE LEARNING (m-learning)

A thorough analysis from a pedagogical and technological perspective important to define the correct usage and implementation of mobile learning technology. Many higher education organizations are implementing mobile learning to provide flexibility in learning (Tsinakos & Ally, 2013).

The factors or determinates that impact the behavioural intention of students to use mobile learning (m-learning) technology were examined (Lowenthal, 2010). Using mobile technology to reach students will benefit education by increasing enrolment and having a broader student population, since students in different age groups will be able to access course materials anywhere and anytime (Lowenthal, 2010). According to Winters, J. E. (2017), high school students may be more comfortable with technology than their predecessors and may take advantage of online learning opportunities.

Using the capabilities that mobile devices bring whilst being portable allows for learners to be able to use them anywhere, anytime and allows for interactions with other learners to share information and expertise and work on projects. Multiple studies have shown promising results when observing students utilizing technology within the classroom. A study conducted by Gerger (2014) shows that the level of engagement of students and their drive to accomplish educational tasks directly correlates or increases in classes that used technology Jankovski, C., & Schofield, D. (2017).

Advantages gained from m-learning include - ability to share knowledge across geographies and cultures, foster relationships, develop intercultural competencies and skills to communicate across cultures. Integrating MOOCs via blended learning or hybrid format could positively impact student outcomes and also decrease costs (Griffiths, 2014 in Israel, 2015), Mabuan, R. A., & Ebron Jr, G. P. (2018).

With communication technology, learners can use mobile technology anywhere and anytime to access educational resources (Tsinakos & Ally, 2013) Hassan et al., 2012; Roberts, 2013). Mobile learning is not about the technology, it is about the learner. The learner is mobile and is at the centre of the learning, and the technology allows the learner to learn in any context (Ally & Prieto-Blázquez, 2014). With mobile technology, a group of learners can access content from electronic repositories or create their own content, validate the content, and help each other regardless of location. Learner-generated content can then be used by other learners (Traxler, 2009).

## 2.1.7 GAMIFICATION IN EDUCATION

Tucker (2012) evaluate the model of the Khan Academy, a Silicon Valley education technology company created by Salman Khan. The Khan Academy is a free online site that provides education tools to students via practice exercises, instructional videos and a personalised learning dashboards to monitor progress. Students study at their own pace in and outside of the classroom. The academy covers math, science, computer programming, history, art history and economics. (Thompson, 2011) report that using the academy has 2 million users watching videos per month.

(Thompson, 2011) compiled a report on the usage of technology to create online courses for Mathematics and Science by the Khan Academy. In addition to the educational videos, the website has software that produces practice problems and rewards good performance with video-game like badges. This changes the reward and punishment system that we have in traditional teaching methods.

According to Lieux, M. L. (2018), the teachers' knowledge, beliefs and attitudes toward teaching is related to student learning. Further to this the study by Lucas Jr, H. C. (2017), shows that schools that embrace technology and use it to improve the educational process are in a much better performance position than those that resist technology.

In terms of gamification processes, according to Bressler, D. M., Oltman, J., & Vallera, F. L. (2018), collaborative mobile games represent a flexible approach and provide meaningful learning across various subjects, ages, and even environments.

**Themes diagrammatically represented, as summarized by the researcher:**

**Experiential Learning versus Memorisation**
Learning will move more and more outside of the classroom and into the learners' environments, both real and virtual, thus becoming more situated, personal, collaborative and lifelong (Naismith et al., 2006).

**Mobile learning versus Traditional Delivery Platforms**.

With communication technology, learners can use mobile technology anywhere
and anytime to access educational resources (Ally & Tsinakos, 2014; Hassan et al., 2012; Roberts, 2013).

**Gamification versus Reward & Punishment System.**

Thompson (2011) compiled a report on the usage of technology to create online courses for Mathematics & Science by the Khan Academy - website has software that produces practice problems & rewards good performance with video-game like badges.

**Learner generated Content.**

A group of learners can access content from electronic repositories or create their own content, validate the content, and help each other regardless of location. Learner-generated content can then be used by other learners (Traxler, 2009).

## 2.5. PERFORMANCE IN SOUTH AFRICAN SCHOOLS

According to (Taylor, 2007) "Increasing the production of the national schooling sector has been identified as a national priority in the fight against the twin problems of high and stubborn levels of social inequality, and the braking effect of an acute skills shortage on economic growth". The South African school sector can be characterised as a high cost, high participation, low quality system (Taylor, 2007), (Taylor, 2008) The paper presented in 2008 at JET Conference using statistics from the Southern and Eastern African Consortium for Monitoring Education Quality (Hungi, 2011) that South Africa is outperformed by 8 surrounding countries.

| *Quintile* | *1* | *2* | *3* | *4* | *5* | *Mean* |
|---|---|---|---|---|---|---|
| **Botswana** | 491 | 499 | 510 | 508 | 557 | **513** |
| **Kenya** | 540 | 545 | 555 | 565 | 611 | **563** |
| **Lesotho** | 443 | 448 | 448 | 445 | 452 | **447** |
| **Malawi** | 422 | 427 | 435 | 433 | 447 | **433** |
| **Mauritius** | 519 | 564 | 587 | 620 | 640 | **584** |
| **Mozambique** | 526 | 525 | 531 | 530 | 538 | **530** |
| **Namibia** | 403 | 402 | 411 | 425 | 513 | **431** |
| **Seychelles** | 520 | 541 | 555 | 576 | 579 | **544** |
| **South Africa** | 442 | 445 | 454 | 491 | 597 | **486** |
| **Swaziland** | 506 | 511 | 511 | 513 | 541 | **517** |
| **Tanzania** | 484 | 511 | 529 | 528 | 560 | **522** |
| **Uganda** | 484 | 497 | 498 | 509 | 543 | **506** |
| **Zambia** | 414 | 425 | 436 | 434 | 466 | **435** |
| **Zanzibar** | 478 | 472 | 478 | 479 | 484 | **478** |
| **Mean** | **468** | **480** | **485** | **492** | **560** | **468** |

**Figure 4: Source What's wrong with South African schools (Taylor, 2008)**

According to (Hungi, 2011) and (Taylor, 2008) countries that outperformed South Africa include Mozambique, Kenya, Uganda and Tanzania, are much poorer, with gross domestic products in the order of one-tenth to one-fifth of South Africa's. The comparison looks specifically at Mathematics and Reading. The study summarises that out of the 20% of schools (quintile 5), South Africa is outperformed by Mauritius and Kenya, and in all the other quintiles the South African mean scores fall below those of the SACMEQ all-country means. Learning improvements in key subjects over the years, has not shown significant learning shifts to uplift transfer and improvement in learning capabilities of students resulting in better performance. It then becomes critical to review how the schooling output in South Africa can be improved, as we are not close to developing students that will contribute to the economy.

If the ultimate aim of schooling is a priority in South Africa (Taylor, 2007) as a way to sustain and improve future economy then how disruption eliminates traditional teaching resources needs to be staggered. In SA teacher shortage is not an issue as in the United States.

Soumonni (2013) says that through the division of 'innovative labour' in Africa, combined with community-based strategies will enable the continent to effectively connect the innovation of both the producers and the users that leverage appropriate technology.

## 2.6. DISRUPTIVE INNOVATION IN THE AFRICAN CONTINENT

Key examples of African led innovation in tertiary learning systems include the African Leadership University (ALU). Other tertiary institutions that have included online courses include the University of Cape Town (UCT) and Witwatersrand University that recently introduced Wits Plus. Key elements of the latter include creating greater access for students by having online courses.

African Leadership University (ALU) analysis:

| ***OECD Innovation Category*** | ***ALU Contribution*** | ***OECD Expanded examples*** | ***Possibility of a Match of the definition:*** |
|---|---|---|---|
| ***Product Innovation:*** | New or significantly tech component, material, software | New syllabus, textbook, educational resources | Lecturers across universities – cross sharing of knowledge.<br>Mix and match curriculum – and knowledge share from different universities. |
| ***Marketing Innovation:*** | Significant change in the 6P's | New marketing techniques differential pricing | Promotion - Social media, Public lectures, Twitter. Price – student pays back when employed |
| ***Process Innovation:*** | Significantly improved production/ delivery method | New service delivery example eLearning | Delivery Platform – Online leveraging technology augmented with lecturers.<br>Hybrid – combination of online courses and bricks mortar infrastructure. |
| ***Organisational Innovation:*** | New business practice, workplace organisation | New ways of organising example tech to communicate to parents D6, Class Dojo | Network of tertiary education institutions across 25 African cities.<br>Redesign of a 3 year degree - 8 months in classes, 4 months working for various businesses (over 3 years). |

Source: Researcher compiled using the Definition of OECD (Innovating Education & Educating for Innovation)

### Innovation Hubs/ Incubators

Opportunities to leverage innovation hubs or technical innovation spaces are also an option in understanding customer needs. Areas that can be explored include the Innovation Hub in Pretoria and the Standard Bank Incubator.

### Open Innovation

Open Innovation is "the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation." (Chesbrough, Vanhaverbeke, & West, 2014) fundamental premise: "not all the smart people work for you". By that definition it is important to note that not all technology can be built in-house skills and

technical expertise. Open innovation allows for opportunities to leverage on expertise external to the firm or institution and for knowledge transfer into the south.

## 2.7. THEORETICAL FRAMEWORK

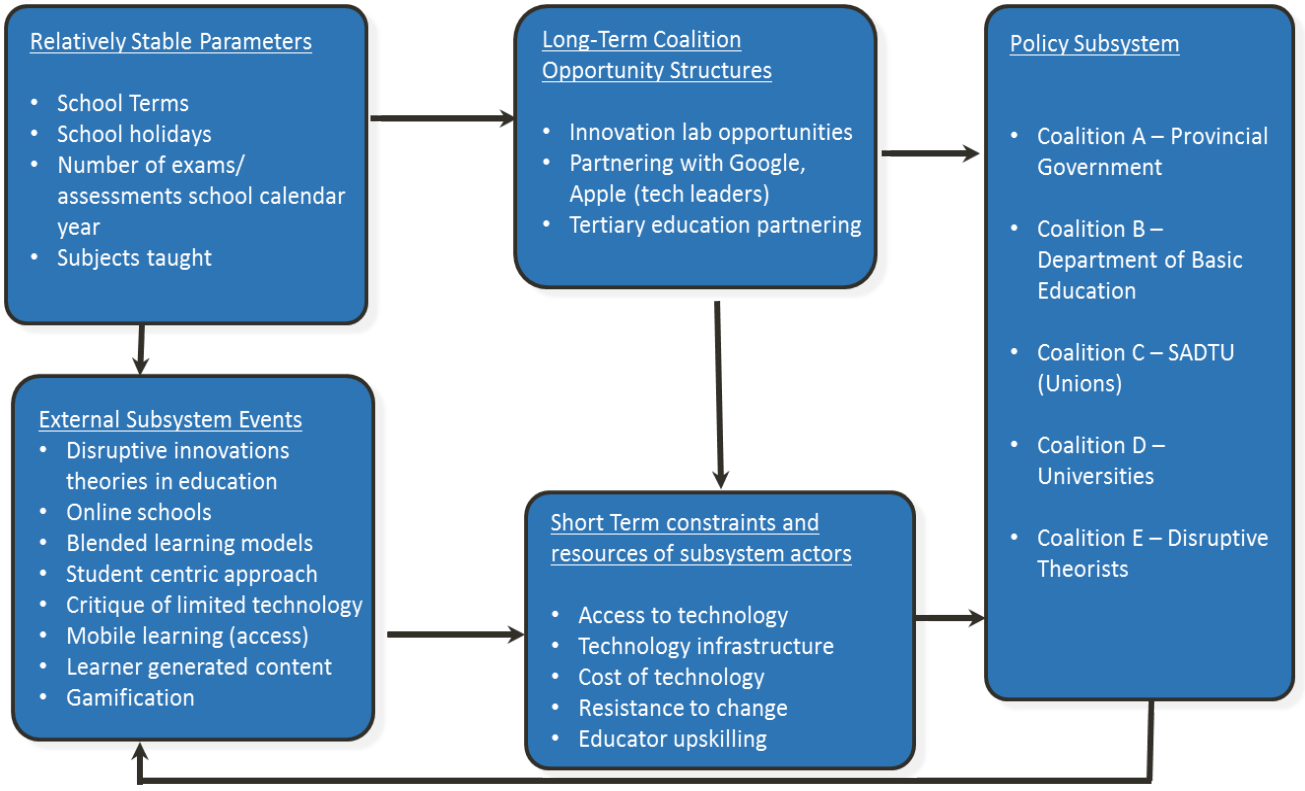
To simplify events and the world around them ACF individuals filter perceptions through their belief system (Lord, Ross and Lepper 1979; Scholz and Pinney 1995) (Weible & Sabatier, 2007).

Key challenges include:

- Challenges in producing the expected learning outcomes in schools.
- Integration of technology in the schooling system (or lack thereof).
- Barriers to entry for disruptive innovation in the South African school system.

The Advocacy Coalition Framework (ACF) is an ideal theoretical framework to understand the various actors in the schooling system. The use of the framework is guided by Weible and Sabatier (2007). The South African political, social and economic contexts are often dominated by actors with often divergent interests. The framework is ideal for analysis of the actors and coalitions especially were contestation exists. It is important to review the different actors and their core, policy and secondary beliefs. The view of the ACF below is based on the literature review thus far and will be revisited once the research has been completed. Based on further literature the ACF has been updated as per below.

**ADVOCACY COALITION FRAMEWORK**



## 2.8. SIGNIFICANCE OF THE STUDY

The literature shows that the education system has been disrupted across secondary and tertiary education. It also shows that the triggers for disruption are affected by enablers and barriers to entry. This research serves to build further knowledge to an existing framework of education theories currently published by Christensen et al. (2008), Martone (2015) and Taylor (2008).

According to Christensen, there are two key enablers required for disruption to occur. Firstly, there must be a technology enabler that makes the innovation available to people previously not served by the industry. Secondly, the business model must change. To be truly disruptive, a new model must be developed. Christensen argues that disruption does not occur if an existing model co-opts an innovation to ensure its own continuation (Christensen et al., 2008).

This study will look at the triggers for disruption in the education sector and whether disruptive innovation can contribute to an approach for improving performance in the South African secondary education sector. The research will assess the enablers and barriers, and create a body of knowledge for application to the South African context. Stakeholders interested in this type of research include public education policy makers, educators, provincial and national government, education theorists and think tanks.

## 2.9. CHAPTER SUMMARY

This chapter presented relevant theory relating to disruptive innovation in the education sector and highlighted disruptive trends in education. These trends included standardised teaching models versus modular approached; intrinsic and extrinsic motivation; limited computer usage in schools, differing views on the disruption in the schooling system, blended learning approaches, mobile learning and gamification in education. Thereafter, the performance in South Africa schools is discussed and reference is made to disruptive innovation in the African continent. This chapter concludes by presenting the theoretical framework and significance of the study after taking all the existing literature into account.

2.1 INTRODUCTION
2.2 DISRUPTIVE INNOVATION
2.3 INNOVATION IN THE EDUCATION SECTOR
2.4 DISRUPTIVE INNOVATION TRENDS
2.4.1. STANDARDISED TEACHING MODEL VERSUS MODULAR APPROACHES
2.4.2. INTRINSIC AND EXTRINSIC MOTIVATION
2.4.3. CRITIQUE OF LIMITED COMPUTER USAGE IN SCHOOLS
2.4.4. DIFFERING VIEWS ON THE DISRUPTION IN THE SCHOOLING SYSTEM
2.4.5. BLENDED LEARNING APPROACHES TESTED
2.4.6. MOBILE LEARNING (m-learning)
2.4.7. GAMIFICATION IN EDUCATION
2.5. PERFORMANCE IN SOUTH AFRICAN SCHOOLS
2.6. DISRUPTIVE INNOVATION IN THE AFRICAN CONTINENT
2.7. THEORETICAL FRAMEWORK
2.8. SIGNIFICANCE OF THE STUDY
2.9 CHAPTER SUMMARY

# 3. CHAPTER THREE: RESEARCH STRATEGY AND METHODOLOGY

## 3.1. INTRODUCTION

The approach of the research proposal will take an interpretivist perspective and the type of research conducted will be qualitative.

According to Christensen, there are two key enablers required for disruption to occur. Firstly, there must be a technology enabler that makes the innovation available to people previously not served by the industry. Secondly, the business model must change. To be truly disruptive, a new model must be developed. Christensen argues that disruption does not occur if an existing model co-opts an innovation to ensure its own continuation (Christensen et al., 2008).

## 3.2. RESEARCH STRATEGY AND DESIGN

### Force Field Analysis

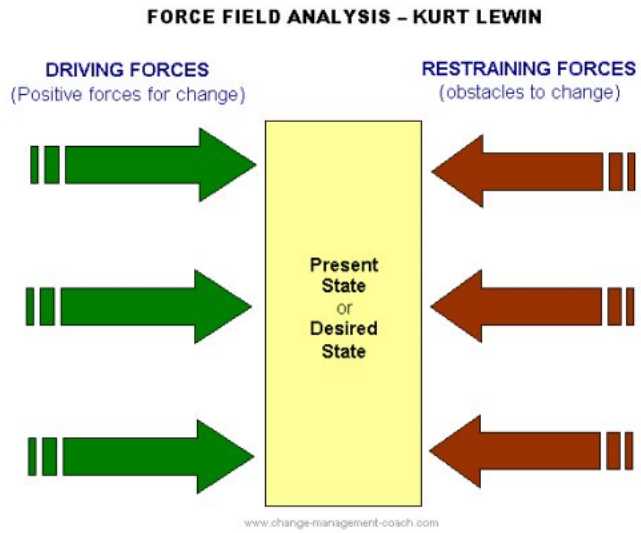



**Figure 6: Kurt Lewin's Force Field Analysis. Source (Lewin, 1945)**

Kurt Lewin views culture as being in a state of equilibrium, "A culture is not a painted picture; it is a living process, composed of countless social interactions. Like a river whose form and velocity are determined by the balance of those forces that tend to make the water flow faster, and the friction that tends to make the water flow more slowly the cultural pattern of a people at a given time is maintained by a balance of counteracting forces (Lewin, 1945). "To bring about any change, the balance between the forces which maintain the social self-regulation at a given level has to be upset" (Lewin, 1945). A Force Field analysis approach would frame problem in schools in terms: of factors or pressures that support the status quo (restraining forces) and those pressures that support change in the desired direction (driving forces).

**Figure 7: Researcher application of Kurt Lewin's Force Field Analysis (pre-data).**

Have **disruptive models** that have **adopted innovative learning systems positively impacted** student performance?

What are the **enablers and barriers to entry** for disruption of SA secondary school education?

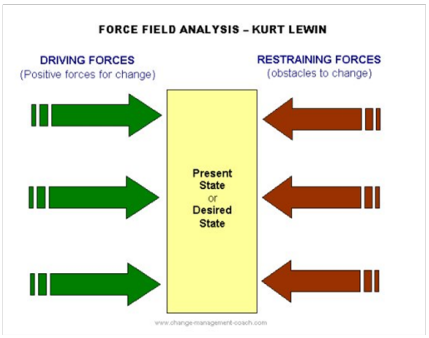
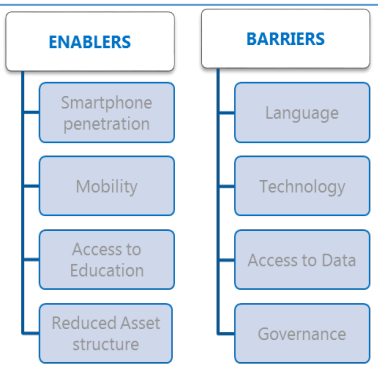



Figure 6: Kurt Lewin's Force Field Analysis. Source (Lewin, 1945)




What are the enablers and barriers to entry?

## 3.3. OBJECTIVES OF THE STUDY:

3.1.1. To understand challenges in student performance in schools relating to the lack of change.
3.1.2. To explore the integration or lack of integration of technology in the schooling system.
3.1.3. To understand the impact on performance in student centric models leveraging the jobs to be done (JTBD) approach.
3.1.4. To understand the linkages of disruptive innovation in the South African school system.
3.1.5. To provide recommendations regarding opportunities and enablers for the South African school system.

## 3.4. SIGNIFICANCE OF THE STUDY:

The literature shows that the education system has been disrupted across secondary and tertiary education. It also shows that the triggers for disruption are affected by enablers and barriers to entry. This research serves to build further knowledge to an existing framework of education theories currently published by Christensen et al. (2008), Martone (2015) and Taylor (2008).

According to Christensen, there are two key enablers required for disruption to occur. Firstly, there must be a technology enabler that makes the innovation available to people previously not served by the industry. Secondly, the business model must change. To be truly disruptive, a new model must be developed. Christensen argues that disruption does not occur if an existing model co-opts an innovation to ensure its own continuation (Christensen et al., 2008).

This study will look at the triggers for disruption in the education sector and whether disruptive innovation can contribute to an approach for improving performance in the South African secondary education sector. The research will assess the enablers and barriers, and create a body of knowledge for application to the South African context. Stakeholders interested in this type of research include public education policy makers, educators, provincial and national government, education theorists and think tanks.

## 3.5. RESEARCH QUESTION

3.1.6. **Primary question:** To explore disruptive innovation models in education and the impact to schooling in South Africa?

3.1.6.1. **Sub-question 1:** Have disruptive models that have adopted innovative learning systems positively impacted student performance?

3.1.6.2. **Sub-question 2:** What are the enablers and barriers to entry for disruption of SA school education?

## 3.6. RESEARCH METHODOLOGY

### 3.6.1 DIAGRAMMATIC REPRESENTATION

**Theoretical Research Design Framework as proposed by researcher**

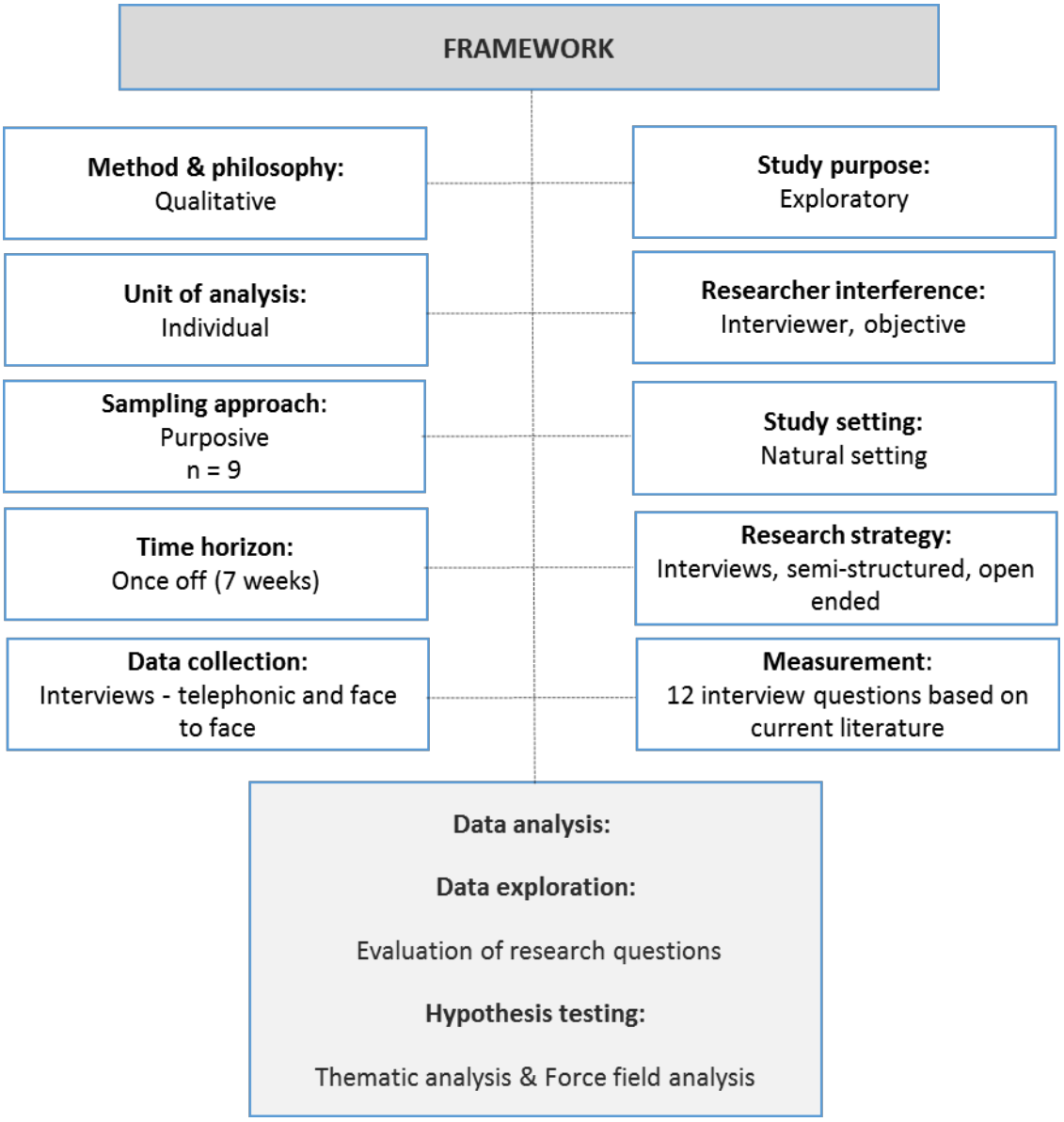



**Figure 8: Framework adapted from Sekaran and Bougie (2013) by Researcher**

### 3.1.7. INTERVIEW QUESTIONS FOR DATA COLLECTION
**(Appendix - Survey Instrument & Consent form)**

## 3.7. DATA ANALYSIS

Analysis will cover content analysis and thematic analysis and adopts a systematic analysis of themes based on findings. To prevent any traceability of respondent details, coding has been applied to ensure that all details (identifiers) are removed and the data is presented in Chapter four.

## 3.8. CHAPTER SUMMARY

This chapter presented the research strategy and design related to the topic. It also included the research objectives and significance of the study. The key research questions are posed and the method that will be used to attain the relevant data. The method is also diagrammatically shown for clarity and understanding.

3.1 INTRODUCTION
3.2 RESEARCH STRATEGY AND DESIGN
3.3 OBJECTIVES OF THE STUDY
3.4 SIGNIFICANCE OF THE STUDY
3.5 RESEARCH QUESTION
3.6 RESEARCH METHODOLOGY
3.6.1 DIAGRAMMATIC REPRESENTATION
3.7 DATA ANALYSIS
3.8 CHAPTER SUMMARY

# 4. CHAPTER FOUR: PRESENTATION OF FINDINGS AND DATA

## 4.1. PARTICIPANTS BACKGROUND

### 4.1.1 Sample Size

| Sample description | Category of respondents | No of respondents |
|---|---|---|
| PRINCIPALS | | |
| Public schools | Principal<br>Retired Inspector/ Principal | 1<br>1 |
| Private schools | Principal, Co-founder | 1 |
| Parent | High school parent | 1 |
| EDUCATION/ TECHNOLOGY SPECIALISTS | | |
| Education Technology companies & Start-up accelerators | Founders, CEO's | 2 |
| Early Child Development | Early child development practitioner | 1 |
| Higher Education | Content provider, Enablement<br>Talent director | 1<br>1 |
| **Total** | | **9** |

### 4.1.2 Description of participants

| Code | Role | Current/ Previous | Institution | Country | Public/ Private | Background/ Education Tenure |
|---|---|---|---|---|---|---|
| **1** | Principal & Co-founder | Current | High School | SA, Gauteng | Private | High school principal. Education tenure 14 years. Current – involved in daily running of the school and management decisions. |
| **2** | Chief Business Development | Previous | Previously Future Learn, Current Accelerator for start-ups, Mentor | USA, SA Gauteng | Private | Education technology. SBG & board member in schools. Start-up Accelerator. |
| **3** | High School Principal | Current | High School | SA, Gauteng | Public | Education tenure at secondary schools 36 years. |
| **4** | Head Enablement | Current | Khan Academy (India) | USA Co. in India | Private | Previously Pearson Content manager. |
| **5** | Talent Director | Current | Pearson | SA, Cape Town | | 8 years exposure to education. 4, 5 years in education – tertiary. |
| **6** | Founder, Design Lead | Current | Early Childhood Development (ECD) | SA, Cape Town | Private | Founder company involved in early creative intervention, improving entrepreneurship and mini business in townships, Lecturer. |
| **7** | CEO | Current | Future Learn | USA Co. in SA | Private Business | CEO 6 years – Education Technology company. Management consultant 6-year, Engineering background |
| **8** | Parent | Current | n/a | SA | Public school | High school parent. |
| **9** | Retired inspector/ Principal | Retired, Previous | High school & DBE | | Public | Education tenure 40 years. Across teaching, Head of department, acting deputy/ principal. Inspector of schools 3 years. Main stream education 14 years. Special needs 19 years. |

**THEMES**

## 4.2. JOBS TO BE DONE

### 4.3.1 Interview Question One

How does the **lack of technological progress** in school models affect student performance and what are the **limiting factors**?

| Rank | Sub-Theme | Participant Code | Frequency |
|---|---|---|---|
| **1** | Schools suffer from lack of funding & poor facilities | P1, P2, P3, P8, P9 | **5** |
| 2 | Teachers not equipped or resisting change | P3, P7, P9 | 3 |
| 3 | Unions preventing change | P3, P2, | 2 |
| 3 | Class numbers too large | P1, P3, | 2 |
| 4 | Matric - 40% to 30% pass rate | P5 | 1 |
| 4 | Apartheid and lack of multiculturalism | P8, | 1 |

**Quotations**

**The follow quotes highlight the experiences of principals:**

*"The lack of change in our school models means that while society is embracing modern technology and seeing stars emerge from YouTube and Instagram etc., our learners are not being given the opportunity to learn in different ways or to discover new things that they might be good at". (P1)*

*"1 in 25,000 made a change and it is publicised. There is no significant change but in pockets". (P3)*

*"A lack of expertise in the decision-making echelons of the education system. Many schools suffer from poor funding, poor facilities and a shortage of skilled educators". (P1)*

*"Current school models do not cater for students from different ethnic and social backgrounds, the effects of the apartheid regime will take a much longer span to fully make up for the past inequalities. Although the support factors of this stems from the general quality of life in surrounding communities". (P8)*

**The follow quotes highlight the experiences of other education/ technology specialists:**

*"Students are not taught to learn but take information – regurgitate and send it back. It's like in manufacturing / old school thinking. Our lives are dynamic and school content is very static". (P2)*

*"Teachers have unions – put pressure on people not to change viz. bringing technology in will replace teachers". (P2)*

*"Kids are spending a lot of time mastering skills (good handwriting) and nurturing temperaments ("heads down, pencils up, no questions") that will have no relevance over the span of their lives". The bulk of the skills and temperaments they do need are being relegated to adulthood and the real-life school of hard knocks". (P4)*

***"**Pupils entering tertiary don't have competencies and mostly due to the decrease from 40% to 30% in pass rate standards. This has long term ramifications". (P5)*

*"Limiting factors, I find are that teachers are trained to do what they are told – they are implicitly uncomfortable with taking action on their own. It takes a lot of support to enable teachers to act like entrepreneurs and create change in their classrooms". (P6)*

*"Teachers spend more time worrying about marks, discipline instead of teaching". (P2)*

### 4.3.2 Interview Question Two

Can you describe any important **factors to overcome** this **lack of technological progress and limiting factors** experienced?

| Rank | Sub-Theme | Participant Code | Frequency |
|---|---|---|---|
| **1** | Upskill teachers (or with business knowledge) | P1, P2, P9 | **3** |
| 2 | Start with policy, curriculum and government control | P2, P5 | 2 |
| 2 | Deconstruct the learning model, leverage technology | P2, P7, | 2 |
| 2 | Link content to real world situations | P2, P7 | 2 |
| 3 | Classes with = max 25 learners | P1, | 1 |
| 3 | Gamification of content | P2, | 1 |
| 3 | Supporting factors of the student – social environment, community and parents | P8, | 1 |
| 3 | Government to focus on high school versus tertiary | P5, | 1 |

**Quotations**

**The follow quotes highlight the experiences of principals:**

*"There should no longer be any classrooms with more than 25 learners per educator; more schools must be built to accommodate our learners". (P1)*

*"The focus should be on producing learners who excel in Literacy and Mathematics (for a start) with a view to having the school system specifically aimed at producing learners who are ready and suitably qualified to excel in further education at universities". (P1)*

*"Lack of finance – government needs to look at it. Unions becoming difficult. I strongly believe teachers need support however unions hinder any changes". (P3)*

*"Students, especially from primary school level need to be nurtured into understanding the importance of a solid education base; this is the job of the parent". (P8)*

***"**Before implementing a new model, the educators as well as school management need to be trained via workshops, seminars etc. or else it will result in failure. The educators need to be dedicated and have faith in new model being implemented". (P9)*

**The follow quotes highlight the experiences of other education/ technology specialists:**

*"If you start with policy, curriculum and government control. The way students learn should be left to the teachers. Not carte blanche". (P2)*

*"Keeping children entertained and engaged – gamification. User experience – excited to learn, job reinvest, key learning executed". (P2)*

*"The kind of people that work in education – especially in leadership positions - are often unimaginative, narrow-horizon and not amenable to change. Change these mind-sets and you'll see change". (P4)*

*"The challenge is the weak foundation not the tertiary sector. Schools example in Limpopo have no textbooks. The local government is not ordering textbooks, children are entering exams without having seen a textbook". (P5)*

*"Greater emphasis needs to be placed on high school tuition. The new commercial model should be free tuition or subsided tuition. Not because of teacher incompetence but to get the methodology followed through". (P5)*

*They should also leverage technology example Finland taught teachers technology. Highly qualified teachers – business people – professionalise – left to teach how they want. They use levers to pull in sections of society. Technology introduces good quality teachers". (P2)*

### 4.3.3 Interview Question Three

What is the main **job to be done by teachers and students** and what **role** do you believe **parents** should play?

| Rank | Sub-Theme | Participant Code | Frequency |
|---|---|---|---|
| **1** | Parents – nurturing, understand changes, connect with child, emotional support, happiness | P1, P2, P8, P5, P9 | **5** |
| **2** | Teacher to be a facilitator, guide, coach | P2, P5, P7, | **3** |
| **2** | Students learning by fun, tap into expertise outside their classrooms | P2, P4, P6, | **3** |
| **2** | Students desire to learn, apathy, attitudinal shift | P1, P5, P8 | **3** |
| 3 | Parents – link to real life activities, content theory to practical | P2, P4 | 2 |
| 4 | Parents – pay school fees & show up | P6, | 1 |
| 4 | Teachers – nurturing, encourage, challenge, inspire | P1 | 1 |
| 4 | Teachers – design activities for problem solving | P6, | 1 |
| 4 | Teachers to embrace cultural differences in teaching | P8, | 1 |
| 4 | Teachers to impart knowledge in a manner that students will be able to understand | P9 | 1 |

**Quotations**

**The follow quotes highlight the experiences of principals:**

*"The main job to be done by teachers is to educate learners to the best of their ability, at the same time providing a nurturing and caring environment that encourages, challenges and inspires learners to learn". (P1)*

*"Students must have a desire to learn, they must commit to learning and they must be prepared to work as hard as possible to achieve success". (P1)*

*"Student's responsibility to follow the path and not hinder their own progress or progress of others". (P3)*

*"Parents must firstly support the learner, their child. Emotional and physical support is highly important". (P1)*

*"Teachers also need to respect and their students and worry about their whole development. Parents should be supportive to their children and be supportive to the teachers. Dedication and respect is needed on all sides". (P9)*

**The follow quotes highlight the experiences of other education/ technology specialists:**

*"A lot of students come to school with emotional baggage – parents are disengaged, lack emotional support, abuse, issues – the children are so exhausted by what's happening at home – too exhausted to learn". (P2)*

*"Parents need to learn how to build relationships - be involved, - reinforce concepts @ home, and connect with the child. If students get emotional support they will be able to learn. (P2)*

*"Parents – children in school are learning theory but do not get to practice, parents can bridge the gap of learning in a real world". (P2)*

*"Students, tap into expertise outside their classrooms, to identify their passions (and keep trying to identify them till they succeed). (P4)*

*"Teachers should invite participation by designing activities that welcome children to problem solve – they need to destroy all their photocopies colouring in activities and replace them with draw/build/create your own activities. Teachers need to let go of their obsession with the final product and be ok with a sheep that looks like it came out of a nuclear explosion (but the child struggled through it and crated something of their own that is unique)". (P6)*

### 4.3.4 Interview Question Four

Can you describe what **limits the job to be done** by teachers and students and can you describe ways in which **parents do not support** the schooling of their children?

| Rank | Sub-Theme | Participant Code | Frequency |
|---|---|---|---|
| **1** | Access to basic (pens, textbooks, toilets, funding) | P1, P3, P5, P6, P8, P9 | **6** |
| **1** | Lack of parent support (time, issues, training, abuse, transport) | P1, P3, P6, P7, P8, P9 | **6** |
| 2 | Number of learners in a classroom | P1, P3, P9 | 3 |
| 2 | Rich versus poor (parent's financial circumstances) | P3, P5, P9 | 3 |
| 3 | Various degrees of learning methodology across 9 provinces | P1, P5, | 2 |
| 3 | Teacher has mundane tasks or lack of access – that technology can change | P4, P7 | 2 |
| 4 | Children demotivated, emotional baggage | P2, | 1 |
| 4 | Content too theoretical | P2, | 1 |
| 4 | Teachers not equipped | P6 | 1 |

**Quotations**

**The follow quotes highlight the experiences of principals:**

*"The number of learners to educators limits the work that can be done in a classroom. There are also numerous schools which do not have sufficient classrooms, where learners do not have access to teaching/ learning materials like text books or even pens and pencils". (P1)*

*"In the past parents would support teachers and endorse the decisions made by teachers in the classroom". (P1)*

*"Some parents just do not have the funds to support their children. In many cases the children are living with their grand- parents as their parents are working far away in towns. The grand -parents face this difficulty and they may not be educated and how then can they support the children". (P9)*

*"Parents are also working full time jobs, by necessity, so have no time to support their children at school events or assist with schoolwork at home". (P1)*

*“Parents often do not come to the party. When behavioural issues come up instead of supporting they look for excuses as to why the child is the way they are. This doesn’t help the process. Time and energy is spent on these things. Teachers spend time on other things instead of teaching”. (P3)*

“*Parent’s not assisting or gaining guidance in assisting their children with academic work. Parents not ensuring their children have the necessary means to attend school, for example, transportation, school attire, stationery and sustenance”. (P8)*

**The follow quotes highlight the experiences of other education/ technology specialists:**

*“Children become demotivated, bored, don’t know how to relate to the real world. And carry a lot of emotional baggage from home”. (P2)*

## 4.3. STAKEHOLDER THEORY

### 4.4.1 Interview Question Five

How can the teaching fraternity leverage off **partnering with universities** and **are teachers motivated** to try **new models** of teaching & testing?

**Themes**

| Rank | Sub-Theme | Participant Code | Frequency |
|---|---|---|---|
| **1** | University knowledge & expertise beneficial | P1, P2, P4, P7, P9 | **5** |
| **2** | Teachers are motivated and trying new ways | P1, P2, P7, P8 | **4** |
| **3** | Finance, technology, resources - too much poverty in SA | P3, P7, P5 | **3** |
| 4 | Pupil teacher ratio disparity – limits new models | P3, P5, | 2 |
| 4 | Great resistance to a different way | P3, P9 | 2 |
| 4 | Cramming new learning / mentoring / partnership activities into teacher's day impossible | P4, P8 | 2 |
| 5 | New technology such as videos and interactive systems such as white boards used | P1, | 1 |

**Quotations**

**The follow quotes highlight the experiences of principals:**

*"Partnering with universities would ensure that learners are educated by a process that has a definite end-goal in mind". (P1)*

*"Teachers (and schools) with the necessary means are using new methods such as videos and interactive systems such as white boards so that the learners can immerse themselves in learning material". (P1)*

*"Our curriculum is also so full- so seldom we can expose student to outside information". (P3)*

*"I am very keen on the new model of reverse classroom. Reverse model – but with the teacher pupil number ratio it won't work. It might work in Norway – where you have 2 teachers to 13 kids but what happens in schools with high numbers". (P3)*

*"Inherently, yes teachers are motivated especially the newly graduated teachers – excited about trying new things" (P2)*

**The follow quotes highlight the experiences of other education/ technology specialists:**

*"It can be achieved with some creative mix of savvy scheduling, motivational messaging, training and rewards and recognition for progress". (P4)*

*"Many teachers do not like change and may show reluctance to employing new models to teach and test". (P9)*

### 4.4.2 Interview Question Six

What **prevents the teaching fraternity** from leveraging off knowledge sharing by universities and would **teachers** be **motivated** to try to new ways if they were **measured differently**?

| Rank | Sub-Theme | Participant Code | Frequency |
|---|---|---|---|
| **1** | Provincial disparity – infrastructure, beliefs, technology - local/ national exposure | P5, P7, P8 | **3** |
| **1** | Teaching fraternity should leverage for skills – literacy, numeracy | P2, P4, P9 | **3** |
| **1** | Teacher's motivated by insight & new methods | P1, P3, P7 | **3** |
| 2 | Teachers motivated by pay, psychological support | P6, P9 | 2 |
| 2 | Teachers – other types of rewards | P7, P4 | 2 |
| 3 | Costs, transportation, time – for visits | P3, | 1 |
| 3 | Parent support, pupil behaviour – for visits | P3, | 1 |

**Quotations**

**The follow quotes highlight the experiences of principals:**

*"At the moment there is no forum that actively allows for the interaction between universities and secondary education educators". (P1)*

**"***Teachers are always seeking new ways of teaching and doing things in the classroom to best engage and educate their learners". (P1)*

*"Time factor and you need finance to take people to universities". (P3)*

*'In the majority of SA – most schools in South Africa – the morale is low, mostly due to pupil behaviour, lack of parent support, management and political instability". (P3)*

*"I also don't think teachers are motivated by the stick. Example IQMS – a measure for teachers is more of a stick than encouragement. Carrot vs stick (if my teachers see a reason that it is good for the student, then they want to do it). (P3)*

**The follow quotes highlight the experiences of other education/ technology specialists:**

*"We are not smart on how to learn. If a student does enough class papers and goes through concepts learnt in school – parrot style, a person can do well in school and then when required to work independently in university, fail". (P2)*

*"The education industry does not have clear cut goals. Measurement is on the matric pass rate only and now the intention is to provide free education". (P5)*

### 4.4.3 Interview Question Seven

Are the **technology platforms** being used in South African schools **contributing to teaching**?

| Rank | Sub-Theme | Participant Code | Frequency |
|---|---|---|---|
| **1** | If technology is available - it contributes | P1, P2, P7, P8, | **4** |
| 2 | Creates disparity for less advantaged children | P6, P8, | 2 |
| 3 | Access is available mostly for internet - public and private | P2, | 1 |
| 3 | Works well - Administration in public school's example SA SAMS, dashboards, GDE – Online admissions | P3, | 1 |
| 3 | Technology in the classroom – textbooks is not tech | P3, | 1 |
| 3 | Support the learning process can work example videos | P7, | 1 |
| 3 | Technology platforms need to be designed for SA conditions | P9, | 1 |

**Quotations**

**The follow quotes highlight the experiences of principals:**

*"Yes. The technology platforms being used are contributing effectively to teaching, where the technology is available". (P1)*

*"In public schools for administration yes, there are some flaws in the admin system but heading in the right direction example. SA SAMS, dashboards, GDE – Online admissions. In the classroom, so much confusion and far too many options. (P3)*

*"Textbook in a tablet - disappoints me when people look at that and say that they are using technology. There is free education out there – Google Education is free. The thinking is that if you pay for something then its better. It's wrong". (P3)*

*"Technology products designed and sold by people that have never worked in schools and don't appreciate the pain points of the practitioners". (P9)*

*"Yes, they are. Only issue is that this may adversely affect children from less fortunate backgrounds that do not have access to these technology platforms, if required at home". (P8)*

**The follow quotes highlight the experiences of other education/ technology specialists:**

*"A lot of private schools we support (ex-Future Learning) use our system. At least 50% use iPads, electronic and printing products. Access is not the problem; the use is the problem". (P2)*

*"Measurement is on the matric pass rate only and now the intention is to provide free education. Not clear goals". (P5)*

*"Devices are being used but the Wi-Fi issue is a joke in South Africa. In other countries, there is free Wi-Fi". (P5)*

*"Don't be ridiculous these teachers have no access to ANY smart tech in they barely have enough data to go online and find a play dough recipe" (early childhood development). (P6)*

*"These technology platforms need to be designed locally to suit SA conditions. We are a multi-cultural society – different languages, values, customs etc. All these need to be taken into consideration". (P9)*

### 4.4.4 Interview Question Eight

What is **limiting** the **use of technology** for education purposes in South Africa?

| Rank | Sub-Theme | Participant Code | Frequency |
|---|---|---|---|
| **1** | Household income levels in SA (money, cost) | P1, P3, P4, P6, P7, P8, | **6** |
| **2** | High data costs in SA | P1, P5, P6, P8, | **4** |
| **2** | Infrastructure in rural schools (plus Wi-Fi) | P3, P5, P8, P9, | **4** |
| 3 | Many schools cannot afford to use or access technology | P1, P8, P9, | 3 |
| 4 | Technology understanding the pain points – integration | P2, P4 | 2 |
| 4 | Dependency on government (implementation) | P1, P7, | 2 |
| 5 | Lack of buy in from teachers - due to failed examples | P7 | 1 |
| 5 | Access not a problem, usage is | P2, | 1 |

**Quotations**

**The follow quotes highlight the experiences of principals:**
*"Socio-political and economic thing. In our school we have many parents that pay and many parents that get subsidised. So, there is internet at school and then the parents don't have internet at home". (P3)*

*"The access to the technology is the biggest stumbling block since many schools cannot afford to use or access the technology". (P1)*

**The follow quotes highlight the experiences of other education/ technology specialists:**

*"Future Learn has looked at building an integrated learning system that provided guidance, content and expert intervention activities. For projects you can read stuff, build spreadsheets, activities. People wanting it want it in one place". (P2)*

*"Wi-Fi – data issues – 1-week access costs R100 in South Africa schools for example in the USA or India it can cost R20 per week. The government can come in and provide tablets but with surging data prices, how will that help". (P5)*

*"Teachers are not equipped with the correct infrastructure. Some teachers are also very old school. We had some teachers visit us with chalkboards. They not well equipped to teach/ take pupils through a full digital lesson". (P5)*

*"Schools need a platform. Then there's textbooks, random, nothing talks to one another. 1 Subject on its own - not integrated the way technology users need it. Very disjointed". (P2)*

*"ECD is not yet formalised or compulsory in South Africa the role out of tech to them is therefore not even part of any strategic educational plan. Some teachers have smart phones but they often don't have data because they can't always afford it. This limits how much they can access the internet and all the useful info it had for them. It's really quite sad if you think about it". (P6)*

## 4.4. DISRUPTION

### 4.5.1 Interview Question Nine

How can teaching/ testing methods in schooling be impacted by **changes in innovation** and will **online/ mobile methods** influence the performance of students?

| Rank | Sub-Theme | Participant Code | Frequency |
|---|---|---|---|
| **1** | Teaching methods will change, improve understanding, interest, expand knowledge base | P5, P7, P8, | **3** |
| **1** | Will improve performance (offline or online) | P2, P3, P5, | **3** |
| 2 | Streamline marking, immediate feedback process | P1, P3 | 2 |
| 2 | Assessment method catered per learner | P1, P2 | 2 |
| 3 | Online/ Mobile will not greatly impact performance | P1, | 1 |
| 3 | Tech collects information, provides insight | P2, | 1 |
| 3 | Technology solves for teacher absenteeism (online example Khan Academy) | P4, | 1 |
| 3 | Teaching/ testing should not be cumbersome | P9, | 1 |

**Quotations**

**The follow quotes highlight the experiences of principals:**

*"Disruption will definitely change teaching and testing methods. Taking in of tests – and marking – children are not getting immediate feedback. When a 3-year-old is walking towards a plug – can you take the child aside 1 hour later and talk to them or do you run to them to sort out. Test in that way. Immediate feedback and know where the pupil went wrong". (P3)*

*"Online / mobile methods will not greatly influence the performance of students, in my opinion. It will however assist in streamlining the marking and assessment process". (P1)*

*"The use of technology as a means of assessment will enable teachers to cater assessment methods to each learner more specifically without the need for uniform assessment for all learners". (P1)*

*"Type on tablets and then write matric exams – a problem. This needs to change first. Immediate teaching must match the assessment at the end of matric". (P3)*

**The follow quotes highlight the experiences of other education/ technology specialists:**

*"Technology has the ability to augment the teaching. In technology you can input information – identify areas that the student is struggling with – schools are using things like Top Dog – Adaptive learning. Collects information and gives you foresight". (P2)*

*"How I learn a concept is different from yours. We learn differently. However, in schools they get branded as failures, even though they just didn't learn the way the textbook says". (P2)*

*"Whether online or offline doesn't matter. Mobile is the difference. We spend more time interfacing with technology. If you reach people where they are on their phones – probably reach more people" (P2)*

*"Classes in some countries can be stuffed with 60+ kids at a time, and teachers may attend to 2-3 classes simultaneously (worst case) when teacher absenteeism soars. Technology will be able to provide personalized learning at scale in such circumstances. At Khan Academy, we have more than anecdotal evidence globally that points to student outcome gains from this". (P4)*

*"The current generation will identify with new technologies and be more interested in using these rather than the teaching methods used from 20 years back. These new innovations could improve student results by increasing interest in a specific subject". (P8)*

### 4.5.2 Interview Question Ten

Can you think of **key issues** faced when introducing **new teaching/ testing methods** and what **issues** could arise from **online/ mobile platforms** in schools?

| Rank | Sub-Theme | Participant Code | Frequency |
|---|---|---|---|
| **1** | Electricity failures, technology issues, infrastructure downtime | P1, P2, P3, P4, P9 | **5** |
| **1** | Teacher training, adoption, resistance to change | P1, P2, P4, P7, P9 | **5** |
| 2 | Cyber security/ blocking unsavoury websites, cyber bullying | P1, P2, P8 | 3 |
| 2 | Sharing electronic content, cheating, copying | P1, P2, P4 | 3 |
| 3 | Distraction, media, games | P5, P8, | 2 |
| 3 | Lack of data, high costs, access to internet at home | P6, P8, | 2 |
| 4 | Matric assessment must be digital as well | P3 | 1 |
| 4 | Changes on lesson plans, timetables | P4, | 1 |

**Quotations**

**The follow quotes highlight the experiences of principals:**

*"The biggest drawback – electricity supply. Example Eskom lets us down – but if test is on paper – can carry on doing that test". (P3)*

*"The devices may not be charged or may need electricity, which may be an issue if there is a power outage or continued loss of access to electricity". (P1)*

*"The online world is filled with unsavoury websites so access to these needs to be blocked. Security of the information and protection of the learners is paramount". (P1)*

*"There may be issues with plagiarism or copying of work since reproduction of work is much easier in the online / mobile platform". (P1)*

*"Mobile devices such as cell phones come equipped with cameras and social media platforms". (P1)*

*"Phases of immediate feedback – really an advantage". (P3)*

**The follow quotes highlight the experiences of other education/ technology specialists:**

*"Regulatory framework and rigidity - told how to teach and everyone must teach this way". (P2)*

*“Concern is that pupils will not be fully invested in the lesson - when on the phone and the learning delivery is impacted. Mobile learning is the way to go. Mobile might improve accessibility. Transport costs are high and therefore mobile might be more accessible. Mobile apps and online submissions”. (P5)*

*“Lack of data!” (P6)*

*“Fixed mind sets, especially from older school managers and teachers”. (P4)*

*“A need to do drastic surgery on logistical aspects of schools (Lesson plans, timetables)”. (P4)*

### 4.5.3 Interview Question Eleven

Will **access to education** via **mobile/ online** contribute to school performance and could **innovation impact student and teacher motivation**?

| Rank | Sub-Theme | Participant Code | Frequency |
|---|---|---|---|
| **1** | Positively contribute to performance – if done right | P1, P2, P3, P4, P7, P8, P9, | **7** |
| **2** | Students motivation - driven by interest, videos, excited, gamification, access to subjects online | P1, P2, P5, P7, P8, P9 | **6** |
| **3** | Teachers motivation – renewed interest, immediate feedback, , monitor performance, games in maths, evidence collated by Khan Academy | P1, P3, P4, P5, P8 | **5** |
| 4 | Reinforce concepts taught, extend beyond classroom | P1, P5 | 2 |

**Quotations**

**The follow quotes highlight the experiences of principals:**

*"Motivation can be enhanced by this innovation since learners may develop an interest due additional videos they have seen or articles they have read. Teachers may develop renewed enthusiasm for subjects they have been teaching for years and perhaps have become bored with". (P1)*

*"If children buy into it – if a child doesn't use it – then wasted. From an immediate feedback it will impact teacher motivation". (P3)*

*"We should remember that the age group of the children and primary and secondary level still required guidance with respect to the vastness of the internet. Mobile or online platforms need to be administered and monitored by teachers and parents alike". (P8)*

*"Yes mobile/online education can contribute to school performance if implemented correctly. TRAINING before implementation is MOST important. Especially students will be thrilled to handle computers etc." (P9)*

**The follow quotes highlight the experiences of other education/ technology specialists:**

*"Yes, the impact is – motivation – will make people excited, positive experience, make sure right access though so not accessing other information". (P2)*

*"Yes, if done right – school performance". (P4)*

*Hell yes! Please read the comments under any Khan Academy YouTube video for evidence - student and teacher motivation". (P4)*

*"A different facilitated way will have a positive effect. Specific module courses – desired medium could yield the right results. It could enhance learning beyond the classroom". (P5)*

*"It could positively impact student motivation. Teacher motivation – the teacher is then encouraged to actively look for other ways, example games in maths in the classroom". (P5)*

### 4.5.4 Interview Question Twelve

What are the **limiting factors** in school performance **that access to education might not solve for** and not result in improving **student and teacher motivation**?

| Rank | Sub-Theme | Participant Code | Frequency |
|---|---|---|---|
| **1** | Infrastructure, funding, electricity, water | P5, P7, P8, P9, | **4** |
| **2** | Lack of parent buy-in - parent doesn't want to buy data, emotional baggage | P2, P3, P7, | **3** |
| 3 | Politics, unions, private education | P2, P8, | 2 |
| 3 | Discourage learners - no academic ability or learning difficulties | P1, P7, | 2 |
| 4 | Demotivated learners – ability of teacher limited | P1, | 1 |
| 4 | High number of learners per class | P1, | 1 |
| 4 | Downfall of pushing buttons the whole day | P3, | 1 |
| 4 | Private school fees are unnecessarily high | P2, | 1 |
| 4 | War between DBE and Private Sector | P2, | 1 |
| 4 | Soft skills – self management etc. | P4, | 1 |
| 4 | Social environment | P7, | 1 |

**Quotations**

**The follow quotes highlight the experiences of principals:**

*"We are going to find out the long-term detriment of things – example when we were younger people used the walking ring. Now they find that there is a correlation between the necessity of crawling and depth perception. So, there are downfalls/ pitfalls example children growing up pushing buttons on cell phones and tablets that we are going to see later". (P3)*

*"Parent doesn't want to buy data". (P3)*

*"Integrated learning thinking. Teach them how to use technology – Access doesn't solve for it all". (P2)*

*"Some learners do not have the academic ability to excel at school, whether they like it or not. The system does not cater for all. These learners may dislike school as a result and hinder their motivation to continue learning". (P1)*

*"More than 25 learners in a classroom means that the teacher cannot get to every learner so learners may therefore get 'lost' in the system, a highly demotivating occurrence". (P1)*

**The follow quotes highlight the experiences of other education/ technology specialists:**

*"Students have to deal with stuff at home and life – emotional baggage spoke of earlier". (P2)*

"*Politics, union's policy and private education – people and proving access" (P2)*

*"War between Department of Education and the Private sector (ADvTECH, Curro, PSG Stable, Educare). There is a big war between business and government because business proved they can do it and the government wants to control. (P2)*

*"Private school fees are unnecessarily high – big war – politics behind education – at the end children are not learning". (P2)*

*"Schools don't have access to – electricity, water, feeding schemes" (P5)*

*"Beyond accessibility – infrastructure. Some schools don't even have a library or even a computer lab. Device/ data – can't afford basic amenities in schools. Maslow's hierarchy of needs". (P5)*

*"If you're asking what problems will access to an education not solve: The soft skills are harder to teach formally – Managing yourself, managing other people, creating and following a personal moral compass. If you're asking me what areas of a school performing well will not result in student / teacher motivation: Probably the behind the scenes stuff like planning and logistics? (P4)*

*"Integrated learning thinking. Teach them how to use technology – Access doesn't solve for it all". (P2)*

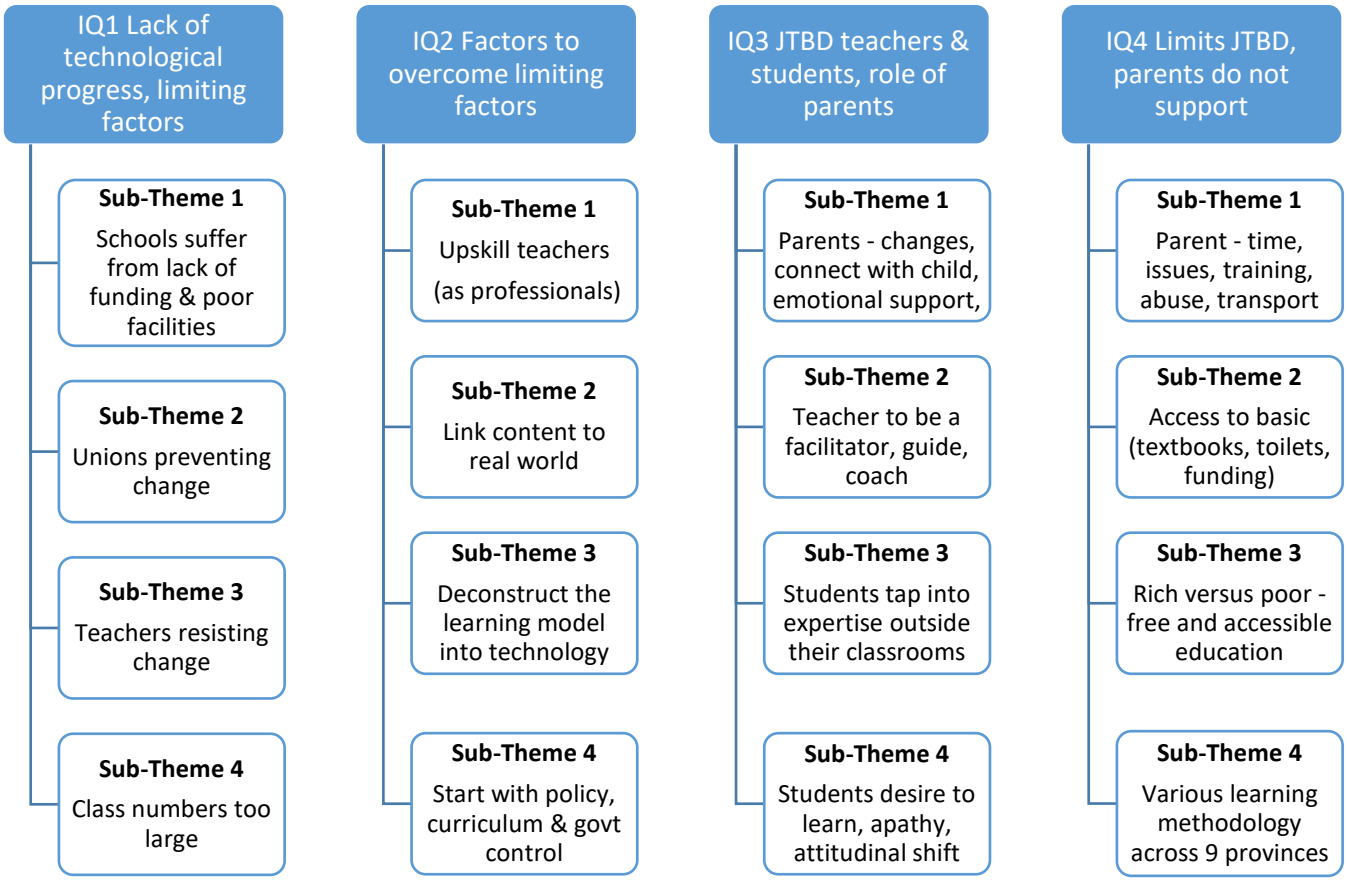
# 5. CHAPTER FIVE: DISCUSSION OF THE RESEARCH FINDINGS

## 5.1. INTRODUCTION

Qualitative research was conducted to facilitate the gathering of more knowledge to answer the research question and sub-questions.

## 5.2. THEMES EXTRACTED FROM DATA ANALYSIS

### 5.2.1 JOBS TO BE DONE THEMES




### 5.2.2 ANALYSIS OF THE JOB TO BE DONE SUB-THEMES

#### 5.1.1.1. Limiting factors for change in school models

The above analysis highlights the extent to which limiting factors like school infrastructure and basic needs are criteria for success in school performance in the current school model.

This infrastructure includes textbooks, buildings, and water and electricity requirements. It also highlights the level of inconsistency across provinces including the level of socio-economic factors that come into play. According Orhan-Karsak, H. G. (2017), to adapt to competition, we must change the education system.

Considering the scale at which changes need to occur in secondary schooling in South Africa (viz to impact the current landscape of buildings and mortar, it would mean an enormous level of funding and implementation across schools and across provinces to improve the situation with the current infrastructure. In the current economic climate of South Africa can this be accomplished at a large scale and the massive cost and time lag? According to Hanushek, E. A. (2013), developing countries have been less successful in closing the gaps than the performance of developed countries.

According to a study by Hamlin, C. R. (2017), the goal of schools is greater than graduating to from high school – it is now important for students to attain college and/or career readiness and can contribute to the United States' globalized economy (Kern, 2011).

Income levels and socio-economic inequality are also highlighted as factors influencing parental roles and responsibilities and ultimately student performance. Irrespective of the curriculum, pedagogy, culture, socio-economic status, or any other factors influencing the classroom, technology is recommended to be used as a tool to reach an outcome, not as a gimmick or to fill quotas (Willis et al., 2018).

The role of the parent is a critical enabler that can result in a child's success in their schooling or alternatively the lack of parental support becomes a barrier to school performance. There are challenges in the parental ability to pay for school transport, school fees and data, considering the income disparity. Issues of poverty, abusive relationships and disruption in the home results in emotional baggage and lack of concentration during school time. The learner takes this emotional baggage and social issues to school with them and the teacher, in a classroom of 40-45 children, is unable to assist. According to Zaid, A., & El Din, S. (2017), the socioeconomic difference, poorly designed policies and limiting customs are the largest reasons for inequity in the Egypt.

Unions are preventing change in school models mostly due to their concern around perceived job losses resulting from change. Teachers are also resistant to change resulting in lower adoption levels and resistance. This resistance is also driven from the changes that have been implemented previously and resulted in failures. As seen research, by Lieux, M. L. (2018). a teacher's knowledge, beliefs, and attitudes toward teaching and student learning will have an impact on the resulting teaching.

Teachers are reluctant to buy-in to the process as it is also seen as a political game. A few changes are made and then publicised when the change in public schools occurs in pockets only and is not as significant. The skill of the teacher is also seen as a limiting factor as it is heavily relied upon in the current school model. The study by Solomon, K. (2018) shows a very positive relationship between the stage of adoption and the teacher's perceptions of ability to use technology to facilitate student learning.
Students are traditionally taught to take information and regurgitate it back and to master handwriting skills. The shift should be to teach students how to learn and cope in preparation for university courses and life as a working adult.

#### 5.1.1.2. Enablers promoting change in school models

- Upskilling of teachers into professional business experts – knowledge sharing for learners of a world they will enter eventually.
- Upskilling of teachers to cope with the emotional demands placed on them.
- Assist teachers with technology changes, training etc.

- Content to be linked to the real world in terms of scenarios and examples.
- Breakdown the learning path (syllabus) and leverage technology to teach and assess in a module specific method.
- Build more schools to be able to reduce the number of students per class.
- Use gamification for students to engage in syllabus content (will drive self-learning).
- Emphasis to be placed on supporting secondary education, free tuition or subsidised tuition for high school learners.
- According to Winters, J. E. (2017), students enrolled in secondary schools are found to be more comfortable with technology than the people before them, and can take advantage of online learning opportunities.

#### 5.1.1.3. The Job To Be Done (JBTD) by the parent:

- Learn how to build a good relationship with your child.
- Maintain a connection between parent and child.
- Support by bridging theory learnt in school with practical job scenarios or experience that the parent holds.
- Parent must be willing to pay for school transport, school fees, school attire and stationery.
- The parent must support their child physically and emotionally.
- The parent must recognise why a good strong educational foundation is important.

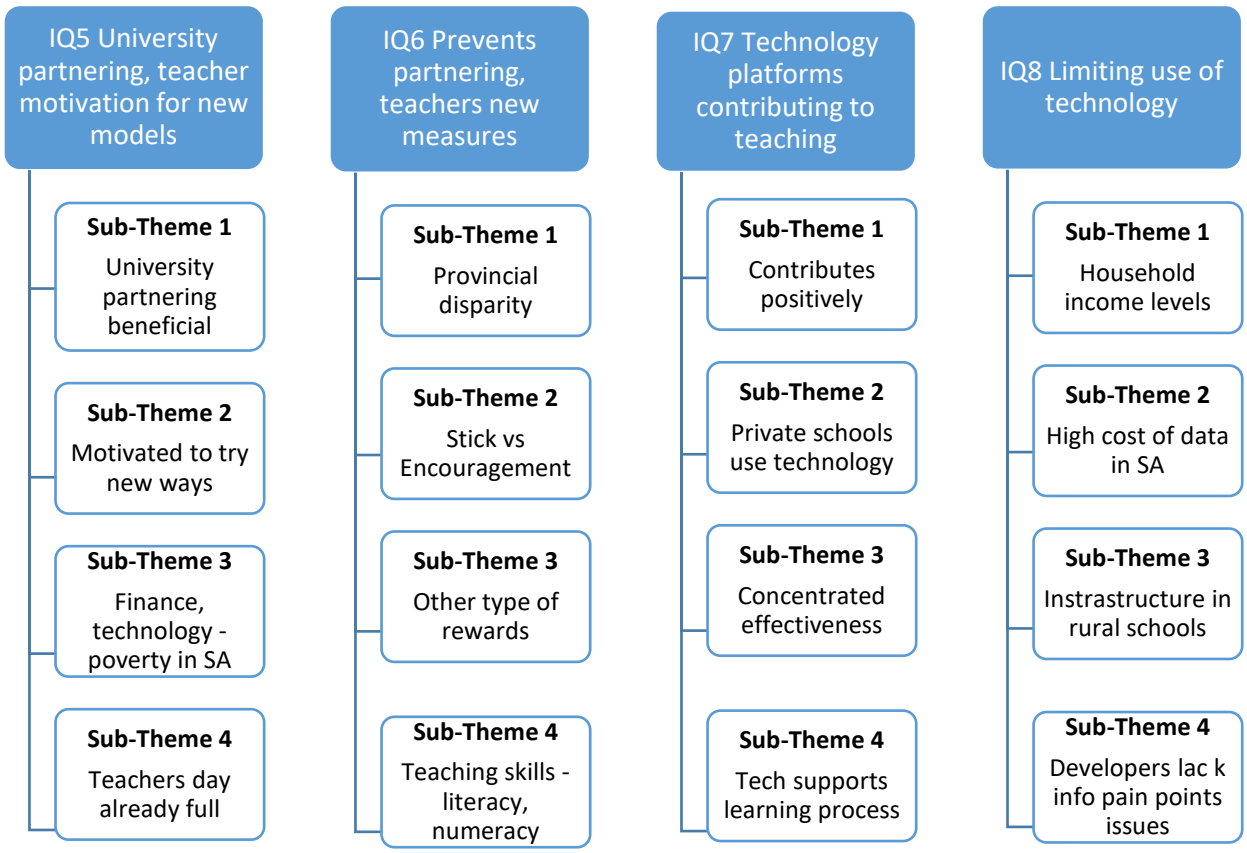
#### 5.1.1.4. The Job To Be Done (JBTD) by the teacher:

- The teacher should be a guide or facilitator as opposed to being relied upon to pass information.
- The teacher's job is to be nurturing, encouraging, inspire and challenge learners.
- The teacher should be open to change and want to upskill themselves.
- The teacher must teach the child how to learn.

#### 5.1.1.5. The Job To Be Done (JBTD) by the student:

- Students must have the willingness and desire to learn.
- Follow the path of the learning and not hinder their own progress or that of other learners.
- Take up the opportunity to learn in different ways or to discover new things.

### 5.2.3 STAKEHOLDER THEORY THEMES




### 5.2.4 ANALYSIS OF THE STAKEHOLDER THEORY SUB-THEMES

#### 5.1.1.6. Leverage off partnering and the impact to motivation from new models

Generally partnering with other knowledge bases or institutions of learning is beneficial. There are some partnering with universities in some schools but very limited and the frequency is low. Partnering mostly occurs in the matric year of the learner and the recommendation is that it should commence from grade eight onwards. The study by Yeigh, T., & Lynch, D. (2017) describes how partnerships between schools, universities and other education providers can be conceived and describes the outcome as the development of practical skills and assists in transferring knowledge.

Partnering will enable:

- Teachers and students to have a goal in mind for future academic paths.
- Enables learning across facilities that schools currently do not have access to.
- Teachers in public schools have access to funding and therefore are using new methods that utilise interactive systems example smart boards, videos.

- Motivation for teachers in public schools to try new models of teaching/ testing could be achieved with being more creative with scheduling, motivational messages and a different rewards or recognition process.

Lack of finance, access to technology and resources in a country that experiences high levels of poverty and disparity in income levels, are highlighted as key limitations to testing new models. The teacher's day is also already full in terms of marks, discipline measures to fit in exploring what the university could offer.

The concept of the reverse classroom is being tried by a few innovative teachers in public schools, without the full permission of the department of education in the US, or the principal in some cases (Tucker, 2012). The concept of reverse classroom relies heavily on student preparation before the lesson (Abdulkhakimova, 2018). Considering the high number of learners per class, utilising a reverse classroom model could be challenging in the South African context.

There are also concerns regarding resistance to change the school model which generally hinders proposed changes. This resistance is due to experiences of "failed change" and having lost hope that changes can succeed, resulting in a lack of buy-in by older teachers. Newly graduated teachers are generally enthusiastic and want to embrace and try out the change.

#### 5.1.1.7. Limitations to partnering and new measurements

Provincial disparity exists in many forms and results in many negative outcomes in education, namely lack of infrastructure, different belief systems, lack of access to technology and disparity in local and national views.

This results in schools not having the time and money to pay for costs associated with visiting and leveraging higher learning institutions.

There is a belief that teachers are motivated by insight and not by the stick, and by providing insight and information to the change, this will result in better buy-in. This talks to aspects of the stick versus reward versus insight/ information. Insight as to why the change is happening and how it will benefit learners creates buy-in from dedicated teachers. Rewards can also take the form of an afternoon off, a recognition award by peers or bragging rights for the teacher of the month.

#### 5.1.1.8. Technology as an enabler

Most participants believe that technology contributes to school performance however access to technology is the greater issue. The other concern is the lack of adoption of the respective technology. According to Mabuan, R. A., & Ebron Jr, G. P. (2018), integrating MOOCs via blended learning could work positively for student outcomes and reduce costs (Griffiths, 2014 in Israel, 2015).

Affordability across students from different economic backgrounds creates disparity between learners. It is acknowledged that we need to upskill our learners and provide exposure to external learning content.

Private schools are predominately users of technology solutions and companies like Future Learn play in this space. The items mostly use are iPads, electronic and printing products.

Public schools advise that the technology being used to manage the administration in schools, although with some issues, works overall - example SA SAMS, Dashboards, GDE-admissions online. Technology in the classroom, namely to replace textbooks, is

not seen as enhancing the education teaching process. The question is then raised that if Google Education is free why are public schools not tapping into this opportunity to the extent that it can be leveraged for content, videos, lesson plans etc.?

#### 5.1.1.9. Limitations on technology

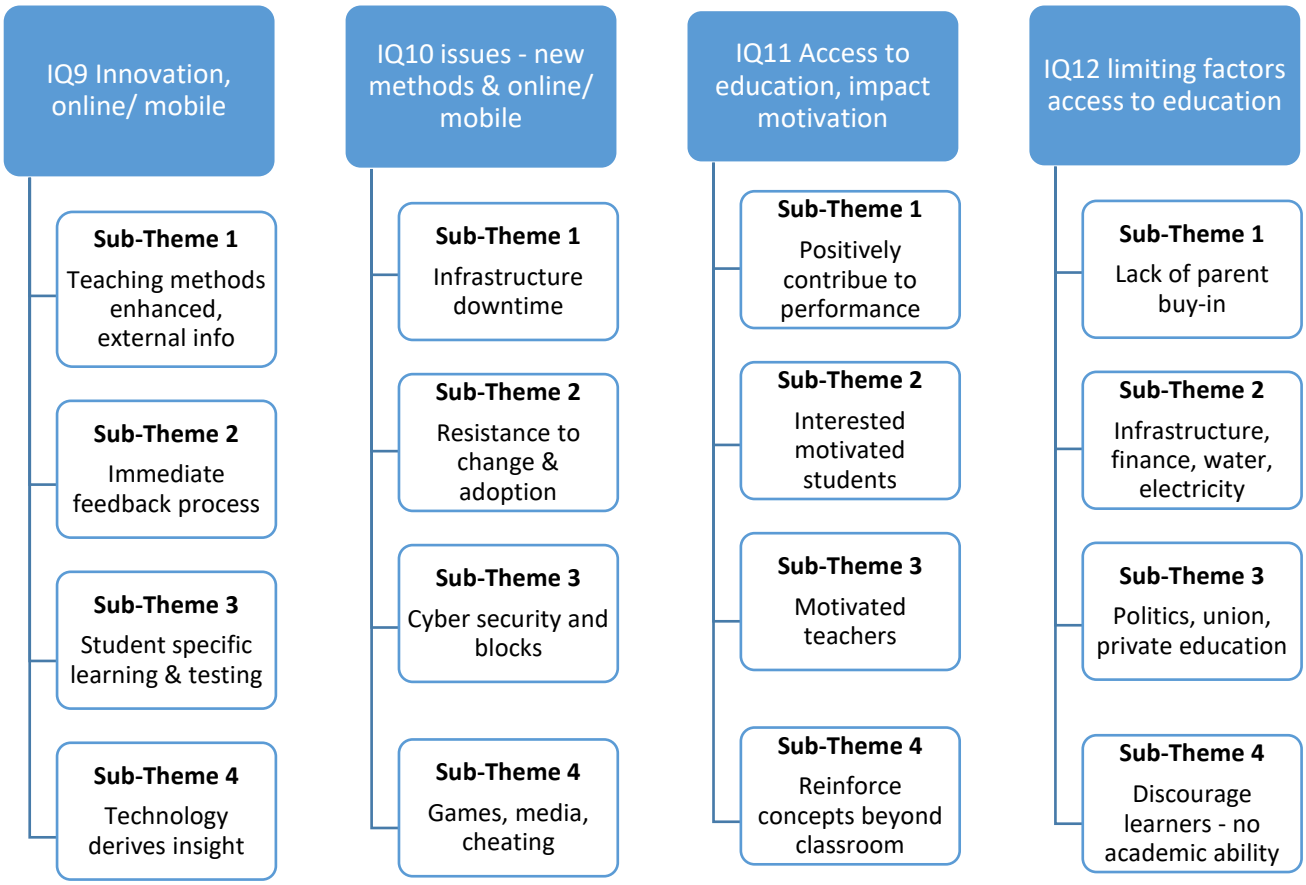
There is a concern that the adoption of technology is hindered by the fact that the technology is created by people that have not been exposed to the pain points of the teacher and the student, so designs are flawed and need a bit of work. Use and adoption of technology is mostly experienced by private schools as finance is not necessarily a hindrance. Future Learn for example, that deals mostly with private schools created an integrated system of tests, projects, sheets, information content in one place to create an ecosystem.

For public schools, access, use and adoption are limitations. The cost of data is another major hindrance. At school, learners have access to data but at home it generally is not the same situation. Especially if parents are unable to support the financial cost of buying data.

According to a study by Uy, J. M. (2017), the are various factors that affect the success rate of 1:1 device initiatives. A high dependence on the is on teacher's effective usage of the tools provided to them in the classroom; and the student understanding of how 1:1 devices can truly enhance their learning capabilities.

Low household income levels don't allow for the use of technology at home. In public schools were school fees are subsidised by the government, buying data for access to the internet for homework is a big blocker. This is mostly due to the high cost of data in South Africa.

### 5.2.5 DISRUPTIVE INNOVATION THEMES




### 5.2.6 ANALYSIS OF THE DISRUPTIVE INNOVATION SUB-THEMES

#### 5.1.1.10. Changes in innovation and Online/ Mobile impact to performance

By innovating teaching methods are enhanced through external connections to online knowledge bases resulting in greater insight and interest for the student and the teacher. There is also a view that performance will improve (regardless of whether offline or online) if it is mobile. The marking process will become streamlined and less administrative. The learner gets the benefit of immediate feedback to correct mistakes timeously and instead of repeating it. Reilly, A. J. (2017), supports and commences to explain the statistics and theory behind Christensen et al (2018) prediction that by 2019 50% of high schools will be online.

Teaching can become much more learning style specific, considering that each person learns concepts differently. Generally, differences are regarded as failures in the currently school model especially if the learner cannot adapt to the way the material is taught. Learning styles differ and this can be catered for by leveraging the right technology. Multiple studies have shown promising results when observing students

utilizing technology within the classroom. A study conducted by Gerger (2014) stated that the level of engagement of students coupled with the initiative to accomplish educational tasks had increased within the classes that utilized technology Jankovski, C., & Schofield, D. (2017).

Assessments can also become learner specific dependent on the level the learner is on and slowly shift away from the application of uniform assessments for all learners. Technology also allows for more specific feedback as technology collects information and foresight. The flipped classroom concept, as discussed by Carrier, M. (2017), states that if a school was planning to use the concept, it is advised to implement the program slowly.

Through this process it can pinpoint that a student that is doing bad in calculus is having an issue with algebra resulting in a bad mark in calculus. Technology can augment the teaching, learner can input information and in the background analysis can identify areas that the student is struggling with.

Mostly private schools are using things like Top Dog (Adaptive learning). It collects information and gives you foresight. In countries or cities with a lot of teacher absenteeism, it allows for the lesson to continue example usage of the online Khan Academy content.

The analysis also shows that if online is implemented and does not include Grade 12 then learners will be disadvantaged as they need to physically write matric exams after typing for many years. So, rollout needs to be across the life stage/ grade of the student continuum.

#### 5.1.1.11. Key challenges in introducing Online/ Mobile for teaching/ testing methods in schools

Infrastructure downtime could be one of the biggest hindrances in the case of online/ mobile. Electricity power supplies (Eskom load shedding), performance of infrastructure systems to minimise technology disruptions of the platform and in school access to the platform.

Resistance to change will need to be addressed by dealing the softer issues of change management and using ambassadors to support the change and provincial implementations. Buy-in from teachers and principals is an important aspect for successful adoption.

Cyber security to protect learners in a digital world is of high importance. There are many unsavoury websites in the online world and these must be blocked to ensure that learners are unable to access them. In addition, people that prey on children must not be able to have access to school platforms. Cyber bulling is a concern and will need to be monitored. According to research done by Sener, J. (2017), student competitions eg. cybersecurity competitions conducted as virtual events, can create an ecosystem of educational opportunities for the student.

The cost of data is an issue in South Africa. Better management of data costs will result in greater adoption. Learners might have internet access at school, however access at home for homework might not be possible due to high costs. Learners might become distracted by exposure to external content that is not school related example games and social media platforms. The ability to copy electronic content might result in a higher number of incidents of plagiarism or cheating. Transport costs to school are high but online submissions would be harder to control to prevent cheating.

Rigid frameworks on how schools need to teach and how learners should be taught will need to be revised. Content and syllabi will need to be revisited.

#### 5.1.1.12. Access to education using Online/ Mobile and impact of innovation on teacher and student motivation

Most of the participants believe that access to mobile or online will positively contribute to school performance, especially if it done right. Innovation Ohio (2011) reported that 90% of student attended cyber charter schools in order to gain knowledge.

Many also believe that student motivation will increase as it creates more interest example watching video formatted learning content. Online digital content creates an opportunity for gamification of syllabi (introducing games, levels, scores etc.) and this will create excitement while learning. Students will be fully immersed in the learning process but because the content relates to them will be more willing to engage.

Teacher motivation is equally seen as being positively impacted as well. Teachers may develop a renewed interest in subjects that they have been teaching for years and might have become bored with. They will enjoy the automated marking (less manual) and see benefit in immediate feedback. According to Perry, W., Danhausen, T., & Johnson, C. (2017), blended learning needs to consider intrinsic and extrinsic student motivation, tech literacy, basic literacy, organizational skills.

Ultimately it is believed that innovation could have a positive effect and enhance learning beyond the classroom. Keeping in mind that children still need to be guided when on the internet. Platforms need to be administered and monitored by teachers and parents alike. Users of Khan Academy YouTube videos have comments or feedback on the impact of learning through videos. It indicates that the student and teacher motivation is positively impacted.

#### 5.1.1.13. Factors that access to education will not solve for and will not impact teacher and student motivation

Lack of parent buy-in is one of the issues noted. More particularly lack of parent support by not wanting to purchase data. Emotional support is a key element of a child's performance at school. Access to technology cannot be given in isolation and it's important to teach learners and teachers how to use the technology.

Lack of infrastructure was raised again where basic amenities are important to have in the current school model. It was also raised that some schools don't even have a library. Lack of finance, electricity and water as basic things that are needed for success. The research by Zaid, A., & El Din, S. (2017) shows that the problems are "much bigger than to be solved by technology" alone. For a success - changing the "one size fits all" approach, political will, institutional readiness, and pedagogical development are important contributors.

There was also a concern raised that children with learning difficulties might be discouraged, the reason was not provided. The learning style of children differ and the current school model predominately uses only one type of learning style. Private school fees are also seen as unnecessarily high.

# 6. CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

## 6.1. INTRODUCTION

Three key themes derived from the literature review were used to design the qualitative interview research questions. These three major themes are Jobs to Be Done, Stakeholder Theory and Disruptive Innovation.

The sub-themes and responses to the field research are presented in Chapter Four and synthesis provided in Chapter Five.

In this chapter (six), the dominant themes and sub-themes extracted from the field research are discussed in more detail, as well as reflected graphically. Recommendations are made as well as possible solutions to the real-life problem being experienced in South Africa.

## 6.2. SIGNIFICANCE OF THE STUDY:

The literature shows that the education system has been disrupted across secondary and tertiary education. It also shows that the triggers for disruption are affected by enablers and barriers. This research serves to build further knowledge to an existing framework of education theories currently published by Christensen et al. (2008), Martone (2015) and Taylor (2008).

According to Christensen, there are two key enablers are required for disruption to occur. Firstly, there must be a technology enabler that makes the innovation available to people previously not served by the industry. Secondly, the business model must change. To be truly disruptive, a new model must be developed. Christensen argues that disruption does not occur if an existing model co-opts an innovation to ensure its own continuation (Christensen et al., 2008).

This study will look at the triggers for disruption in the education sector and whether disruptive innovation can contribute to an approach for improving performance in the South African secondary education sector. The research will assess the enablers and barriers, and create a body of knowledge for application to the South African context. Stakeholders interested in this type of research include public education policy makers, educators, provincial and national government, education theorists and think tanks.

## 6.3. RESEARCH STRATEGY AND DESIGN

The Force Field analysis helps us frame the problem. By reviewing the factors or pressures that support the status quo (restraining forces) and reviewing those pressures that support change in the desired direction (driving forces) we can extract the barriers and enablers. These are discussed in detail later.

### Force Field Analysis

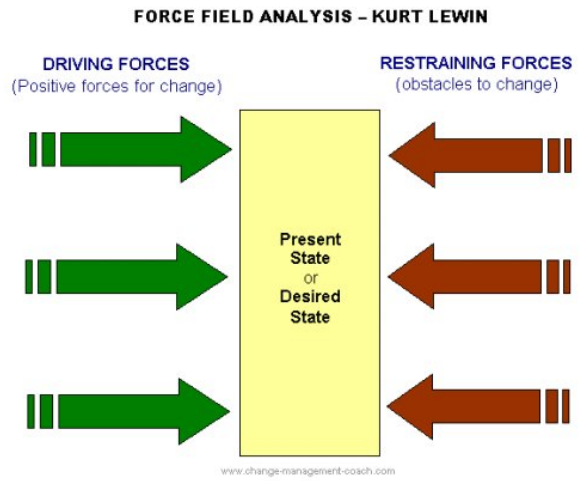



**Figure 6: Kurt Lewin's Force Field Analysis. Source (Lewin, 1945)**

## 6.4. CONCLUSIONS OF THE STUDY

The primary research question was to explore how disruptive innovation models in education and the impact to schooling in South Africa. The first sub-question sought to understand whether disruptive models based on innovative learning systems positively impacted student performance. The first set of research objectives were developed to assist in answering this sub-question.

The first research objective sought to understand challenges in student performance in schools relating to the lack of technological progress. It was found that there is a lack of technological progress, and limiting factors identified were schools suffer from lack of funding and poor facilities, unions and teachers prevent and resist change, and class numbers are too large.

The second research objective sought to explore the integration or lack of integration of technology in the schooling system. It was found that to overcome integration the factors are to upskill teachers to become more professional, link content to real world applications, deconstruct the learning model into technology. It is also critical to review policies, curriculum and government control that are holding back technological integration initiatives in the schooling system.

The third research objective sought to understand the impact on performance in student centric models leveraging the jobs to be done (JTBD) approach. It was found that the driving forces as part of the force field analysis were parents being able to connect and emotionally support their children; teachers acting as facilitators, guides and coaches; students being able to tap into expertise outside their classrooms; and students having a desire and attitude to learn.

It was found that the restraining forces as part of the force field analysis were parents facing issues such as time-constraints, abuse and transport; students having access to basic resources such as textbooks, toilets and funding; the disparity between the level of education

amongst the rich and poor students; and having a major discrepancy in service delivery due to logistics and funding amongst the 9 provinces.

The fourth research objective sought to understand the linkages of disruptive innovation in the South African school system. The first set of linkages that were analysed using the force field approach related to partnering with stakeholders. It was found that the driving forces were universities being motivated to partner with schools to benefit in trying new ways and financing the use of technology in impoverished schools. Universities could also assist in alleviating the heavy workload on teachers to promote new technological innovations. The restraining forces found were the provincial disparities in terms of financial and logistical support to schools, the lack of encouragement and motivation for teachers, not having other types of rewards, and the deficiencies in teaching skills regarding literacy and numeracy.

The second set of linkages that were analysed using the force field approach related to the use of technology platforms. It was found that the driving forces were the positive contribution of new technologies, private schools being early adopters of technology in a concentrated capacity, and the additional support that new technologies bring to the learning process. The restraining forces found were low average household income levels impacting affordability, high data costs in SA, poor infrastructure in rural school, and educational software developer's lack of info on pain points issues.

The second sub-question sought to determine the enablers and barriers to entry for disruption of SA school education. The final research objective sought to answer this sub-question by exploring the opportunities and enablers for disruptive innovation models in the South African school system. The first set of triggers for disruptive innovation that were analysed using the force field approach related to online/mobile innovations. It was found that the driving forces were technologically enhanced teaching methods using external information, having an immediate feedback process catered for student specific learning and testing, and deriving insight using technology to analyse all sources of data collected. The restraining forces found were infrastructure downtimes (e.g. maintenance), resistance to change and adoption, cyber-security issues and attacks, and unintended uses of the innovative technology through gaming, media or cheating.

The second set of triggers for disruptive innovation that were analysed using the force field approach related to access to education. It was found that the driving forces were positive contributions to educator performance, creating new interests among motivated students and teachers, and reinforcing concepts beyond the classroom. The restraining forces found were the lack of parent buy-in, poor infrastructure and access to finance, access being suppressed due to politics, unions and private education, and discouraging learners who aren't inclined to using technology.

## 6.5. SUMMARY AND RECOMMENDATIONS

The research indicates that basic infrastructure like stationery, textbooks, water and electricity and toilets are lacking, and are limiting factors in school performance. Income levels and socioeconomic inequality are also highlighted in public schools. The ability of the parent to be able to afford the necessary items for schooling like stationery, uniform and pay for transport becomes a struggle. Lack of internet access at home already puts the learner on the back-foot when trying to complete homework.

The role of the parent, including the relationship with the child can either positively or negatively impact the school performance of the learner. The parental role has a strong link to the learner's performance. Programmes to equip parents should be devised and rolled out. The role of the parent in the life of the learner needs to have a renewed focus. Parents need to be provided

with insight to understand the relationship that a solid educational foundation has with setting up a child for longer term success.

There is a very strong consensus that innovation (and if technology works as it should) will positively contribute to school performance. It will also increase student motivation as it will create more interest as well as excitement as students learn by watching videos and through media. The ability to access external content will reinforce concepts beyond the classroom. Teachers that have lost interest might see value in new models of teaching and benefits of assessments and marking (with immediate feedback) for students could have a positive spinoff. Technology could also provide insight into student performance. Modules can be taught at the pace of the learner and tested accordingly. Concerns around the downtime of technology platforms, high costs of data and distraction of the learner by being online needs to be managed. The data industry needs to be managed and costs kept minimal or subsidised to provide access to education.

Teachers will need to see the benefit as well as have insight to the changes in school models to buy-in. New methods for reward and recognition needs to be introduced (examples provided in chapter 5). Teachers will need to be taught how to coach and facilitate learners instead of being the bearer of the knowledge.

The research shows that differences between private and public schools exist that are linked to finance/ funding and creates a massive divide between the school propositions being offered. The private school sector, with the advantage of access to funding, can provide much more advanced usage of technology. The basic issues of amenities (which seems to be the biggest hindrance in public schooling) does not come up. Private schools can explore alternative methods of education, partnering with fraternities and technologies like Future Learn and Top Dog.

Private schools still encounter somewhat similar issues of student motivation and teacher buy-in. These might be addressed via change measures and implementation rather than being a systemic problem though and therefore possibly easier to solve for. Parent buy-in involves both an issue around affordability as well as relationship building with children. Ultimately you cannot change the mind-set of learners if the support and buy-in of the parent and affordability is not solved for. The dependencies between the two are great and there needs to be cohesive policies in place to address the two in parallel while creating opportunity for low cost access to education technology platforms.

Further exploration into public and private sector differences would be needed to understand both models and how to leverage off what might be working. An alternative is to explore low cost access to educational digital platforms (online or mobile). Regulating data costs at an industry level might address the inequalities sooner and create a significant shift in education access.

Provincial disparity in service delivery to schools is another massive problem in South Africa. Here again there no quick fixes and massive rollouts are required. How do we solve for these massive issues in the short to medium term? There is a lot of focus on tertiary education and school fees but the call for subsidised tuition or free tuition for secondary school learners needs to be addressed.

Considering the benefits that technology can bring in the form of innovation, namely improving the interest of the learner, engagement driven from gamification of syllabi, and the positive impact to teacher motivation, we should be looking at creating an education technology platform that is accessible to low income learners. According to Bressler, D. M., Oltman, J., & Vallera, F. L. (2018), game-based learning (GBL) can show benefit in class, outside of class and even off-site.

Although access is not deemed to be the only critical need, policies to support the other concerns can be developed and monitored as explained below. This might remove the basic amenities infrastructure issues that are harder to solve for.

### 6.5.1 DESIRED STATE

The solution then is to design for syllabi that introduces external online content (already existing in massive forms in the likes of Khan Academy etc.), technology that enables foresight into root cause of learning issues and self-helps the learner to progress to the next level. We need to breakdown the learning path (syllabus) and leverage technology to teach and assess module specific dependent on the level a learner is on.

This platform must have the ability to utilise videos and media to teach and test a module at a time. The capability to use games or levels (rewards) - gamification to encourage students to engage with content willingly. It must also block out access to unsavoury websites as well as have the capability to block and prevent electronic cheating.

This platform needs to be able to be accessed in a mobile form that allows for learners that do not have computers or iPads are able to access at all schools across provinces or at home. The cost of access must be minimal and needs to be subsidised and industry data costs regulated for educational purposes.

From the current body of teachers, it means that their role changes to become facilitators and coaches and focus on the many social issues that South African learners are facing. The teacher can get exposed to content of the syllabi to the extent that they need to facilitate. However, the key role of the teacher is to provide the critical guidance required to grow healthy students with healthy minds, building social skills and moral integrity.

Teachers need to be upskilled and assisted with technology changes, training etc. to support and facilitate the learner. Emphasis needs to be placed on supporting secondary education, free tuition or subsidised tuition for high school learners. Policies and programmes focused on equipping parents with the right skills to support and connect with their children needs to be budgeted for. Rollout needs to be supported and measured.

### 6.5.2 JOB TO BE DONE BY THE PARENT

6.5.2.1 Learn how to build a good relationship with their child.

6.5.2.2 Maintain a connection between parent and child

6.5.2.3 Support by bridging theory learnt in school with practical job scenarios or experience that the parent holds.

6.5.2.4 Parent must be willing to pay for school transport, school fees, school attire and stationery.

6.5.2.5 The parent must support the child physically and emotionally.

6.5.2.6 The parent must recognise that a good strong educational foundation is important.

### 6.5.3 JOB TO BE DONE BY THE STUDENT

6.5.3.1 Students must have the willingness and desire to learn.

6.5.3.2 Follow the path of the learning and not hinder their own progress or that of other learners.

6.5.3.3 Take up the opportunity to learn in different ways or to discover new things.

### 6.5.4 JOB TO BE DONE BY THE TEACHER

6.5.4.1 The teacher should be a guide or facilitator as opposed to being relied upon to pass information.

6.5.4.2 The teacher's job is to be nurturing, encouraging, inspire and challenge learners.

6.5.4.3 The teacher should be open to change and want to upskill themselves.

6.5.4.4 The teacher must teach the child how to learn.

### 6.5.5 RECOMMENDED POLICY IMPLEMENTATIONS TO SUPPORT THE DESIRED STATE

6.5.5.1 Regulate industry data costs for educational purposes.

6.5.5.2 Subsidised or free tuition for secondary school learners.

6.5.5.3 Tertiary learning institutions need to have responsibilities that link to learner and teacher development outcomes in the secondary school environment (not research outcomes only).

6.5.5.4 Contract and/ or access companies playing in the digital education field – for specific agreed knowledge sharing outcomes.

6.5.5.5 Formal training programmes in place for parents – gain understanding of the importance of a strong education foundation for future success.

6.5.5.6 Rewards and recognition measures in place to reward teachers that are making progress in adopting new ways and become change ambassadors in their communities.

6.5.5.7 Introduce an RFP process for technology and content providers to enable a solution for low cost, high accessibility platform / ecosystem for new school model.

### 6.5.6 RECOMMENDED POLICY MONITORING AND MEASURES

6.5.6.1 Measures and disciplinary actions against cyberbullying will need to be created. It will also need to include teaching learners how to manage digital sharing etc.

6.5.6.2 Monitor blocking of unsavoury websites and prevent hacking.

6.5.6.3 Strong system performance measures in place to reduce and manage infrastructure downtimes. Benchmarks and escalation process in place for high touch priority support managed by service level agreements.

6.5.6.4 Measures for student performance - per module, per grade and system recommendations from insight/ foresight to improve the performance of the learner.

6.5.6.5 Monitor and block any capability that will result in electronic copying, plagiarism, fraudulent user identification etc.

6.5.6.6 Measures to monitor and highlight teachers (not schools) that make progress to do things differently in support of the new process (new reward and recognition process).

### 6.5.7 RFP CONSIDERATIONS FOR TECHNOLOGY COMPANY'S TO LEVERAGE OFF THE RIGHT PLATFORM

6.5.7.1 Technology that supports best of world benchmarks in reducing downtime of system performance.

6.5.7.2 Blocks to prevent access to unsavoury websites, hacking, cybersecurity and unauthorised access to the platform.

6.5.7.3 Ability to access the system offline so that data is not a dependency for offline usage.

6.5.7.4 User authentication to prevent unauthorised access or fraudulent logging into system (homework and testing purposes).

6.5.7.5 Easy integration of between hardware and software for content updates (process and costs streamlined).

6.5.7.6 Reduced costs for upgrading of software. Software upgrades must be quick and simple.

6.5.7.7 Ways to prevent plagiarism, copying, screenshots of electronic content.

6.5.7.8 Download of the system must be easy to navigate and quick response times. Training and support must be best of class.

### 6.5.8 RFP CONSIDERATIONS FOR CONTENT PROVIDERS TO SUPPORT THE POLICIES

6.5.8.1 Deconstructed learning path/ modules – learn at learner pace and level.

6.5.8.2 Syllabi to be re-engineered and to include digital content available from education technology companies.

6.5.8.3 Student centric testing – test related to the level the learner is at.

6.5.8.4 Cater content for different learning styles example visual, audio, written and kinaesthetic.

6.5.8.5 Insight or foresight capabilities - ability to detect root cause of poor performance per module and provide tips to the user and teacher.

6.5.8.6 Incorporate existing content available online into teaching methods.

6.5.8.7 Content to prevent plagiarism and provide cybersecurity, encryption etc.

6.5.8.8 Best of world downtime performance metrics on software and content.

6.5.8.9 Gamification built into content so that levels are linked to rewards to motivate the student to move to the next level.

6.5.8.10 Blending of digital content with the teacher facilitating projects, coaching and activity of the teacher.

6.5.8.11 Reporting on performance of student progress and the teacher facilitation, coaching process – both to be measurable.

## 6.6. SUGGESTIONS FOR FUTURE RESEARCH

Future studies should build on the findings of this research by continuing exploration into other education contexts such as Early Centre Development or Universities. The findings from this study should also be quantitatively evaluated by conducting surveys with principals and other education specialists to further establish the Triggers for Innovative Disruption in South African secondary schools, or even at tertiary education levels. Lastly, in order to establish how changes in public school disparity gets addressed it important to see both public and private sector participation in removing socioeconomic factors that contributed to the current disparity in public schools.

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# APPENDIX

## 1. CONSENT FORM

My name is Aveshnee Iyer (Student Number: 1802838). I am conducting research for completing my Masters in Management in Innovation at the Wits Business School.

My objective:
To understand the impact on performance in student centric models leveraging the jobs to be done (JTBD) approach. To understand the linkages of disruptive innovation in the South African secondary school system and its associated enablers and barriers.

Your participation:
I am requesting for participation in my research through the interview process. Your participation is voluntary and you will not be forced to take part in the study. The choice of whether to participate or not, is yours alone. If you choose not to participate there will also be no penalties and you will not be prejudiced in any way. The interview will take 30 minutes to an hour maximum.
Confidentiality:
All responses will be interpreted at an aggregate level and treated with high research ethics and confidentiality as stipulated in the Wits Business school code of ethics.

Benefits:
This study will look at the triggers for disruption in the education sector and explore whether disruptive innovation can contribute to an approach for improving performance in the South African education sector. The research will provide insights to the enablers and barriers and create a body of knowledge for application to the South African context.

Who to contact if you have any concerns:
The Wits Business School has approved this research. If you have concerns or questions about the research you may call my research co-supervisor Dr Diran Soumonni. Email: Diran.Soumonni@wits.ac.za. If you have any queries, concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (non-medical), telephone + 27(0)11 717 1408.

STATEMENT BY PERSON AGREEING TO PARTICIPATE IN THIS STUDY
I hereby agree to participate in research on the triggers for disruptive innovation in the South African education sector. I understand that I am participating freely and without being forced in any way whatsoever. I understand that this is a research project whose purpose is not necessarily to benefit me personally in the immediate or short term. I understand that my participation will remain confidential. I freely and voluntarily choose to participate in this study.

Yes, I consent _____

No, I do not consent _____

## 2. INTERVIEW QUESTIONS FOR DATA COLLECTION

**1.2.1. Jobs To Be Done – These interview questions highlight the experience of participants regarding the jobs to be done.**

**1.2.1.1.** How does the **lack of technological progress** in school models affect student performance and what are the **limiting factors**?

**1.2.1.2.** Can you describe any important **factors to overcome** this **lack of technological progress and limiting factors** experienced?

**1.2.1.3.** What is the main **job to be done by teachers and students** and what **role** do you believe **parents** should play?

**1.2.1.4.** Can you describe what **limits the job to be done** by teachers and students and can you describe ways in which **parents do not support** the schooling of their children?

**1.2.2. Stakeholder Theory – These questions highlight the views and perceptions of stakeholders regarding the role of industry, governments, think tanks and practitioners.**

**1.2.2.1.** How can the teaching fraternity leverage off **partnering with universities** and **are teachers motivated** to try **new models** of teaching & testing?

**1.2.2.2.** What **prevents the teaching fraternity** from leveraging off knowledge sharing by universities and would **teachers** be **motivated** to try to new ways if they were **measured differently**?

**1.2.2.3.** Are the **technology platforms** being used in South African schools **contributing to teaching**?

**1.2.2.4.** What is **limiting** the **use of technology** for education purposes in South Africa?

**1.2.3. Disruption – These questions illustrate the impact of disruption.**

**1.2.3.1.** How can teaching/ testing methods in schooling be impacted by **changes in innovation** and will **online/ mobile methods** influence the performance of students?

**1.2.3.2.** Can you think of **key issues** faced when introducing **new teaching/ testing methods** and what **issues** could arise from **online/ mobile platforms** in schools?

**1.2.3.3.** Will **access to education** via **mobile/ online** contribute to school performance and could **innovation impact student and teacher motivation**?

**1.2.3.4.** What are the **limiting factors** in school performance **that access to education might not solve for** and not result in improving **student and teacher motivation**?

## 3. GDE RESEARCH APPROVAL LETTER

GAUTENG PROVINCE
Department: Education
REPUBLIC OF SOUTH AFRICA

8/4/4/1/2

### GDE RESEARCH APPROVAL LETTER

| | |
|---|---|
| Date: | 20 February 2018 |
| Validity of Research Approval: | 05 February 2018 – 28 September 2018<br>2017/365 |
| Name of Researcher: | Iyer A |
| Address of Researcher: | P O Box 145985 |
| | Brackengardens |
| | 1452 |
| Telephone Number: | 074 170 2702 |
| Email address: | Aveshnee.Iyer@standardbank.co.za |
| Research Topic: | Triggers for disruption innovation in South African Schools |
| Type of Degree: | Masters in Innovation Studies |
| Number and type of schools: | Two Secondary Schools and Head Office |
| District/s/HO | Ekurhuleni South, Gauteng East, Gauteng North and Gauteng West |

***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.

20/02/2018

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

1

*Making education a societal priority*

**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

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

1. *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

Ms Faith Tshabalala
CES: Education Research and Knowledge Management

DATE: 20/02/2018



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