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Change Management as a requirement for introducing ICT in curriculum delivery – the Gauteng Experience

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Abstract: The main objective of this study is to establish the role that change management plays in introducing ICT in curriculum delivery with special reference to Gauteng Province. A desktop literature review and a mixed method approach was adopted to gather information on how change management can impact on the effectiveness of ICT integration, not only in the South African context but also on the global and African context. The study findings were that the support for ICT integration in education is overwhelmingly positive; ICT is seen as having made a positive contribution to education and also noted that more training is required to improve teachers' competencies in ICT usage. Also, more support needs to be provided to the principals, School Management Teams (SMTs) and School Governing Bodies (SGBs) in terms of training. In order to optimise the results of the change management process in ICT integration into the curriculum, the researcher recommended the following: establish a change management committee whose sole mandate is to ensure an effective integration of ICT projects; ensure sufficient and effective continuous training support to the educators, principals, SMTs and SGBs before, during and after launch of the ICT project. Moreover, the study recommends that continuous evaluation of the change process to assess if intended objectives are being achieved as well as ensuring that undivided buy-in and support from the district and top management are the steps to be observed so that change management process happens effectively in schools. Funding is key to ensure that there is provision of ICT equipment in schools and to invest in the ongoing maintenance and upkeep of the infrastructure.
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Keywords: Basic Education; Change Management; ICT; Curriculum Delivery; Pedagogy.

1.Introduction

The contemporary organizational and institutional environment has seen the adoption and development of ICT (Information and Communication Technology) – systems and technologies at a faster rate in the face of government and business world where every facet has become highly technical. Institutions, especially large companies have turned to rely heavily on technical solutions in their day-to-day operations and failure to comply with these modern changes will result in them performing poorly in terms of quality and eventually this will degenerate in them losing a good portion of their market share in the face of growing competition globally. In essence, the adoption and development of ICT has also become a source of competitive advantage.

Therefore, the main thrust to the current study is the exploration of the important role that the change management process plays in introducing ICT in curriculum delivery. Special reference will be made to the South African education sector in Gauteng Province. Legris & Collerette (2017) state that the majority of ICT project failures is caused by poor management in the implementation process. Most researchers assert that too much focus is laid upon the technical side, overlooking the management side which is the most crucial one. Survey has shown that management and people are the biggest obstacles to a success of any project. Thus, most ICT projects have been chocked either by poor management in general (Legris & Collerette 2017), poor communication and underestimation of required retraining (Price & Chakal 2017), or inability to manage project uncertainty (Asllani & Ettkin 2019). The list is endless as researchers brand the factors in many ways but all this boils down to one common factor - management.

2.Background to Study

Established in the year 2003, Matthew Goniwe School of Leadership and Governance (MGSLG) is an arm or agency of the Gauteng Department of Education (GDE) that was commissioned to serve as the capacity-building portfolio of the GDE in the provision of empirical and research-based quality intervention programs for various stakeholders such as School Governing Bodies, School Management Teams, district officials, educators, learners, and parents. MGSLG was tasked with the responsibility to administer change management services that would involve giving on-site support to role players such as school principals, district, and provincial ICT committees in the wake of integrating ICT in teaching, learning administration and communication.
Thus, in order to achieve this objective, MGSLG administered a robust change management process with a selected 434 schools in the 4 regions of Gauteng in the period spanning October 2016 to October 2017. The process followed an 8-step model in order to address four core areas, (institutional capacity, infrastructure and facility, leadership and management as well as attitudes and perceptions) that were considered by MGSLG as very important in the change process for an increased usage of ICT in Gauteng schools. Therefore, this report sums up approaches, activities, results, and challenges of the change management program as well as giving a breakdown of lessons and recommendations for future change management programs focusing on ICT integration in education in the South African context.

3.Problem Statement

The low adoption and integration of ICT in curriculum delivery in Gauteng Public schools despite the investment and resources availed by government.

4.Research Objective

The objective of this study is to explore the importance of change management within the context of ICT integration in curriculum delivery. In order to gain this understanding, it is fundamental to first establish the crucial components of change management according to the literature. Thereafter, a comparison is

then done between the findings and the empirical data in order to assess how change management is applied in practice in the case study.

5.Research questions

The sub-section provides the primary and secondary research questions.

5.1 Primary question

The main question the study seeks to address is: What is the importance of change management for ICT project implementation in schools?

5.2 Secondary questions

To further structure the researcher trajectory in answering the primary research question, the following secondary questions were formulated:

a. What are the challenges faced by both educators and learners in integrating technology to enhance teaching and learning in the classroom?
b. How can change management be used to effectively integrate ICT in curriculum delivery?

6.Significance of the Study

Som and Dumitraşcu (2019) asserts that the fact that very little research has been carried out regarding the importance of administering change management on employees before and during the ICT integration period is a strong indication that management in many organizations have not yet comprehended the relevance of dealing with those affected by the change initiatives.

Therefore, the results of this study should add value to the existing body of knowledge on change management upon which stakeholders such as the research community, South African Institutions including educational institutions could build on and make use of in correcting any past misconceptions regarding the importance of change management. Clegg and Walsh (2014) argued that such a study could help equip the decision makers, management, employees (and in this case educators, learners, non-academic staff at district and provincial level) to have cognitive, functional, emotional, and social skills as well as competencies that will help them deal with the change process.

7.Literature Review

This section of the study focuses on the review of the existing literature on the subject. The concept of change management has been viewed from different perspectives in order to gain a full understanding of its importance to ensure successful integration of ICT in teaching and learning. Generic issues pertaining to ICT rollout shall also be looked at with the purpose of understanding the challenges that management encounter in trying to get support in introducing technology for teaching and learning. Reference will also be made to the global, African, and South African perspectives respectively.

7.1 Theoretical Perspective

7.1.1 The concept of change

Research has shown that in-spite of what brings about the change; its effects on people are similar. There is high probability that employees will always resist change if they perceive that their jobs are in danger.

Organizational change is not a once off event. Rather it is a process that calls for careful planning, motivation, and professional execution. Proper communication and engagement of role players is very crucial if change is to be successfully implemented. Williams & Williams (2007) asserted that people respond to change more positively when they are appraised on the purpose and consequences thereof. Clegg & Walsh (2014) noted that more often than not, social side of change is overlooked and yet many authors have discovered that this is the most crucial aspect that determines the success of change.

7.1.2 Reaction to change

Ponelis (2015), asserts that there are four psychological stages under which reaction to changes can be categorized into. These include shock, defensive retreat, acknowledgement, acceptance, and adaptation. In the shock phase, employees are very skeptical and feeling unsafe resulting in a decline in productivity. The defensive retreat is characterized by anger on the suggested change as people try to hold on to the past. The acknowledgement phase is when employees realize that the way they used to do things is no longer relevant and acceptable. Finally, in acceptance and adaptation phase, majority of the employees decide to internalize and embrace the change and then move on.

7.1.3 Change management

The main thrust of change management should be the creation of a conducive environment in which change can be implemented (Kemp & Low 2018). Price & Chahal (2017) asserts that an ideal strategy is needed if change is to be carried out successfully. In-spite of the existence of extensive literature on change management, very few of those provide a practical set of tools for it. Milis & Mercken (2016) pointed out that in the field of Technology, change is inevitable thus its management becomes a crucial phenomenon. Change that comes as a result of the outcome of the project can be classified into technological changes and cultural changes where the former refers to a scenario where people are obliged to familiarize themselves with the changes in systems and tools. Effective training and support help to get people adapt easily.

7.1.4 Change management framework

Price & Chahal (2017) have developed a six-step framework for strategic change management which can be applied in various situations since it deals with change management on a rather broad scale. As opposed to coming up with specific tools for change management, the framework gives a good outline for managing the overall process.

7.1.5 Teacher Development Frameworks

According to the Gauteng Department of Education (2013), ICT policy strategy of 2013 teacher development was centred mainly on giving ICT training and support by the delegation of ICT facilitators to various schools by using the tech empowered approach. These facilitators were mandated to provide onsite support and training on how to use digital devices, mediation of the e-content image as well as providing ICT integration training programmes bound to upgrade the skills of teachers who already had affluence on the use of ICTs. Prior to the introduction of ICT in 2014, the ICT training programs were in the main device oriented. This resulted in most teachers either resisting or being slow in the adoption and integration of ICT for teaching and learning. The teacher development strategies or models and the training teachers received from the Mathew Goniwe teacher development and training work stream are shown in the table 1 below.

Table 1.1: Teacher Development Strategies: MGSLG Change Management 2018

Model	Use in professional development of teachers
Analysis Design, Development, Implementation and Evaluation (ADDIE)	Instructional design model whose purpose is to inform needs driven training

10:20:70	Instructional design model used to define optimal learning sources for teachers 10%- theory 20%-practical 70%-work integrated learning
Content Pedagogy Assessment and Full ICT integration (CoPAF)	This is the main ICT integration framework which focuses on five key training components: • Content • Pedagogy • Assessment • Technology • Change Management
Differentiated approach	All training programs acknowledge that teachers are at different levels of integration and courses are developed in the following manner. • Generic • Targeted • Advanced
Blended Learning	Teacher development will strive to utilize a blended approach that also acknowledge remote teaching to reach out to teachers without devices.

Source: Mathew Goniwe Change Management Strategy 2018 Edition

8.The Global Perspective

Pearson (2020) reports on various government policies on the adoption and integration of computers and pointed out that the American government put in place a computer policy in 1996 entitled: "Getting America's learner ready for the 21st century." This publication included supply of technology and recently the average ratio of microcomputers to students in schools has been 1 computer to each learner. Research findings on the integration of technology in the curriculum in developed countries have reported the general effectiveness of technology as a method of instruction (McRobbie & Thomas 2018). However, in some other parts of the world, the integration of technology has come with its own challenges. In China, Liu and Pange (2015) discovered that the lack of hardware (laptops, notebooks, and computers), teaching material, pedagogical models, teachers' interest as well as teachers' support have adversely affected the adoption of ICT. Research findings in countries such as Australia (Downes, 2011), Finland (Kankaanranta & Kangalasso, 2013), the UK (O'Hara, 2014), Scotland (Learning and Teaching Scotland, 2003a), and New Zealand (Bain, 2014) have shown that ICT application and integration into the curriculum has been slowed down by many factors and that practitioners are not very sure about the importance of ICT in contributing towards their practice. In-spite of the challenges involved in managing the change that comes with it, the dawn of the 21st century, saw the adoption of ICTs on the whole spectrum of life and the necessity for the establishment of the knowledge society culminated in many countries like the United Kingdom (UK) (Livingstone, 2015:2), Malaysia (Kannan, Sharma and Abdullah, 2015:111), Turkey (Cavas, Cavas, Karaoglan and Kisla, 2009:200) and the Republic of Korea (Hwang, Yang and Kim, 2015:21) introducing and expanding the application of ICTs in their education systems in order to transform education and to establish knowledge societies. However, with proper change management practice, better results and outcomes can be guaranteed. (Kamya, 2019)

9.African Perspective

Kamya (2019) is among different researchers who perceived that Uganda was the first of the twenty-seven World Links countries in Africa, Latin America, the Middle East, and Asia to pilot the adoption and usage of the Very Small Aperture Terminal (VSAT) technology for school connectivity. This was indeed a major milestone toward achieving relevancy of ICT in education. This breakthrough led Uganda to become the first country in Africa to make usage of Microsoft Partners in the process of teaching and learning, to develop localized digital content that maps directly to the national curriculum. Kotter (1996), asserts that Uganda developed its initial ICT policy in 2003 and this document affirmed that for a successful integration

of ICT, Uganda would need to embrace the goal of lifelong education for all with strategies that include:

- The administration of ICT centers of excellence in a way that will provide basic and advanced ICT training.
- Establishing mechanisms to facilitate collaboration between industry and training institutions in order to build appropriate human resources capacity.
- Enhancing the networking of training institutions in Uganda with those elsewhere to promote skills transfer.

Different researchers (Kotter 2017), refer to the Kenyan Information and Communication Technology (ICT) policies and implementation. The Kenyan Ministry of Education launched the National ICT Strategy for Education and Training in June 2017, (Kotter, 2017).

10.The South African Perspective – Gauteng Province

In-spite of the challenges that the South African education system is facing regarding the integration of ICT in curriculum delivery, frantic efforts have been put in place to try and manage the transition through engaging a sound change management process. It is in this ambit that the Gauteng Department of Education, through the Matthew Goniwe School of Leadership and Governance (MGSLG) took an effort to administer the change management process in order to yield best results as far as ICT integration into the system is concerned. Evidence on the ground shows that MGSGL managed to unearth the fundamental role that change management plays in the quest for an effective integration of ICT. Below is a summary of the major activities that were carried out to implement the change management project as well as the results, conclusions, and recommendations.

10.1 The Change Readiness Assessments

The Change Readiness Assessments (CRA's) were carried out on the sampled schools with the aim to evaluate the status of the school regarding ICT Infrastructure, Institutional Capacity, Leadership & Management, and Attitudes & Perceptions. The results thereof will be used as a tool in the Change Management interventions in line with the 8 Step Change Management Model. The CRAs were administered using the Qualitative approach where interviews were carried out to gather information on whether the school was ready or not.

10.2 Change Management Training

ICT Change Management Training had its objective to promote an ambience favorable for the transformation of sampled Gauteng schools from traditional or conventional teaching schools into ICT schools. This could be achieved by assisting the selected schools in the identification of barriers to change and thereafter equip them with ideal tools that would help them to either remove or manage the barriers so that the ICT in Schools vision can be realized, with the following objectives: -

- Training ICT Committees and all Change Agents on the basic theoretical principles that determine a sound change management in the schooling system.
- Assist trainees internalize and grasp the essence of change from an individual perspective to change at schools.
- Help change the mindset of the educators from teaching to a facilitation role that is ICT driven.
- Assist schools with a smooth ICT transition in an effective and efficient way.
- Facilitate the transition to the Paperless "less paper" classroom in schools.
- Promote a clear comprehension of the Eight Step change management model.
- Help participants communicate and implement the ICT change management model as shown below in table 2.

Table 2: Individual responses to "Did you participate in the ICT Change Management training?", disaggregated per designation.

Designation	Yes	Not Sure	No	Total
MGSLG ICT Programme coordinator	75%	9%	16%	100%
Principal	74%	6%	20%	100%
ICT committee	70%	10%	20%	100%
Educator	68%	9%	23%	100%
SMT	66%	3%	31%	100%
Teacher	58%	16%	27%	100%
SGB	50%	9%	41%	100%
Learner	23%	13%	64%	100%

Source: (Department of Basic Education:2019)

The above responses gave an indication that the training was regarded as most beneficial by principals (74%), followed by MGSLG ICT Programme coordinators (73%) and ICT committee members (70%). However nearly half of the learner respondents, (45%) indicated that they did not benefit anything from the training.

11.Methodology

11.1 Research Method

The current study is inclined towards a mixed methods approach, leaning upon a pragmatist orientation, with a qualitative dimension holding the core of the inquiry and the quantitative approach serving as supplemental (Johnson & Christensen, 2017). Although ICT by its nature lends itself in the pure sciences, the implementation of ICT interventions involves people who have a particular orientations, views and experiences. It is thus important to solicit the views of those involved in the implementation of ICT programmes. Pragmatist scholars expressed their specific perspective that, separate from human experience, there is an objective reality. This reality, however, is based on the environment and can only be met via human experience (Goles & Hirschheim, 2018; Morgan 2014; Tashakkori & Teddlie, 2018).

One of the key principles of pragmatism is that knowledge and reality are dependent on socially created beliefs and habits. Pragmatists generally agree that all knowledge is socially built in this world, although certain versions of such social constructs more resemble individual experiences than others (Creswell & Creswell, 2018).

A case study research strategy was selected for this inquiry as it was possible to accommodate both qualitative core and quantitative supplemental approaches to the inquiry. Case studies have become popularly known as designs/strategies for inquiry within the qualitative dimension of research tradition in academic research, following the seminal work of John Creswell in explication of research methods (Creswell & Creswell, 2018). However, there has been significant work in the literature that locates the value of the case study approach in both interpretivist and positivist approaches, which form the pragmatist paradigm chosen for this investigation (Harrison, Birks, Franklin & Mills, 2017).

In this study, the philosophically rationale for the approach using a case study strategy was based on the fact that case study research can be oriented from a relativist or interpretivist standpoint whereby in-depth experiences and views of participants are explored while at the same time using the realist or positivist standpoint as a supplemental component for purposes of triangulation. Thus, according to Costa and Tumagole (2020), the research design was a Qualitative/Quantitative inductive simultaneous design.

12.Population and sampling

Babbie (2011) asserted that a study population is the summation of elements from which a sample is selected. Bless, Higson-Smith and Sithole (2013) described a population as the set of elements focused on by the researcher to which they obtained results should be generalized. In addition, Polit and Beck (2017) define the population as a totality of individuals composed of similar characteristics or traits.

For this research, the accessible population included curriculum specialists, principals, deputy principals, educators responsible for the technology education and learners in senior secondary schools. Maree and Pietersen (2016) defined sampling as the process used to select a portion of the population for the study. For the core part of this investigation (Qualitative Dimension) Purposive sampling was used to select as sample from the participants indicated above. In qualitative research, it is common to employ the technique of purposeful sampling in order to find and select cases that contain a wealth of relevant information about the phenomenon under study (Palinkas, et al., 2015). In implementation research, criterion sampling appears to be the most commonly used strategy for purposeful sampling. As this study was a form of research that seeks to implement solutions, hence, it was within a pragmatist philosophy, criterion sampling was used to select participants (Marshall, Rapp, Becker, & Bond, 2008). For the supplemental component of this study, a simple random sampling that is proposed for a study involving mixed methods with qualitative as a core (Onwuegbuzie & Leech, 2005) was used to select 210 participants from a population of 557 (Onwuegbuzie, 2007).

The sample used in this study consisted of schools that received ICT investments such as computers, smart boards and other relevant resources. The study sought to determine the extent to which those schools were integrating ICT in the classroom. Ethical approval was sought from the Department of Education and all participants were asked to consent before participating.

13.Data Collection

Data collection in this mixed methods study used both interviews (for the qualitative core dimension) and questionnaires (for the quantitative supplemental dimension).

13.1 Interviews - core component dimension

It is widely accepted that interviewing people is a common means of gathering information from them (DeJonckheere & Vaughn, 2019). It is possible to define interviews in a variety of ways, but they are generally defined as a process in which two or more people interact with one another for a specific purpose. In contrast to unstructured interviews, the ones used in this study were structured, allowing researchers to ask any question they wanted. For Babbie (2011), field research entails going where the action is and just sitting back and listening. Qualitative research relies heavily on this, in which participants are asked questions about their lives and given the opportunity to respond, and the responses are then recorded by the researcher. "Unlike a survey, a qualitative interview is an interaction between an interviewer and a respondent in which the interviewer has a general pan of inquiry, including topics to cover," says Creswell (2014). Interviews conducted were structured because they had a set of questions to be answered about specific issues relating to the use of ICT in public schools, as previously stated Interviews rather than questionnaires may be necessary in obtaining information from people who are unable to read. All participants in this study could read and write, which was a blessing because they were able to participate in both interviews and questionnaires. Another benefit of interviews over surveys is that researchers can get more information from subjects by asking clarifying questions and following up on interesting responses (Kumar & Omar, 2018).

13.2 Likert Scale – Supplemental component dimension

A Likert scale was used for constructing survey instrument for the supplemental component of this study. A Likert scale is one of the widely used tools for data collection in both education and socials sciences (Joshi, Kale, Chandel, & Pal, 2015). A Likert scale is a type of psychometric scale that includes multiple

categories from which respondents can indicate their opinions, attitudes, or feelings about a particular subject (Nemoto & Beglar, 2013).

14.Data analysis

Bengtsson (2016) defined data analysis as "a method to reduce, organize, and give meaning to data gathered or construction that emerged and these are constructed into a meaningful whole." The method of analysis used on this study followed the COSTA QDA technique (Costa,2020), whereby codes were created both deductively (anchor codes) and inductively (significant statements) (Saldana, 2015). For this study, the recorded interviews and observations were transcribed and analyzed in the following order:

- The data collected was coded through a process of classifying responses into categories that bundled together the same ideas, concepts of themes one had discovered.
- Following the completion of data coding, it was then put into categories to facilitate comparison of what different participants said, what themes were discussed and how concepts were understood (Rubin & Rubin 1995:228).

Data and analytical integrity were ensured careful use of approaches for quality criteria and rigor determination for trustworthiness, applying the TACU verification strategy (Costa, 2020). Quality criteria applied through the TACU strategy involved the four dimensions of credibility, transferability, dependability and confirmability (Elo, et al., 2014) to establish the truth value, applicability value, consistency value and Unbiased value.

For the quantitative dimension, survey data were treated to the computation of descriptive statistics which includes percentages and distribution frequencies were done using Statistical Package for Social Sciences (SPSS).

15.Findings

The objective of this study was to explore the importance of change management within the context of ICT integration in curriculum delivery. The goal of this study was to evaluate the use of ICT in the classroom. According to the study findings, male educators have a higher and more positive attitude toward ICT integration and use in the classroom than their female counterparts, who have a lower and more negative attitude toward ICT integration and use in the classroom. This supports findings by Kankaanranta (2020) who noted teacher's evolving behaviors regarding technology integrtion. As a result, both genders use ICT to varying degrees in the classroom (Liu & Pange, 2015). According to the study findings, the majority of the professional development support provided by the department to educators empowers them only how to best use the available information communication technology, not how to effectively integrate the technology into the curriculum (Legris & Collerette, 2017).

The findings of this study confirm that, despite the availability of resources and training, educators are not adequately prepared to develop their own approaches that incorporate ICT into the learning process (Clegg & Walsh, 2014). Most teachers do not use computers to prepare their lessons. A clear understanding of how educators integrate ICT in teaching is critical for developing and delivering effective educational opportunities that properly prepare learners for higher education, work, and life in the twenty-first century. Change management was supported by all participants as a need from both aspects of the study.

16.Conclusion and recommendations

The beginning of this study saw the preliminary assumption pointing to the fact that change management is a fundamental tool that determines the successful implementation of any ICT project. This matter was explored by referring to various sources of information. Literature on the ground was sufficient enough to support the initial assumptions concerning the need for change management. The majority of scholars

agree that poor change management is the major cause of ICT integration projects more-so in the education sector.

17. Recommendations

Based on the information gathered during this research, the following is recommended:

- Establish a change management commission whose sole mandate is to ensure an effective integration of ICT projects.
- Ensure sufficient and effective continuous training support to teachers and educators. principals, SMTs and SGBs before, during and after launch of the ICT project.
- Continuous evaluation of the change process to assess if intended objectives are being achieved.
- Ensure undivided buy-in and support from the districts and top management.
- Improve security measures to prevent theft of equipment and reduce threat of crime to learners.
- Ensure funding is made available to increase the provision of ICT equipment in schools and to invest in the ongoing maintenance and upkeep of the infrastructure.

18. Limitations

The current study investigated the subject matter in provincial public school in Gauteng Province South Africa. As much as results are generalizable, the study did not focus on how the private schools are dealing with the issue of ICT integration and Change Management implementation for adoption of ICT.

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