

Exploring teachers' readiness for e-Learning: On par with the Fourth Industrial Revolution?

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ABSTRACT This quantitative study used a questionnaire as a method of data collection. Located within a positivist paradigm, the study investigated teachers' readiness on the use of eLearning in the Eastern Cape Department of Education. Data was analysed using descriptive statistics. Respondents in the study was a total of 10 school principals selected from 10 secondary schools in the province of the Eastern Cape, South Africa. Research results revealed that although teachers have access to digital tools and devices, high school teachers do not integrate e-learning in their teaching methods, also information sharing in high schools are still paper-based. However, findings revealed that unavailability of internet connectivity is one of the major challenges that hinders teachers' e-readiness. The study, therefore, recommends that if teachers in South African schools are to be ready for the use of digital tools and resources, the Department of Basic Education (DBE) needs to introduce directive policies governing the use of digital technology in schools and also provide an adequate internet bandwidth that will ensure faster and reliable connectivity, hence facilitating readiness for the Fourth Industrial Revolution.

Keywords: eLearning, the Fourth Industrial Revolution, digital devices, digital learning, digital tools and resources

Introduction

Over the past two decades, information, communication and Technology (ICT) has transformed higher education (Hammond, 2013). In particular, the use of digital learning technologies, smart phones, broadband connectivity to internet and social media have brought substantial changes to the way schools (universities and colleges) provide learning opportunities for students. Therefore, the technical ability to interact online has quickly emerged into collaborative learning activities, such as online forum discussions, which remained an essential feature of online education (Harasim, 2000). However, as interactive technology became more affordable and user friendly, technology driven pedagogical changed and has begun a process of transforming of teaching and learning in higher education. Thus, this transformation has shifted education from teacher-centred (traditional) to student-centred (modern) pedagogy where students have more responsibility for their own learning (Koch, 2014).

In the globalised world of the 21st century where the promises of e-learning for organizations are multi-fold, organisations are confronted with a challenging economic competition. Employees need to be equipped with new competences to adapt to constantly changing work and life conditions in knowledge-based economies and societies (Schreurs, et al., 2008). Therefore, organizations need to be ready to adopt e-learning and benefit from its advantages. According to Song (2010), the concept of e-

readiness emerged in early 2000 and measures the preparedness of institutions and countries to take part in the digital economy. By so doing, it provides a framework for evaluating the digital divide between various countries (Song, 2010).

Kingori (2014) defines e-readiness as a measure of the degree to which a country, nation or economy may be ready, willing or prepared to obtain benefits which arise from ICTs. This however includes the ability to adapt to technological challenges, collaborative training and synchronous as well as asynchronous self-paced training (Colvin & Mayer, 2008). Therefore, e-readiness can be assessed using four interrelated variables which are human skills, infrastructure, access and connectivity (Wu, 2012).

The Nature and Benefits of E-Learning

ICTs have been touted as potentially powerful enabling tools for educational change and reform and many of the productivity gains in the developed world economies over the past decade to a great extent can be attributed to the impact of ICT (Kiilu & Muema, 2012). However, for a country to effectively adopt ICTs, it must be “e-ready”. Hence, e-readiness is achieved by providing the requisite infrastructure and ensuring the populace have access to ICTs (Arkorful & Abaidoo, 2014; Sitienei, 2015; Cloete, 2017). Increasingly, governments, educational organizations and researchers are supporting the view that incorporating ICTs in teaching and learning is an important aspect of keeping the curriculum relevant and preparing students for the future (Njagi, 2013). It is also believed that ICTs have the potential to revolutionize pedagogical methods, expand access to quality education, and improve the management of education systems (Owino, 2013). In addition, ICTs can provide an array of powerful tools that may help in transforming the present teacher-centred and text-bound classrooms into rich, student-focused, interactive, knowledge-based environments (Sitienei, 2015). Hence, the method of learning which uses electronic instructional contents delivered via the internet is referred to as e-learning (Njuguna, 2013).

Aldhafeeri & Khan (2016) refers to e-learning system as a systematic process of planning, designing, evaluating, and implementing online learning environments where learning is actively fostered and supported. Therefore, a wide range of systems falls into the e-learning purview which ranges from students using email and accessing course work online while following a course on campus to programs offered entirely online (Mercado, 2008). Hence, this type of ICT enhanced learning is increasingly prominent. Therefore, for successful e-learning, a comprehensive understanding of the issues related to various dimensions of e-learning and the needs, capabilities, interests, and willingness of all major stakeholder groups, including instructors and students, is sorely needed (Chapnick, 2005).

E-learning is a crucial component of the powerful, fast, and disruptive transformations that the world of education is going through (Sangrà, et al., 2012). Hence, the benefits of this form of learning include the ability to easily deliver distance learning, the facilitation of a blended learning/teaching approach that involves both face-to-face interactions and the fact that it enables a variety of different educational activities to be supported by technology (Smythe, 2012). In a globalized and knowledge-based information society, every community is trying to transform itself into an information society. Therefore, the advancement of information technology has great potential for education and training. However, today’s youth live in the Web 2.0 era; where the internet is used to communicate, publish, share contents and to form vital teams (Alajmi, 2010). Therefore, taking advantage of today’s advanced technology to raise

the educational level to a higher level and shrink the digital divide becomes paramount (Elges, et al., 2006).

Like any other major innovation, e-learning strategies require considerable up-front analysis, development time, money, technological infrastructure, and leadership support to be successful. Tubaishat & Lansari (2011) recommends that organizations assess readiness for e-learning before adopting this innovation because the adoption of e-learning without careful planning would most likely result in cost overruns, unappealing training products, and failure. Hence, one of the most critical front-end tasks of any e-learning initiative is to conduct a comprehensive assessment of its organizational and individual readiness factors (Tubaishat & Lansari, 2011). According to Farid (2014), effective e-learning readiness allows educational institutions to improve performance and productivity by responding to the demands of the learners and making learning available. Therefore, e-learning readiness depends on the availability of organizational assessment of attitudes towards the choice of the mode of e-learning (Vilkonis, et al., 2013).

Integration of Digital Device and Resources for teaching and learning

Integration of digital technologies in schooling is positioned as a mechanism for educational reform via transformation of teacher practice (Hammond, 2013) and to actualize digital learning. Digital technologies are however positioned as Vygotskian mediating tools to facilitate change in schools, improving standards and facilitating personalized learning (Fullan, 2013). They are also necessary to satisfy curriculum expectations and facilitate Science-Technology-Engineering Mathematics (STEM) education (AiGroup, 2016). Like film, radio, and television, digital technologies are positioned as important tools for reformation or transformation of schooling (Howard & Mozejko, 2015). Rationales for the integration of digital technologies include improving standards; increasing vocational relevance; contributing to knowledge-based economies; enriching learning experiences; transforming pedagogy to make it more student-centred, constructivist in nature, and with a focus on higher-order learning; and facilitating personalized learning (Fullan, 2013; Hammond, 2013).

However, e-Learning has been integrated into many educational institutions to reap the benefits of the rapid developments in technology that assist in improving the learning experience and increasing its efficacy. As a result, many governments and educational institutions implement e-Learning in order to improve learners' performance (Taha, 2014). Although e-Learning has been successfully implemented in many educational settings, the implementation of E-Learning projects has every possibility to face slow progress (Neyland, 2011; Frimpon, 2012). According to Andersson (2008), the dropout rates of E-Learning education particularly in the developed world are usually much higher than that of a traditional classroom-based teaching. Hence, the percentage of dropouts from course units provided within an E-Learning environment ranges between 20 and 40% (Kim & Park, 2011; Rostaminezhad, et al., 2013).

Accessibility and Usage of Digital tools and resources

However, there are voluminous studies that report on why teachers are not ready to use technologies and these reasons includes lack of competence, knowledge, autonomy, skills, access, time, resources, training, and technical support which represents almost all that is necessary to engage in e-Learning. (Davids, 2009; Chigona, et al., 2010). The counter to this is that even if technologies were available, and the

knowledge and skills exist, research has evidenced that these were not conditions that automatically resulted in adoption and use (Thaufeega, 2016). Research has also shown that readiness for eLearning depends on access, technological skills, study habits and skills, and self-directedness in learning (Thaufeega, 2016).

Njagi (2013) stated that before embarking on e-learning implementation, it is crucial to decide on the commencement and model of e-learning to create a strong technology plan for teachers. This is because the barriers to the effective use of technology involve teachers' attitudes and resistance to change, training deficiencies and inadequate access (Njagi, 2013). Owino (2013) however added that the implementation of e-learning in the developing countries is slowed by low connectivity (low bandwidth) and accessibility, inadequate telecommunications infrastructure, lack of reliable power supply, among other challenges. Therefore, for successful implementation of e-learning, e-learning readiness must first be established (Owino, 2013).

However, Broadbent (2001) stated that eLearning does not require a vast infrastructure, a reliable Internet connection and sufficient computers for participants would be adequate for effective eLearning to take place. Similarly, Fathaigh (2002) states that a basic prerequisite of online learning is the access to a reliable and secure internet connection and a computer or other such device. Additionally, Globokar (2010) claims that access to technology, comfort of using the technology, reliability of technology, ability to logon frequently and technological skills are important technological aspects of e-learning readiness (Globokar, 2010). Therefore, adequate level of access is essential for eLearning, and provision of such access would also become part of institutional readiness for e-learning.

Rhema & Miliszewska (2014) however stated that in assessing how developing countries have progressed with eLearning, access to convenient and reliable ICT infrastructure is the most important factor that had been noted. In developing nations, the traditional print-based means of learning is still the most common and not the web-based learning methods, which is due to the fact that for developing nations traditional means of learning are more sustainable and reliable (Rhema & Miliszewska, 2014). While e-learning provides several benefits to educational settings which enhance the quality of education and develop the learning environments, conversely there remain many challenges which hinder the exploration and utilization of its opportunities (Alkharang & Ghinea, 2013). Hence the need to investigate teachers' readiness for e-learning in South African schools in the 21st century.

Theoretical Framework

This study is underpinned by Khan's Octagonal e-Learning Theory (Khan, 2003).

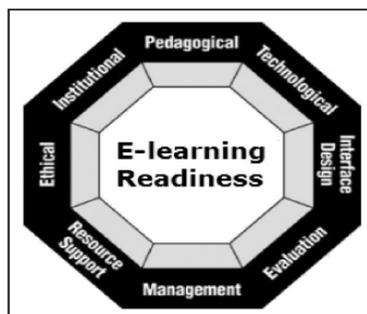


Figure 1: e-learning readiness framework (adapted from Khan, 2003)

Badrul Khan's e-learning framework which is also referred to as Khan's Octagonal Framework (because of its octagonal shape representing the eight dimensions of the e-learning environment) provides a framework that enables educators to select appropriate ingredients for flexible learning environments. Khan's framework consists of eight dimensions namely: institutional, pedagogical, technological, interface design, evaluation, management, resource support and ethical. Each of these dimensions in the framework represents a category of issues that need to be addressed in order to create a meaningful learning experience (Singh, 2003). Khan (2001, 2005a, 2007, 2012) developed a comprehensive framework for e-learning by clustering various e-learning issues and factors into eight critical dimensions of the e-learning environment: pedagogical, institutional, technological, interface design, evaluation, management, resource support, and ethical. Each dimension has several sub-dimensions, and each sub-dimension consists of issues related to a specific aspect of an e-learning environment that must be considered to assess readiness (Morrison, 2003).

Therefore, a comprehensive assessment of e-learning's organizational and individual readiness factors includes critical perspectives from major stakeholder's groups, including students and teachers. Hence, e-learning readiness assessment allows the user to design comprehensive e-learning strategies and effectively implement information and communication technology goals (Aldhafeeri & Khan, 2016).

Research Problem

The delivery of education has shifted from the traditional method of curriculum delivery to a digital format of delivery using available technology. Also, studies such as Owino (2013); Arkorful & Abaidoo (2014); Popovici & Mironov (2015); Basak, et al. (2017) have revealed the e-learning benefits in the teaching and learning process around the world including several factors that affect the use of e-learning at universities. Popovici & Mironov (2015) revealed that one of the factors affecting the use of e-learning is the technology readiness factor. However, without e-learning readiness, e-learning benefits will not be reaped and the probability of failure in adopting e-learning will be high. Therefore, this study seeks to investigate South African school teacher readiness for e-learning to achieve the delivery of quality education.

Research Questions

This study was guided by a main research question and several sub-questions. The main research question was: what is the level of South African school teachers' readiness for eLearning in the 21st century? The sub-research questions are the following:

- i. Do South African School teachers have access to digital device and resources in their schools?
- ii. Do South African school teachers use educational technologies for teaching and learning?
- iii. Do South African school teachers share information using digital tools and resources?
- iv. What are the challenges of using digital devices and resources in South African Schools?

Methodology

This quantitative study used a questionnaire as a method of data collection. Located within a positivist paradigm, the study investigated teachers' readiness on the use of e-learning in the Eastern Cape Department of Education. Data was analysed using descriptive statistics. The population for the study consists of all ten (10) high school educators in the Eastern Cape Province in South Africa. The sample of the study consist of 10 respondents who are educators in high schools, participants were purposively selected because of their understanding and information about the phenomena under study. Principals of schools participating in the COL Teacher Futures programme were requested to complete a survey form and quantitative data generated were analysed descriptively.

Results

The results are presented under the following sub-headings which are: access to digital devices and resources in south African schools, usage of digital tools and resources for teaching and learning in schools, information sharing using digital tools and resources, and internet connectivity as a challenge to effective use of digital resources.

Access to Digital Devices and Resources in South African schools

Principals of the ten (10) participating schools gave feedback on the access to digital devices and resources as regard their readiness for its use in the teaching and learning process in South African Schools. As shown in figure 2 below, 60% of the principals surveyed either strongly agreed or agreed to the question about access to digital devices and resources in schools. The latter is contrasted with 40% of the principals who either disagreed or strongly disagreed with the question.

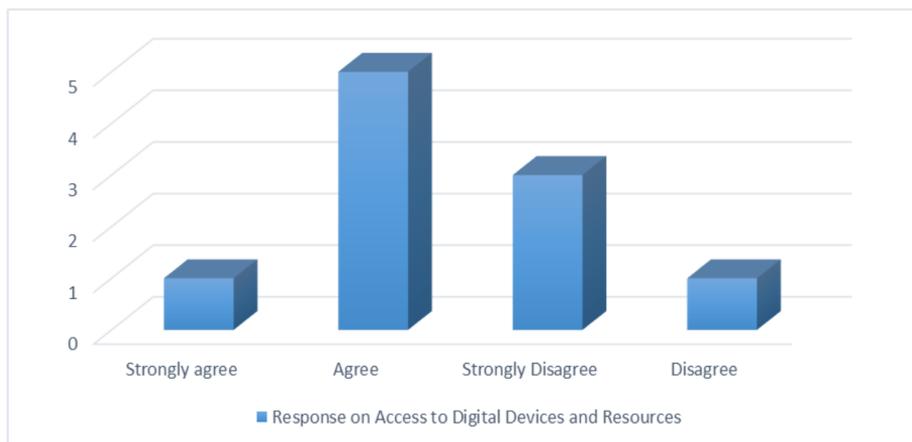


Figure 2: Participants Response on Access to Digital Devices and Resources

Usage of Digital tools and resources for teaching and learning in South African Schools

Principals of the ten (10) participating high schools gave the feedback on the usage of digital devices and resources in exploring curriculum contents in demonstrating readiness for its use in the teaching and learning process in South African Schools. Results

on figure 3 indicated that 30% of the participants agreed that they use digital tools and devices in exploring curriculum contents while 70% of the participants strongly disagree on the use of digital tools and devices for exploring curriculum.

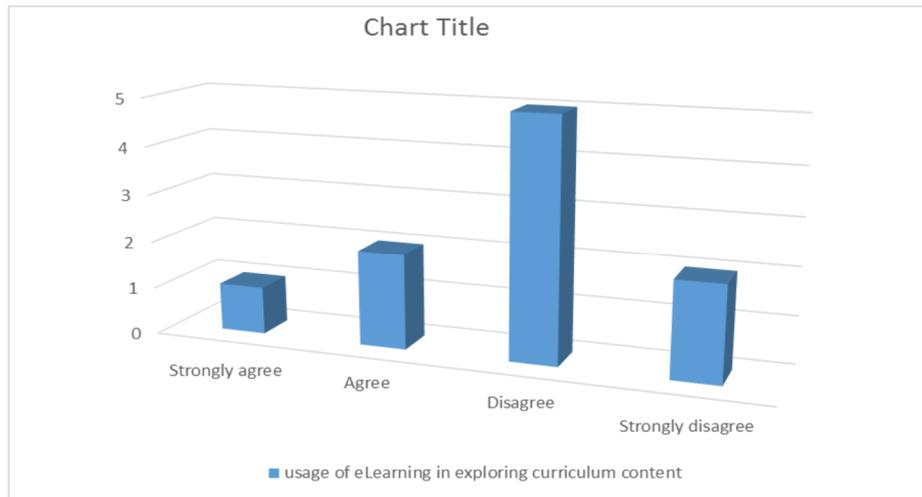


Figure 3: Usage of Digital tools and resources in teaching and learning

Information sharing using Digital tools and resources

Principals of the ten (10) participating high schools gave feedback on sharing of educational information using digital tools and resources in South African high schools. As shown in figure 4 below, 10% of the participants agreed that information shared in schools are through digital tools and devices while 90% of the participants disagreed by stating that educators in high schools do not employ digital tools in information sharing.

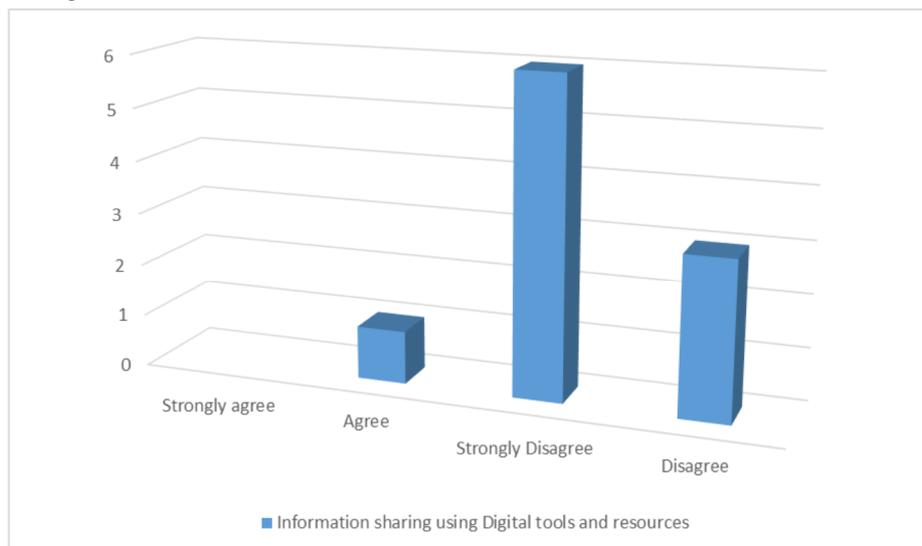


Figure 4: Information sharing using digital tools and resources

Internet connectivity as a challenge to effective use of Digital Resources

Principals of the ten (10) participating high schools gave feedback on poor internet connectivity has a hindrance to teachers' readiness on the use of digital tools and devices for the teaching and learning in South African Schools. Findings from figure 5 indicated that 40% of the participants agreed that their school has internet connectivity while 60% of the participant disagree on availability of internet connectivity among many other hindering factors. Hence, unavailability of internet connectivity hinders teachers' readiness and does not encourage the use of digital devices.

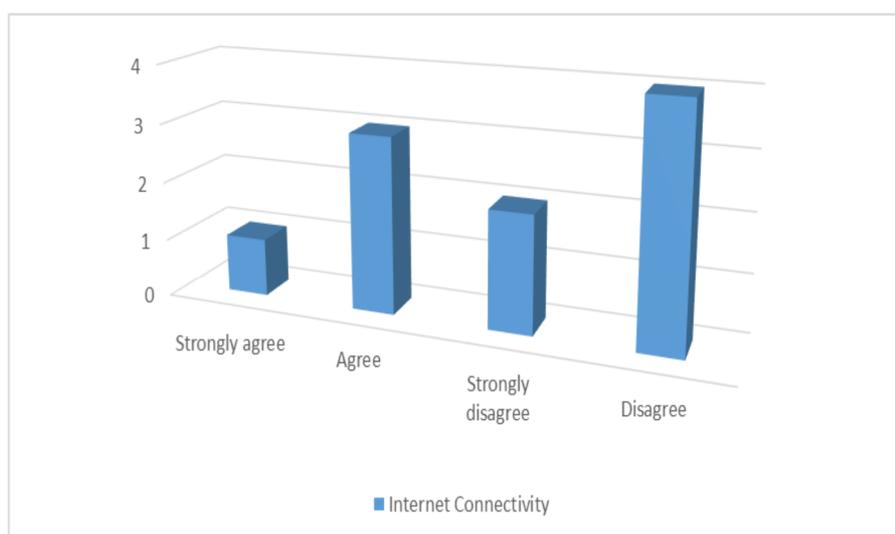


Figure 5: Internet Connectivity for Digital Device and Resources

Discussion of Findings

Discussions will be presented under the following themes:

- Access to Digital Devices and Resources in South African Schools
- Usage of Digital tools and Resources for teaching and learning in schools
- Information Sharing using Digital tools and Resources
- Internet connectivity as a challenge to effective use of Digital Resources

Access to Digital Devices and Resources in South African schools

The findings on South African Schools access to digital devices and resources revealed that high school teachers in South Africa have access to digital devices and resources for teaching and learning. Hence, the findings of the study are in line with Gillwald, et al. (2018) who stated that South African schools outstrips other African countries in terms of access to digital devices and resources. Furthermore, Modelling undertaken on the data from the ICT access and use survey conducted by Gillwald, et al. (2018) confirms that demand for telecommunications services is significantly driven by income and education level (Gillwald, et al., 2018). Further, the overall GNI per capita masks the level of income inequality in the country. Even though South Africa performs well in this measure, there is evidence that communications services are not affordable to the majority of South Africans at the bottom of the pyramid (Gillwald, et

al., 2018). The results are evidence that, even though the telecommunication industry is well developed, traditional universal access policies focusing primarily on supply-side interventions create only some of the necessary conditions for access. Unaffordability, lack of local content and the lack of skills are all barriers that limit meaningful access and contribute to digital inequality in South African Schools (Gillwald, et al., 2018).

Usage of Digital tools and resources for teaching and learning in South African Schools

Findings from the principals on the usage of digital tools and resources revealed that high school teachers do not use digital tools and devices for exploring curriculum content. The findings of this study is however in line with Dagada (2013) who stated that most teachers do not make use of digital tools because they lack the understanding of the complex relationships between content, pedagogy and the technology to be integrated into the curriculum delivery. Dagada (2013) therefore suggest that there is a need for schools to assist teachers to improve their technological pedagogical content knowledge if the institutions are to successfully domesticate e-learning platforms.

Similarly, Keengwe & Georguna (2013) opined that the integration of technology into education could meet the needs of the Millennials as the generation currently attending universities. Keengwe & Georguna (2013) further describe the characteristics of this generation as wanting to construct their own learning content and process, wanting to work in teams and have sophisticated knowledge and skills of information technologies. At the same time, they are cautious about the instrumentalist understanding and use of technology, whereby technology is understood as an end in itself. Keengwe & Gergina (2013) therefore stated technology should not drive instruction, but should rather be integrated into the curriculum and not the other way around because 'Technology is not a substitute for good instruction' (Keengwe & Gergina, 2013)

Information sharing using Digital tools and resources

Findings revealed that information sharing among teachers and students in South African high school is still paper based as majority of the participants disagreed by stating that educators in high schools do not employ digital tools in information sharing. This finding is however in line with Netteland, et al. (2007) who stated that information sharing through digital devices is a critical factor in the implementation of e-learning. Netteland, et al. (2007) further stated that a number of factors which may contribute to disturbance in information sharing include but not limited to weaknesses in the implementation of e-learning, a missing understanding in e-learning activity, a need for a shared digital access point to update information and a need to prepare for integration of learning and work (Netteland, et al., 2007). Pappas (2016) therefore stated that improved productivity and efficiency, increased learners participation, optimization of e-learning feedback system and collaborative learning are the benefits of knowledge/information sharing in e-learning.

Internet connectivity as a challenge to effective use of Digital Resources

However, a major obstacle identified in this study concerns the unavailability of internet connectivity which hinders teachers' readiness and does not encourage the use of digital devices. Hence the findings of the study is in line with Khumalo, et al. (2015) who stated that poor provision of ICT infrastructure, lack of electricity, shortage of educational resources and poor or no internet connectivity impact negatively on the

use of eLearning. Therefore, the provision of internet access to schools and rural areas is a major boost to the Information Communication Technology for Development (ICT4D) activities in every developing country (Dalvit, et al., 2014). Hence, setting up the broadband connection in these areas would mean great investment in the e-learning, e-commerce and other economic activities (Khan, 2015). Fathaigh (2002) therefore concludes that access to stable internet is a basic prerequisite of online learning; also, the access to technology off-campus, comfort of technology, reliability of technology, ability to logon frequently and software skills are important technological aspects of eLearning readiness (Greaves, 2008).

In relation to exploring South African teachers' readiness for e-learning, findings generally revealed that although high school teachers have access to digital devices in their schools for teaching and learning, teachers do not integrate e-learning in their teaching methods, also information sharing in high schools are still paper-based. Findings also revealed that poor or unavailability of internet connectivity hinders teachers' e-readiness.

Conclusions

Access to high-quality and rich education is the main goal of any education system. E-learning is provides opportunity for teachers in schools to improve their skills to meet the demands of lifelong learning, but the implementation of e-learning needs to be well prepared for and managed and this is why it is important for schools to know if they are e-ready.

This paper investigated South African's high schools state of readiness to enjoy the benefit of technology enhanced learning. The paper focused on high schools' access to digital device and resources, the use of digital device and resource for teaching and learning, information sharing using digital device and resources and lastly, the challenges faced in using digital devices and resources. The paper concluded that if teachers in South African schools are to be ready for the use of digital learning and technologies, the Department of Basic Education (DBE) needs to introduce directive policies governing the use of digital technology in schools and also provide an adequate internet bandwidth that will ensure faster and reliable connectivity, hence facilitating easier access to e-learning in the 21st century.

Recommendations

In a globalised knowledge economy, enabled by an increasingly pervasive digital, networked world, where eLearning possibilities are being explored by educational institutions, where learning and teaching is and can now be designed to enable learning anywhere and at any time, this study recommends that teachers should endeavour to implement digital tools in their teaching methods. Teachers in South African schools should shift from a teaching method that is highly dependent on physical infrastructure such as schools and colleges, physical learning materials, and in class education delivery to a teaching method that makes extensive use of interactive education technology. However, in other to achieve the former, the study recommends that the Department of Basic Education (DBE) should introduce directive policies that governs the use of digital technology in schools as well as provide adequate internet bandwidth that will ensure faster and reliable connectivity.

Limitations of the Study

This study has some limitations that were considered when interpreting its findings. Firstly, this study is limited to high school principals in the Eastern Cape province, South Africa. Secondly, this study adopted a quantitative approach that included a survey strategy with questionnaires for principals of schools to establish a baseline of school needs and their readiness for e-learning. However, the research could have more validity if this study adopted mixed methods of quantitative approach (questionnaires) and qualitative approach (interviews) to reveal the e-learning readiness state of high schools in the Eastern Cape, South Africa.

Implications for Policy and Practice

This study showed that access to digital devices for teaching and learning are not obstacles towards e-learning readiness in South African schools. However, obstacles to e-learning readiness are teachers unwilling attitude to integrate e-learning in their teaching method and the poor or unavailability of internet connectivity in schools. Therefore, schools should develop their own operational plans, guidelines, indicators and strategies for e-Learning based on the provincial operational plans. Also, ICT directors should work with relevant stakeholders to refine and implement draft policies that are available in the Eastern Cape province to ensure the availability of internet connectivity in schools. Finally, there should be a revision of the current White Paper 7 on e-Education (DoE, 2004) to include a set of richer and more concise guidelines, and indicators for e-Learning in South African schools.

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