

## Multicultural Education

Research Article

Homepage: [www.MC-caddogap.com](http://www.MC-caddogap.com)**TECHNOLOGY AND INNOVATION MODEL TO IMPROVE CORE UNIVERSITY ACTIVITIES IN SOUTH AFRICA; A CASE STUDY OF A RURAL-BASED UNIVERSITY****Ayansola Olatunji Ayandibu (PhD)***Department of Business Management, Faculty of Commerce Administration and Law, University of Zululand, South Africa.***Elizabeth Oluwakemi Ayandibu (Mrs)***Department of Business Management, Faculty of Commerce Administration and Law, University of Zululand, South Africa.***ABSTRACT**

Rural-based universities face numerous challenges, including limited resources, lack of modern infrastructure, and insufficient access to technology. These limitations often hinder the universities' ability to provide quality education and conduct impactful research. However, advancements in technology and innovation offer opportunities to address these challenges and enhance core university activities.

The study adopts a Scoping literature approach. It examines the experiences and perceptions of academic staff, students, and administrative staff regarding the use of technology in teaching and learning, research, and administrative tasks. Furthermore, it explores existing initiatives, such as e-learning platforms, digital libraries, and research collaborations, to identify successful models that can be replicated and expanded upon.

The findings reveal that despite the limitations, the rural-based university has made some progress in incorporating technology into its core activities. However, there are significant gaps and untapped potentials for further integration. The study proposes a technology and innovation model specifically designed for the context of a rural-based university in South Africa. This model emphasizes the need for tailored solutions, capacity building, and partnerships with external organizations to address infrastructure challenges and promote sustainable technology adoption.

The implications of this research extend beyond the case study university, as the proposed model can serve as a framework for other similar institutions in South Africa and globally. It offers insights into leveraging technology to bridge the digital divide and enhance core university activities, contributing to the overall advancement of higher education in rural areas.

**ARTICLE INFO***Keywords:*

Technology, Innovation, Rural-Based University, South Africa, Core University Activities, Teaching, Learning, Research, Administrative Processes.

*Article History:*

Received: 25<sup>th</sup> Nov 2023

Accepted: 30<sup>th</sup> Dec 2023

Published: 20<sup>th</sup> Jan 2024

© 2023 The authors. Published by CADDO GAP Press USA. This is an open access article under the Creative Commons Attribution Non Commercial 4.0

**1. INTRODUCTION**

The Higher Education [HE] landscape across many countries has experienced very significant changes in the last decades. The constant change and increasing competition in most institutions resulting from globalisation, especially in this modern world lead to new demands in HE and thus made it inevitable to question the quality of education at Higher Education Institutions [HEIs] (Basar, Altinay, Dagli & Altinay, 2016). Today, there are important responsibilities of HEIs regarding the quality that presents value to people and continuous development. Research (Enders & Westerheijden 2014; Harvey & Williams 2010) shows that quality teaching and learning and research have become major strategic issues in HEIs worldwide over the last decades.

In Europe for instance, the Bologna process and other concurrent developments, have hastened the introduction and elaboration of institutionalised quality assurance and quality management mechanisms. According to Teichler (2012), the Bologna process strives to make degrees and learning outcomes more comparable across European university systems as an aid to increasing student and staff mobility across European higher education institutions. Although there exists no universally acceptable definition of quality education, there is a general pattern and model for the assessment of quality HE. Altbach, Reisberg and Rumbley (2009) argued that model quality HE is based on the understanding and institutional culture, along with peer review that does not affect the autonomy and freedom of scientific thinking and expression of the university.

Özer, Gür and Küçükcan (2010) explained that in general terms, quality assurance can be defined as systematically monitoring and assessing various dimensions of a project/service/institution to determine whether it meets the quality standards. In a similar opinion, Skolnik (2010) refers to quality assurance as the monitoring, assessment and review of activities of the stakeholders who benefit from HE in terms of meeting their views and expectations at minimum requirements. Altbach et al. (2009) claim that despite the consensus on the need for higher quality education, there is a need for quality assurance to be carefully examined with closely related issues such as university autonomy, national culture and university behavior according to the local conditions. There are significant differences among countries in the ways the quality assurance system is understood or measured. For instance, state HEIs in Austria do not practice accreditation but private institutions need to be accredited. In Sweden, National Higher Education Agency oversees accreditation, pays attention to the internal quality assurance systems of HEIs and practices a system that emphasises mutual interaction with HEIs. In South Africa, both public and private universities are expected to be accredited. As a result of quality assessment and university ranking around the world, many institutions have started searching for ways to improve upon their core mandate while meeting their target.

Against this background, the proposed study seeks to develop a new conceptual model on technology and innovation to assist HEIs in South Africa to improve upon their core functions as well as increase their ranking in the HE landscapes. This article addresses aspects such as the background of the study, problem statement, aims/rationale for the study, research questions and objectives, preliminary literature review / discussion, theoretical and conceptual frameworks, research methodology, contribution to the study and limitation to the study.

### **Background of the Study**

The term quality assurance is of paramount importance in any HEI across the globe. Zaki and Rashidi (2013) argued that the concept of quality education is a great concern for many stakeholders such as academics, governments and parents globally, and lately, this notion has also trended the realm of HE in Pakistan. According to Zaki and Rashidi (2013), it is an undeniable fact that there are many factors responsible for quality assurance both internally and externally. Previous studies (Bonser, 1992; Crosby, 1979; Juran & Gryna, 1988; Peters & Waterman, 1982) have also confirmed that quality is a key concern of academia worldwide and several efforts in multiple directions were employed by management, academia and administrators to incorporate it into core university activities, particularly teaching and learning and research. In most developed nations, research shows that quality assurance remains the primary concern in the policies and practices for HEIs that engage in the training of individuals to assume various roles in society (Crosby, 1979; Juran & Gryna, 1988). Just like in the developed world, developing countries have witnessed a major shift in the value system regarding education and institutions have begun discussions on the missing quality factor in the HE landscape which has rendered all efforts surrounding the training and grooming of masses ineffective (Zaki & Rashidi, 2013).

Shuttler and Crawford (1998) suggest that quality in education is perceived as a positive and dynamic idea achievable by design with meaningful investment. However, Navaratnam, Mordi and Mansor (1997) advocate that the quest for quality should reflect customer-oriented approach with continuous improvement of the products and services, and of the processes brought about by the planning, implementing, evaluating, and decision-making methods. Crosby (1979) avers that quality in education is achieved when education output conforms with the planned goals, specifications and requirements.

Sangra and González-Sanmamed (2011) argued that in the last few years, studies have highlighted the opportunities as well as the potential benefits of information and communication technologies (ICT) for improving the quality of education. According to UNESCO (2003), ICT is considered a major tool for building knowledge societies and, particularly, as a mechanism in schools that has the potential to provide a way to rethink and redesign the educational systems and processes to improve the quality of activities such as teaching and learning and research. The Commission of the European Communities (2001) states that in Europe, the

adoption of ICT in schools is considered a key instrument for improving quality education. Currently, the European Commission is promoting the use of ICT in learning processes through its e-learning action plan to improve the quality of learning across many schools. Apart from the adoption of ICT in schools, innovation in education is a highly contested issue across different continents. Peña-López (2016) claims that in recent years many governments have invested heavily in technological innovations or ICT with the view to improve the quality of education in their respective countries.

Serdyukov (2017) concurs that for an individual, a nation and mankind to survive, innovations and evolution are essential. Innovations in education are of particular importance because it plays a crucial role in creating a sustainable future (Hoffman & Holzhter, 2012). According to Cornali (2012), today's educational institutions are expected to be both effective and efficient, or in other words, to reach the goals set while making the best use of available resources. In the United States of America, underlying pressure to innovate comes from political, economic, demographic, and technological forces from both inside and outside the nation. According to Wildavsky, Kelly and Carey (2012), stakeholders of education in the USA seem to recognise that education at all levels critically needs renewal. The stakeholders of education proposed the need for more innovation in US schools. Serdyukov (2017) argues that in the USA, after more than 50 years now, the actual pace of educational innovations and their implementation is too slow as shown by the learning outcomes of both school and college graduates, which are far from what is needed in today's world.

In South Africa, the adoption of ICT and innovation in teaching and learning is not a new concept. It has been argued that between 1996 and 2000, ICT in South African HE experienced an expansion of computers and networks across institutions for use by staff with a particular concentration of computers in libraries (Czerniewicz & Brown, 2009). During this era, the introduction of ICT aimed to increase staff productivity and facilitate staff development. It was argued that between 1996 and 2000, the use of ICT and technological innovations for teaching and learning was fragmented, with a strong focus on computer-aided or assisted instruction. Research shows that while the potential for teaching and learning with ICTs and innovation in HE was acknowledged, there was also a strong sense of failure to realise this potential and respond to it, with perceived serious consequences for South African HEIs in terms of global competitiveness (Ng'ambi, Brown, Bozalek, Gachago & Wood, 2016). It has also been found that after several years of the introduction of ICT in the South African HE landscapes, the country still lacks a coherent national policy on the role of ICTs in HE teaching and learning (The Department of Higher Education and Training [DHET], 2012).

According to Nash (2009), although students' access to digital devices has increased over the years, a small but consistent group of first-year students arrive at universities with insufficient access to ICTs and basic computer literacy skills. Brown, (2013) alludes to the fact that most universities are now faced with the need to reconceptualise concepts such as computer literacy and move beyond a view of students' technical competence to one of situated knowledge practices that students need to use digital tools for communication, expression and social action in the academic world. To address these challenges in HEIs in South Africa, the current study aims to develop a conceptual model on how technology and innovation can be used as tools to improve university core functions such as teaching and learning and research.

### **Problem Statement**

Since the 1994 election, the South African HE sector has changed significantly influenced by global trends, national development goals as well as pressure from local educational institutions, in the context of a digitally networked world (Ng'ambi et al., 2016). The scholar further notes that the changes in technology-enhanced pedagogical practices and in discourses around information and communication technologies (ICTs) have had varying degrees of influence on HE (Ng'ambi et al., 2016). Evidence shows that the University of Cape Town and others were successful in obtaining funding from the government and other funding agencies to establish projects to explore the adoption or use of technology in education (Czerniewicz, 2008).

In the 2000s, as the notion of integrating ICTs was being challenged for the lack of consideration for personal, epistemological and social dimensions of access, the South African government began to see information as a commodity, equating access to ICTs making knowledge easier to obtain (Department of Education and Communication, 2001). As a result of this new development, many writers began to see technology as radical democratisation (Pejout, 2004). According to the Department of Education (2001), South Africa National Development Plan on HE acknowledges how ICTs and innovation brought far-reaching changes that influenced the HE landscapes in the twenty-first century. Several studies (Czerniewicz, Ravjee & Mlitwa, 2006; Keats, 2003; Keats, Collins & Petersen, 2001) have confirmed that there was an increasing proliferation of e-learning strategies at South African HEIs, where many have developed detailed and comprehensive policies

regarding the use of ICTs in teaching and learning, although in many cases the focus was limited to institutional learning management systems.

By 2004, the use of ICTs within the HE landscapes in South Africa was very much a reality, although use was quite narrow and was dominated primarily by instrumental tasks such as finding information and writing assignments (Czerniewicz & Brown, 2005; Hodgkinson-Williams & Mostert, 2006; Louw, Brown, Muller & Soudien, 2009). The South African government's e-education policy stipulated that all learners at HEs should be able to participate in the global community by using ICTs (Department of Education, 2004). However, the South African Council on Higher Education has noted that while other countries have developed policy frameworks for technologies in HE, there were no such national policies in South Africa as of 2007. The CHE also indicated in its report that while only a few HEIs in South Africa had developed ICT strategies (Universities of Pretoria, Stellenbosch, Cape Town and Western Cape and the Tshwane University of Technology), HEIs were shifting their focus from access to the use of Technology Enhanced Learning (TEL).

Research by (Kirkup & Kirkwood, 2005; Schmidt, 2008) shows that although there was a growing consciousness of the opportunities for pedagogical innovation through ICTs between 2006 and 2010, South African HEIs were still not able to use ICTs for the improvement and innovation of teaching and learning. It was found that the use of ICTs was limited to supporting traditional practices and only a small number of innovative practices started to mushroom. Moll, Adam, Backhouse and Mhlanga (2007) noted that studies on teaching and learning with ICTs showed a strong link to a pedagogical agenda, in particular student learning. However, by 2016 South Africa still lacks a coherent national policy on the role of ICTs in HE teaching and learning. It has been found that up to date many institutions in South Africa are still struggling with how to integrate technology and innovation into their core practices. Boyinbode, Ng'ambi and Bagula (2013) also noted that the challenges of the introduction of ICTs in most universities continue as some students continuously need to learn new academic skills to operate in a digital world.

It has been observed that while universities in South Africa often adopt ICTs as a distinctive feature of their professional identity and defining yardstick to benchmark their innovative teaching and learning strategies there is limited research evidence on how they have used technologies innovatively to transform their curricula design and delivery (Du Pré, 2009; Ntshoe & Selesho, 2014). Furthermore, evidence shows that most HEIs in South Africa particularly Universities of Technology are still struggling with integrating educational technologies into their curriculum design and delivery, which often leads to institutional decisions that hinder technology adoption (Bozalek, Ng'ambi & Gachago, 2013). In addition, literature reveals that despite technology adoption becoming a common practice at South African universities, the innovative use of emerging technologies to transform teaching and learning and research remains an emerging phenomenon (Gachago et al., 2013). The review of literature further shows that while much has been written and public on the integration of ICTs and innovation into HE curricula, there is a paucity of conceptual models on how technology and innovation improve teaching and learning and research in South African universities. This study seeks to develop a conceptual model of technology and innovation to improve core university functions in South Africa.

### **Aim of the Study**

The main aim of the study is to develop a conceptual model of technology and innovation to improve teaching and learning as well as research in South African universities. Furthermore, the study aims to assist universities to be positioned among world class universities in the global context.

### **Research Objectives**

To achieve the general objective of the study, the following specific research objectives will be investigated.

- To determine the readiness of the rural based university to integrate technology and innovation into its core functions;
- To identify the reasons for the adoption of technology and innovation into core functions at the rural based university;
- To investigate the challenges of integrating technology and innovation into the University's core functions;
- To explore the reasons why staff members resist the adoption of technology and innovation into the

integration of the core functions in the University;

- To analyse the type of relationship that exists between technology and innovation and core function of the rural based university;
- To examine how the challenges associated with the adoption of technology and innovation can be addressed.

### **Research Questions**

The study will find answers to the following research questions:

- What is the readiness of the rural based university to integrate technology and innovation into its core functions?
- Why will the rural based university integrate technology and innovation into its core functions?
- What are the challenges of integrating technology and innovation into the core functions of the rural based university?
- Why will staff members resist the adoption of technology and innovation into the integration of the core functions in the rural based university?
- What type of relationship exists between technology and innovation and core function of the rural based university?
- How do the challenges associated with the adoption of technology and innovation be addressed in the rural based university?

### **Preliminary Literature / Discussion**

This part of the article reviews empirical literature closely related to technology and innovation. The discussion focused on the research objectives.

### **Definition of Key Terms**

The key constructs such as technology and innovation are first defined in this section. Throughout the literature, various definitions exist of the term technology. According to Hall and Khan (2003), technology adoption refers to a consistent process that assists users in successfully adopting and using sophisticated or new inventions for a particular purpose. Younes and Al-Zoubi (2015) defined technology as application, art or skill, and means science and learning. However, from the linguistic point of view, technology refers to methods and tools that a society has developed to facilitate the solution of its practical problems and to provide the necessary needs for the community (Al-Majali, 2007).

The term innovation has been defined as the creation or adoption of new ideas or behaviors (Amabile 1988; Daft 1978). On the contrary, Anderson, Potočnik, and Zhou (2014) see innovation as the process, outcomes, and products of attempts to develop and introduce new and improved ways of doing things.

To improve core university activities in South Africa through technology and innovation, it is important to consider the systemic, institutional, and personal levels of a comprehensive model. This model aims to address various aspects of the university ecosystem to foster growth and enhance the quality of education, research, and administrative processes. Below is an overview of each level:

1. **Systemic Level:** At the systemic level, the focus is on the broader policy and regulatory framework that governs higher education in South Africa. To enhance technology and innovation, the following strategies can be considered:
  - a. **National Initiatives:** Encourage the government to develop and fund national initiatives that promote technology and innovation in universities, such as research grants, innovation hubs, and collaborative platforms.
  - b. **Collaboration and Partnerships:** Facilitate partnerships between universities, industry, and government to foster research collaborations, knowledge transfer, and commercialization of innovations.



- c. Policy Support: Advocate for policies that incentivize universities to invest in technology infrastructure, research commercialization, and intellectual property rights.
2. Institutional Level: At the institutional level, universities need to create an enabling environment for technology and innovation. This involves the following actions:
  - a. Technology Infrastructure: Invest in state-of-the-art technological infrastructure, including high-speed internet, research laboratories, and innovation spaces, to support cutting-edge research and experimentation.
  - b. Research and Innovation Culture: Foster a culture of research and innovation by providing incentives, recognition, and support for faculty and students engaged in research and innovation activities.
  - c. Industry Engagement: Establish strong ties with industries, including internships, cooperative education programs, and joint research projects, to bridge the gap between academia and the practical application of knowledge.
  - d. Entrepreneurship Support: Develop entrepreneurship programs and incubators to nurture entrepreneurial skills among students, faculty, and staff, enabling them to transform research outcomes into viable commercial ventures.
3. Personal Level: At the personal level, individuals within the university community need to be equipped with the necessary skills and mindset to leverage technology and drive innovation. This includes:
  - a. Training and Development: Provide training programs to enhance digital literacy, research methodologies, and innovation management skills among faculty, researchers, and administrative staff.
  - b. Student Empowerment: Integrate technology and innovation into the curriculum, offering courses, workshops, and extracurricular activities that encourage creativity, critical thinking, and problem-solving.
  - c. Mentoring and Support: Establish mentorship programs that connect students and early-career researchers with experienced faculty and professionals in their respective fields, fostering knowledge exchange and guidance.

By considering these systemic, institutional, and personal levels, South African universities can create a conducive environment for technology and innovation. This readiness model aims to drive research excellence, promote knowledge transfer, and enhance the overall quality of education, leading to positive societal impact and economic development. This article explores the technology and innovation readiness at governance, management, staff and students levels. This will help them enhance the adequate use of technology in discharging their duties.

### **Readiness of Universities to Adopt Technology and Innovation**

Adopting technology and innovation in teaching and learning and research without planning results in excess costs. Rohayani (2015) suggests that the adoption of technology and innovation (e-learning) can be initiated by assessing the readiness of the institutions. In measuring the readiness to adopt technology and innovation in HEIs, several factors such as policymakers and regulatory bodies, competencies of the users, the experience of the users/staff, attitudes of the staff, knowledge skills and habits towards technology and innovation, source of funding, organisational barriers, motivation for adopting technology and innovation, the culture of the institution, infrastructure development must be considered. (Azimi, 2013; Sadik, 2007).

A study shows that the assessment or technological readiness measures the extent to which the participants have adequate technical skills to pursue e-learning (Coopasami, Knight & Pete, 2017). It was found that there are eight readiness categories including psychological readiness, sociological readiness, environmental readiness, human resource readiness, financial readiness, technological skills readiness, equipment readiness and content readiness (Coopasami et al., 2017). Although most universities have adopted technology and innovation in their core functions such as teaching and learning and research, it appears that many research did not investigate the readiness of some of these institutions (Urme & Barua, 2023). In view of this, this study intends to investigate the readiness of the rural based university to adopt technology and innovation in teaching and learning and research.

## **Reasons for the adoption of technology and innovation in universities**

There exist varied reasons for the adoption of technology and innovation in universities across the globe. Murgor (2015) argues that a significant several universities and HEIs have adopted technology and implemented it productively to develop skilled human resources in respective areas of specialisation. According to Prensky (2001), in many European universities, the purpose of adopting ICTs and innovation is to allow students to use them daily and seamlessly for studies and recreation and social interactions. Librobo (2001) and Luboobi (2007) found that ICTs and innovation are introduced in universities worldwide to improve learning.

A study also reveals that the reason for adopting technology in universities, especially in advanced countries like the USA is to reduce costs (Luboobi, 2007). However, in developing countries like Africa, this may not be the case. Notwithstanding help from several donor agencies, the issue of hardware and bandwidth provision remains hard nuts to crack in Africa (Putro, Hadi, Rajiani & Abbas, 2023). According to Murgor (2015), although there are several reasons for adopting technology in universities, the integration of ICT into teaching is yet to be given serious consideration by many developing nations of the world, particularly Africa. It is against this background that this study aims to explore some of the reasons for integrating technology and innovation into teaching and learning as well as research at the rural based university.

## **Challenges of adopting technology and innovation in universities**

Murgor (2015) states that the realisation of technology in HE in general and science and engineering in particular is faced with various challenges and the African universities are no exception. Loing (2005) believes that significant challenges facing African universities regarding the integration of technology and innovation into teaching and learning have to do with national policies and plans. It has been found that many African countries do not have national ICT policies (Lubinga, Maramura & Masiya, 2023). This leads to a situation where each university has to do what it believes is best to do without a central coordinating document (Loing, 2005). According to Luboobi (2007), the regulatory frameworks for technology and intellectual property rights are still restrictive in most African countries. Furthermore, it has been found that major external force that seems to have plagued ICT implementation in universities is the problem of Bandwidth (Luboobi, 2007). The high cost of bandwidth, inadequate and unreliable telecommunication services and applications remain a major challenge. There is also the problem of insincerity on the part of the service providers. Many universities pay for an amount of bandwidth that is never supplied to them (Luboobi, 2007).

Sadik (2007) notes that adopting technology (e-learning) is one of the major problems in faculty development plans at Egyptian universities. Sadik (2007) in his survey explored how support systems and procedures for staff could be further developed to enable the universities make the most effective and appropriate use of learning technologies to enhance the student and staff experience. The results revealed that the majority of respondents, who came from a wide range of faculties across the universities y, considered themselves to have limited competence and little experience in e-learning.

## **Resistance to the adoption of technology and innovation in varsities**

It is an undeniable fact that change is inevitable in every organisation. According to Lucas (1997), the rapid infusion and diffusion of information and communication technology into public universities in Kenya raise important management issues for top management and the technical staff. Lucas (1997) asserts that many staff members including top and technical staff resisted the adoption of ICTs into teaching and learning because of the fear of losing their jobs. Kirkup and Kirkwood (2005) argue that staff may resist the introduction of new technology and innovation if management fails to communicate properly. Heads of schools need to create awareness of new initiatives that are being introduced. Normally, people resist change when there is a failure on the part of management to inform staff about it. Ng'ambi et al. (2013) state that resistance is likely to occur when people lack the basic computer and technical skills to use the new technology or invention.

## **2. THEORETICAL FRAMEWORK AND CONCEPTUAL MODEL**

The study is supported by both theoretical and conceptual frameworks. A conceptual model will be developed from the theoretical framework which underpins the study.

## Theoretical framework

Although various theories support e-learning or technology and innovation in schools, however, this study will adopt the “Chapnick Readiness Model”. Chapnick (2000) developed the readiness model to determine the e-learning readiness of an organisation by providing answers to the following basic questions, namely: can we do this? If we can how can we achieve it? what will the results be and how do we evaluate them? The model groups divided factors that determine e-learning or ICTs readiness into eight categories as follows:

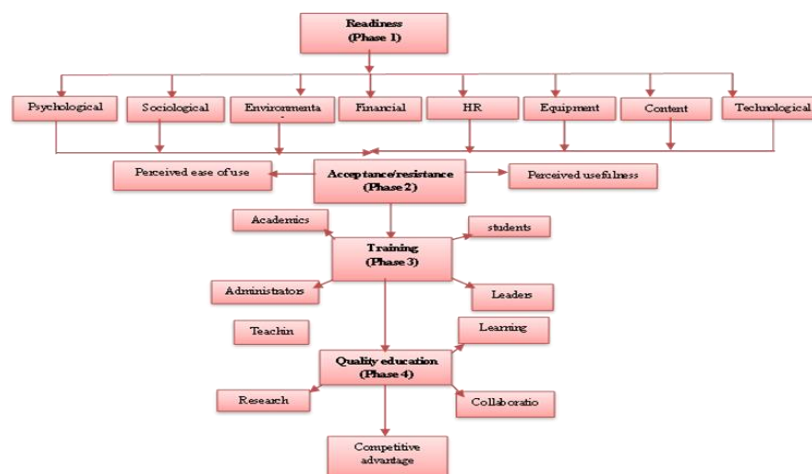
- **Psychological readiness:** This focuses on the participant’s or individual’s state of mind as it impacts the outcomes of the e-learning initiative. This type of readiness is considered the most significant aspect of readiness that could affect the integration of technology and innovation into universities’ core functions such as teaching and learning and research (Chapnick, 2000).
- **Sociological readiness:** This type of readiness pays key attention to the characteristics of the environment in which the programme will be conducted (Chapnick, 2000).
- **Environmental readiness:** It also considers the forces affecting stakeholders both inside and outside the organisation (Chapnick, 2000).
- **Human resource readiness:** This type of readiness reflects on the accessibility and plan of the human support system (Chapnick, 2000)
- **Technological skill readiness:** It accesses the availability of technical support in relation to e-learning or innovative teaching and learning (Chapnick, 2000).
- **Equipment readiness.** This has to do with the ownership and availability of proper and appropriate equipment (Chapnick, 2000).
- **Content readiness:** It pays critical attention to the substance of the curriculum being developed for teaching and learning (Chapnick, 2000).

Kaur and Zoraini Wati (2004) argued that e-learning readiness is very crucial if effective e-learning programmes are to be achieved. So and Swatman (2006) see readiness as the ability of an individual to be prepared mentally or physically for some experience or action. Karmakar and Wahid (2000) suggested that an institution that is ready to implement technology and innovation provides the ideal environment in which continuous learning and teaching can take place. The Chapnick Readiness Model is very appropriate for the study because it will help to determine whether an institution and its students are psychologically and technically prepared to implement technology and innovation in teaching and learning as well as research. Again, the Readiness Model will make the institution aware of what is required to optimally facilitate technology and innovative teaching and learning and research.

## Conceptual model

The proposed conceptual model which guides the study is shown in Figure 1

**Figure 1** Technology and innovation readiness model



Source: Adopted from Akaslan and Law, 2011



This model was adopted from Akaslan and Law (2011) to help determine the factors affecting technology and innovation in HEIs. From the proposed conceptual model eight factors could affect the adoption of technology and innovation in HEIs including psychological, sociological, environmental, financial, HR, technological, equipment and content. The interaction of technology and innovation factors and readiness may impact universities. These factors may either create satisfaction or dissatisfaction regarding the adoption of technology and innovation in teaching and learning and research in universities. If the interaction is positive, then the benefits will also be positive, however, if the interaction is negative, it leads to negative or pessimistic results for the academics, students and the institutions. The decision by an institution to integrate technology and innovation into teaching and learning and research may be accepted or rejected based on the perceived usefulness and ease to use. The positive interaction is appreciable and leads to academics/staff progress in terms of reaching more students within a limited time along with higher flexibility and leads to students' progress in terms of gaining higher knowledge through a variety of resources and books available online. Flexibility and convenience are positive points for both students and academics as they can learn or make others learn from any location. The successful integration of technology and innovation in universities is likely to positively impact on core activities such as teaching and learning, research and collaboration, which can lead to competitive advantage.

### 3. RESEARCH METHODOLOGY

The methodology used for this research is scoping literature review. Furthermore, the article also followed the below steps:

The purpose of this methodology section is to outline the steps taken to conduct a literature review for this journal article. The literature review was conducted to provide an overview of the existing research on a particular topic and to identify any gaps in the literature.

Step 1: The main research question/objective is "To determine the readiness of the rural based university to integrate technology and innovation into its core functions". The first step in conducting a literature review is to define the research question or topic. This involves identifying key concepts and terms that were used to search for relevant literature. The research question was clearly stated and focused to ensure that the review is comprehensive and relevant.

Step 2: The second step that was followed in conducting the literature review is to conduct a comprehensive search for relevant literature. This involves searching electronic databases, such as Google Scholar, Web of Science, SCOPUS, etc using a combination of keywords and Boolean operators to identify relevant studies. In addition, manual searching of reference lists from identified studies is also done to find additional relevant studies.

Step 3: The third step in conducting a literature review article was to screen and select studies that meet the inclusion criteria. The inclusion criteria were established at the outset and were based on the research question. Studies that do not meet the inclusion criteria were excluded from the review. Screening and selection of studies were done in two stages. In the first stage, titles and abstracts were screened to identify potentially relevant studies. In the second stage, full-text articles were reviewed to determine if they met the inclusion criteria. The articles that met up with managing research administration in the universities were included and those that did not, were excluded.

Step 4: The fourth step in conducting this literature review article was to extract data from the selected studies and synthesize the findings. Data extraction involves the systematic and objective identification, and explanation/summary of data from the selected studies synthesized. The data that was extracted included study outcomes and key findings. The synthesis of findings involves the analysis and interpretation of the data and the identification of patterns and themes.

Step 5: The fifth step was assessing the quality of the selected studies. Quality assessment involves evaluating the validity, reliability, and generalizability of the studies. The quality assessment criteria were established at the outset and were based on the research question.

Step 6: The final step was to write the review. The review was structured and included an introduction, literature review, methods, findings recommendations, and area of future research sections. The introduction provided background information on the topic and the research question. The methods section should describe the steps taken to conduct this literature review article. The finding sections summarised the findings. The recommendation section gave recommendations based on the findings, identify gaps in the literature, and

provide suggestions for future research.

### **Suggested solutions on Technology and Innovation Model to Improve Core University Activities in South Africa.**

To solve problems associated with technology and innovation and improve core university activities in a rural-based university in South Africa, you can consider the following steps:

1. **Assess the current situation:** Begin by conducting a thorough assessment of the university's existing technology infrastructure, innovation practices, and core activities. Identify the specific challenges and areas that require improvement. This assessment will serve as a baseline for developing targeted solutions.
2. **Establish a technology and innovation committee:** Form a dedicated committee comprising faculty members, administrators, and IT professionals who have a keen interest in technology and innovation. This committee will be responsible for driving change, implementing new initiatives, and monitoring progress.
3. **Develop a technology and innovation strategy:** Create a comprehensive strategy that outlines the goals, objectives, and action plans for integrating technology and innovation into core university activities. Consider factors such as infrastructure development, training and capacity building, research collaboration, and community engagement.
4. **Improve technology infrastructure:** Upgrade and expand the university's technology infrastructure to support innovative teaching and research practices. This may include investing in high-speed internet connectivity, modern computer labs, software licenses, and digital learning platforms. Ensure that the infrastructure is accessible and reliable, especially in rural areas where connectivity may be a challenge.
5. **Foster a culture of innovation:** Encourage a culture of innovation among faculty, staff, and students. Organize workshops, seminars, and conferences to promote creative thinking, problem-solving skills, and entrepreneurship. Establish innovation hubs or incubators where students and researchers can collaborate on projects and develop their ideas.
6. **Establish partnerships and collaborations:** Forge partnerships with industry, government agencies, and other universities to enhance technology transfer, research collaborations, and funding opportunities. Seek out grants and funding specifically designed to support technology and innovation initiatives in rural areas.
7. **Offer relevant training and support:** Provide regular training sessions and workshops to enhance the technological skills of faculty, staff, and students. Offer support services such as a dedicated IT helpdesk, technical assistance, and mentoring programs to ensure that individuals can effectively utilize technology in their core activities.
8. **Incorporate technology into teaching and learning:** Encourage faculty members to integrate technology into their teaching methodologies. Promote the use of digital tools, online learning platforms, and interactive multimedia content to enhance the learning experience. Provide incentives for innovative teaching practices and recognize faculty members who excel in this area.
9. **Support research and development:** Allocate resources and funding to support research projects focused on technology and innovation. Encourage faculty and students to engage in applied research that addresses local challenges and contributes to the development of the rural community.
10. **Monitor and evaluate progress:** Regularly assess the implementation of technology and innovation initiatives to gauge their effectiveness and identify areas for improvement. Collect feedback from faculty, staff, and students to understand their experiences and make necessary adjustments to the strategy.

The implementation of technology and innovation initiatives requires a long-term commitment and continuous improvement. It's essential to involve all stakeholders and ensure that the solutions are tailored to the unique needs and challenges of the rural-based university in South Africa.

### **Contribution of the Study**

The importance of this study cannot be overemphasised. Firstly, the study is very significant in the sense that it will help HEIs to improve their core functions such as teaching and learning and research. Secondly, the

study will help HEIs in South Africa to improve upon their ranking globally. Thirdly, the study will serve as a reference point of material for researchers who intend to carry out a similar study of this nature. Fourthly, the study will be used as a tool by the South African government well as HEIs to achieve high-quality education.

### **Limitation to the study**

The scoping literature review article has some limitations which are discussed below:

**Lack of depth:** Scoping reviews typically aim to provide a broad overview of the available literature on a particular topic. Consequently, they may lack the depth and detail provided by more focused systematic reviews or meta-analyses. As a result, scoping reviews may not provide a comprehensive understanding of the research landscape or answer specific research questions.

**Limited quality assessment:** Scoping reviews often prioritize breadth over the quality assessment of included studies. Unlike systematic reviews, scoping reviews do not typically assess the methodological rigor or quality of the included studies. This limitation can affect the overall reliability and validity of the findings.

**Potential for bias:** Due to the iterative and subjective nature of scoping reviews, there is an increased risk of bias in the selection and interpretation of the literature. The inclusion/exclusion criteria and search strategy may introduce unintended biases, potentially leading to an incomplete or skewed representation of the available evidence.

**Lack of statistical analysis:** Scoping reviews focus on summarizing and presenting descriptive data rather than conducting statistical analyses or synthesizing quantitative data. As a result, they may not provide precise effect sizes, pooled estimates, or quantitative assessments of the relationships between variables.

**Limited stakeholder involvement:** Scoping reviews often prioritize mapping the existing literature and identifying knowledge gaps rather than actively engaging stakeholders such as practitioners, policymakers, or patients. This limitation may restrict the potential for incorporating diverse perspectives and input from key stakeholders.

**Evolving literature:** Literature reviews, including scoping reviews, are based on existing published literature at a specific point in time. However, research is continually evolving, and new studies may be published after the review is completed, potentially rendering the findings outdated.

**Publication bias:** Scoping reviews, like other types of literature reviews, are susceptible to publication bias. Studies with significant findings or positive results are more likely to be published, while studies with negative or inconclusive results may remain unpublished. This bias can affect the comprehensiveness and representativeness of the included studies.

### **Area for future research**

The next phase of this study should focus on a comprehensive analysis of the existing technological infrastructure, innovation adoption, and its impact on various facets of academic and administrative operations. Conducting surveys, interviews, and workshops with key stakeholders, including faculty, students, administrators, and local community members, will provide valuable insights into the current state of technology integration and innovation within the university. Moreover, a comparative analysis with urban-based universities could offer a broader perspective on the challenges and opportunities specific to rural settings. Furthermore, it is essential to investigate potential barriers to technology adoption and innovation in the context of the local community, considering factors such as accessibility, socio-economic conditions, and cultural considerations. This holistic approach will contribute to the development of targeted recommendations for implementing technology-driven improvements tailored to the unique needs and challenges of a rural university in South Africa.

## **4. CONCLUSION**

In conclusion, this study highlighted the importance of technology and innovation in improving core university activities at a rural-based university in South Africa. By adopting a technology and innovation readiness model, the proposed model aimed to address the challenges faced by such institutions and enhance their capacity to provide quality education, conduct impactful research, and streamline administrative processes.

### References

1. Al-Majali, F. (2007). The use of the Internet and its impact on social relations among university students. *An Empirical Study*, lighthouse, 13(7).
2. Altbach, P. G., Reisberg, L., & Rumbley, L. E. (2009). *Trends in global higher education: Tracking an academic revolution*. Paris: UNESCO.
3. Anderson, N., K. Potočnik, and J. Zhou. 2014. "Innovation and Creativity in Organizations: A State-Of-The-Science Review, Prospective Commentary, and Guiding Framework." *Journal of Management* 40 (5): 1297–1333. doi:10.1177/0149206314527128.
4. Azimi, H. M. (2013). Readiness for implementation of e-learning in colleges of education. *Journal of Novel Applied Sciences*, 2(12), 769-775.
5. Basar, G., Altinay, Z., Dagli, G., & Altinay, F. (2016). Assessment of the Quality Management Models in Higher Education. *Journal of Education and Learning*, 5(3), 107-121
6. Bonser, C. F. (1992). Total quality education?. *Public Administration Review*, 52(5), 504-517
7. Brown, R. (2013). A Survey of Professor Acceptance and Use of E-Textbooks in Higher Education. *Contemporary Issues in Education Research*, 6(2), 219-222.
8. Coopasami, M., Knight, S., & Pete, M. (2017). e-Learning readiness amongst nursing students at the Durban University of Technology. *health sa gesondheid*, 22(1), 300-306.
9. Cornali, F. (2012). Effectiveness and efficiency of educational measures: Evaluation practices, indicators and rhetoric. *Sociology Mind*, 2(03), 255.
10. Crosby, P. B. (1979). *Quality is Free*, New York, NY: McGraw Hill.
11. Czerniewicz, L. (2008). Distinguishing the Field of Educational Technology. *Electronic Journal of e-Learning*, 6(3), 171-178.
12. Czerniewicz, L., & Brown, C. (2009). A study of the relationship between institutional policy, organisational culture and e-learning use in four South African universities. *Computers & Education*, 53(1), 121-131.
13. Czerniewicz, L., & Carr, T. (2005). Guest Editorial - Growing communities of practice among educational technology researchers and practitioners in development-oriented contexts. *Linking Local and Global Debates, IJEDICT*, 1, 2. Retrieved 8 January, 2016, from <http://ijedict.dec.uwi.edu/viewarticle.php?id=72&layout=html>
14. Czerniewicz, L., Ravjee, N., & Mlitwa, N. (2006). ICTs and the South African Higher Education Landscape. *Higher Education Monitor*. Council for Higher Education. Pretoria.
15. Department of Education (DoE) (2001). *The National Plan for Higher Education*. Retrieved 4 January , 2020, from <http://www.justice.gov.za/commissions/FeesHET/docs/2001-NationalPlanForHigherEducation.pdf>
16. Department of Education (DoE) (2004). *White paper on e-Education. Transforming learning and teaching*. Retrieved 8 January, 2020, from [http://www.sahistory.org.za/sites/default/files/white%20\\_paper\\_on\\_e-education\\_2004.pdf](http://www.sahistory.org.za/sites/default/files/white%20_paper_on_e-education_2004.pdf)
17. DHET (Department of Higher Education and Training) ( 2012). *Green paper for post-school education and training*. Pretoria: DHET.
18. Enders, J., & Westerheijden, D. F. (2014). The Dutch way of new public management: A critical perspective on quality assurance in higher education. *Policy and Society*, 33(3), 189-198.
19. European Commission. Working Committee on Quality Indicators, & European Commission. Directorate-General for Education. (2001). *European Report on the Quality of School Education: Sixteen Quality Indicators: Report Based on the Work of the Working Committee on Quality Indicators*. Office for Official Publications of the European Communities.
20. Harvey, L., & Williams, J. (2010). Fifteen years of quality in higher education (Part Two). *Journal of Quality Higher Education*, 16, 81-113: <https://doi.org/10.1080/13538322.2010.485722>
21. Hodgkinson-Williams, C., & Mostert, M. (2006). *The use of ICTs in teaching and learning: a survey of academic staff and students at Rhodes University*. Draft Report version 1d Unpublished, Rhodes University.
22. Hoffman, A. and Holzhtuter, J. (2012). The evolution of higher education: innovation as natural selection”, in Hoffman, A. and Spangehl, S. (Eds), *Innovation in Higher Education: Igniting the Spark for Success*, American Council on Education, Rowman & Littlefield Publishers Inc., Lanham, MD, pp. 3-15
23. Juran, J. M., & Gryna, F. M. (1988). *Juran's Quality Control Handbook*, New York, NY: McGraw-Hill.
24. Keats, D. W. (2003). *Knowledge Environment for Web-based Learning (KEWL): An Open Source Learning Management System Suited for the Developing World*. *The Technology Source*, January/February 2003. Retrieved 8 January, 2020, from <http://technologysource.org/article/knowledg>
25. Keats, D. W., Collins, J., & Petersen, Y. (2001). The internet as an outreach tool: the UWC case. *South African Journal of Higher Education*, 15(2), 185–193.
26. Kirkup, G., & Kirkwood, A. (2005). Information and communications technologies (ICT) in higher education teaching - a tale of gradualism rather than revolution. *Learning, Media and Technology*, 30(2), 185–199.
27. Louw, J., Brown, C., Muller, J., & Soudien, C. (2009). Instructional technologies in social science instruction

- in South Africa. *Computers in Education*, 53(2), 234–242.
28. Lubinga, S., Maramura, T. C., & Masiya, T. (2023). The Fourth Industrial Revolution Adoption: Challenges in South African Higher Education Institutions. *Journal of Culture and Values in Education*, 6(2), 1-17.
  29. Moll, I., Adam, F., Backhouse, J., & Mhlanga, E. (2007). Status report on ICTs and higher education in South Africa: prepared for the Partnership on Higher Education in Africa Unpublished, South African Institute for Distance Education.
  30. Murgor, T. K. (2015). Challenges Facing Adoption of Information Communication Technology in African Universities. *Journal of Education and Practice*, 6(25), 62-68.
  31. Nash, J. (2009). Computer skills of first-year students at a South African university. In *Proceedings of the 2009 Annual Conference of the Southern African Computer Lecturers' Association* (pp. 88-92). ACM.
  32. Navaratnam, V., Mordi, M. N., & Mansor, S. M. (1997). Simultaneous determination of artesunic acid and dihydroartemisinin in blood plasma by high-performance liquid chromatography for application in clinical pharmacological studies. *Journal of Chromatography B: Biomedical Sciences and Applications*, 692(1), 157-162.
  33. Ng'ambi, D., Brown, C., Bozalek, V., Gachago, D., & Wood, D. (2016). Technology enhanced teaching and learning in South African higher education—A rearview of a 20 year journey. *British Journal of Educational Technology*, 47(5), 843-858.
  34. Ng'ambi, D., Bozalek, V., & Gachago, D. (2013). Empowering educators to teach using emerging technologies in higher education – a case of facilitating a course across institutional boundaries. In *Proceedings of the Eighth International Conference on e-Learning*, Cape Peninsula University of Technology, June 27–28, 2013
  35. Özer, M., Gür, B. S., & Küçükcan, T. (2010). *Yükseköğretimde kalite güvencesi*. Ankara: SETA Yayınları.
  36. Pejout, N. (2004). The communication of communication. An illustration: The South African rhetorical promotion of ICTs'. *Politikon*, 31(2), 185–199.
  37. Peña-López, I. (2016). *Innovating education and educating for innovation. The power of digital technologies and skills*. Paris: OECD Publishing
  38. Peters, T. J., & Waterman, R. H. (1982). *Search of Excellence*, New York, NY: Harper and Row
  39. Putro, H. P. N., Hadi, S., Rajiani, I., & Abbas, E. W. (2023). 16. Adoption of e-Learning in Indonesian Higher Education: Innovation or Irritation?. *Membelajarkan Diri Menulis Membukukan Tulisan*, 22(1), 177.
  40. Rambe, P. (2016). The role of educational technology in design and delivery of curricula programmes: A case of STEPS at a University of Technology. *The African Journal of Information Systems*, 8(2), 5.
  41. Rohayani, A. H. (2015). A literature review: readiness factors to measuring e-learning readiness in higher education. *Procedia Computer Science*, 59, 230-234.
  42. Sadik, A. (2007). The readiness of faculty members to develop and implement e-learning: The case of an Egyptian university. *International Journal on E-learning*, 6(3), 433-453.
  43. Sangra, A., & González-Sanmamed, M. (2011). The Role of Information and Communication Technologies in Improving Teaching and Learning Processes in Primary and Secondary Schools. *Journal of Asynchronous Learning Networks*, 15(4), 47-59.
  44. Schmidt, P. (2008). Open courseware as an example for user-centric innovation in higher education – towards a new social role of the university. *Proceedings of the 4th International Barcelona Conference on Higher Education*. Vol. 2. Knowledge technologies for social transformation. Barcelona: GUNI. Retrieved 8 January, 2020, from [http://upcommons.upc.edu/bitstream/handle/2099/5735/l2\\_pap\\_Schmidt.pdf?sequence=1](http://upcommons.upc.edu/bitstream/handle/2099/5735/l2_pap_Schmidt.pdf?sequence=1)
  45. Serdyukov, P. (2017). Innovation in education: what works, what doesn't, and what to do about it?. *Journal of Research in Innovative Teaching & Learning*, 10(1), 4-33.
  46. Shuttler PME, Crawford LED (1998). The Challenge of ISO 9000 Certifications in Higher Education. *Quality Assurance in Education*, 6 (3) 152-161
  47. Skolnik, M. L. (2010). Quality assurance in higher education as a political process. *Higher Education Management and Policy*, 22(1), 67-86. <http://dx.doi.org/10.1787/hemp-22-5kmlh5gs3zr0>
  48. Teichler, U. (2012). Excellence and internationality of higher education. *Tying It All Together: Excellence, Mobility, Funding and the Social Dimension in Higher Education*, 24-56.
  49. UNESCO (2003) *Global monitoring report: gender and education for all. The leap to equality* Paris UNESCO
  50. Urme, U. N., & Barua, B. (2023). Assessing the online teaching readiness of faculty member. *Journal of Research in Innovative Teaching & Learning*.
  51. Wildavsky, B., Kelly, A. & Carey, K. (Eds) (2012). *Reinventing higher education: The Promise of Innovation*, Harvard Education Press, Cambridge, MA.
  52. Zaki, S., & Rashidi, M. Z. (2013). Parameters of Quality in Higher Education: A Theoretical Framework. *International Journal of Social Sciences & Education*, 3(4), 1-10.