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Editorial

Dolina Dowling

Over the past years, much has been written about the Fourth Industrial Revolution and how it is leading to a fundamental change in the way we live and work. The merging of the biological, physical and digital worlds, along with a fusion of technologies, is disrupting our institutions, businesses and societies, and it will continue to do so to an extent that we cannot yet foresee. This game-changing technologically-driven revolution offers both a future wherein the lives of (some) humans are bettered but also a danger that those who live in a poorly serviced digital world are left further and further behind. In short, the current digital divide will exponentially increase unless there are concerted efforts by global actors (such as the World Economic Forum, UNESCO, the World Bank), regional trading blocs (such as BRICS and the EU), and national governments.

Addressing the divide is especially important in the higher education (HE) sector. Prior to COVID-19, progress had been made in using technologies to provide opportunities to those who might not otherwise have had access, such as online programmes and Massively Open Online Courses (commonly called MOOCs). This has benefited adult learners in particular. However, progress has been uneven both within countries and across continents despite the many signals that HE had to evolve from being the 'least digitised and most people-intensive business sectors' to the digital transformation of teaching and learning so that students are prepared for an ever more digital future.[1] They need to have the skills to (i) successfully compete in a global workplace in employment that does not yet exist and (ii) be able to fully participate in their societies.

The pandemic forced all sectors of education to shift to remote learning due to lockdowns. Indeed, at the height of the pandemic, it is estimated that 1.6 billion learners were out of school – i.e., 85% of learners worldwide.[2] Remote learning during this period had various degrees of success. School closures, particularly in developing countries, often meant no formal learning took place at all due to a lack of technological infrastructure. Furthermore, many faculty and teachers worldwide had limited technological skills and even more had little training in the use of information and communication technologies (ICTs) in education systems (EdTech). Hence, there is a large deficit that needs to be made up in order for learning to be congruent with the economic and societal needs that come with our ever deeper moves into the 21st century.

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1 European Commission (2022) *The Future of Digital and Online Learning in Higher Education*. S. Humpi & T. Andersen Reflection Paper Series, doi: 10.2766/587756

2 World Bank Group (2021) Digital Technologies in Education. www.worldbank.org/en/topic/edutech

In this 17th edition of the IJTL, the first cluster of articles reflects this sense of urgency with respect to the use of EdTech in teaching and learning. Both the education of teachers and learners are important for student attainment. In the first article, the authors are concerned with promoting active learning using mobile and web-based design interfaces, design principles, and online engagement. Using a Design Science Research paradigm, they developed a 10-step framework adapted from the Multi-Motive Information Systems Continuance (MISC) Model. In the next article, the author undertook a case study to understand the factors constraining the uptake of ICT in schools. He found that both poor technological pedagogical knowledge and little experience in integrating computers into the classroom were impacting negatively on ICT uptake. The author recommends that ICT professional development opportunities for teachers is needed. The following article addresses the challenges of student motivation and engagement in e-learning. The authors used a case study to explore how gamified quizzes influence the motivation of programming students. Their findings were mixed: the use of gamified quizzes strengthens student understanding and confidence but only in low stakes activities. The next article explores the effectiveness of digital media as teaching tools in Chemistry for second-year pre-service teachers. The author found that their use typically enhanced conceptual understanding. The last article in this cluster returns to the issue of online leaning during COVID-19. In a country like South Africa, the digital divide is acute. Students living in its rural areas generally have limited if any internet connectivity and access to digital devices. The authors recommend that HE leaders and managers put in place mechanisms and resources to address the digital gap.

The second cluster in this issue of the journal centres around various aspects of teaching and learning. The first article explores the quality management arrangements that a sample of Private Higher Education Institutions have implemented for programme reaccreditation by the Higher Education Quality Committee of the Council for Higher Education. The second article uses a constructivist paradigm to explore postgraduate supervisors' perceptions of supervision. The findings resulted in reframing postgraduate supervision as a teaching and learning practice. The authors in the following paper used three case studies to determine the application of general pedagogical knowledge and their intention-realisation in the classroom. The final article in this cluster explored, using a mixed method approach, the impact of teachers' professional development on second language learning of Grade 1 learners.

In Practitioners' Corner, the shortage of teachers led the author to conduct a case study to determine what conditions would encourage former teachers to return to teaching. A number of factors were identified including a supportive school environment, better remuneration, a manageable workload, and sufficient resources.

Measuring the effectiveness of e-learning contents for active learning when deployed on mobile and web-based design interfaces using the Multi-Motive Information Systems Continuance (MISC) Model[1]

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ABSTRACT

Active learning is evolving as an interesting area of research at many higher institutions of learning, and this paper presents its practical contributions and implications for developing e-learning contents for both mobile and web-based design platforms and interfaces. With current advances and development in the best design interfaces, the literature indicates that the gaps identified in designing e-learning contents for both mobile and web-based designed platforms need serious attention. This paper looked closely at both mobile and web-based design interfaces, design principles, and online engagement in view of recommending the best approaches to promote active learning. The study followed a Design Science Research (DSR) paradigm to develop the framework to promote active learning. Following a pragmatic research paradigm, the study used one single DSR cycle in the development of the framework after reviewing and analyzing literature. The proposed framework is comprised of 10 steps, and these are supplemented with best approaches using the proposed taxonomy of major motivations for system design and use adapted from the Multi-Motive Information Systems Continuance (MISC) Model.

Keywords: Multi-Motive Information Systems Continuance Model (MISC), user engagement, mobile learning, web-based design, user interface design, active learning

INTRODUCTION

Digital technologies have played an important role in learning and great emphasis has been placed on digital technologies to promote active learning. There has been, however, little emphasis and attention paid to the way learning design platforms, both for mobile and web-based learning, have been designed for the promotion of active learning. This study paid attention to the interface designs used for mobile and web-based platforms to promote active learning and encourage user engagement.

The intersection and the role that both mobile and web-based interface designs present in today's educational landscape have been studied separately in many instances and this paper brings its awareness and practical contributions concerning these two design interfaces in one context through the lens of Multi-Motive Information Systems Continuance Model (MISC) to establish gaps that have not been adequately addressed in Information System Research.

Some of the questions that have not been answered in the literature include the user engagement for e-learning contents deployed on both mobile or web-based design learning interfaces, challenges associated with e-learning contents deployed on both mobile and web-based interfaces, and the effectiveness of interface designs concerning the user engagement to promote active learning.

PURPOSE OF THE STUDY

This study investigated the effectiveness of e-learning contents deployed on both mobile and web-based design interfaces to promote active learning. There have been several studies on usability, system functionality, accessibility, and user interface design (Goh, Hong & Gunawan, 2013; Scarpin, Mondini & Scarpin, 2018). The authors explain that these studies were conducted to establish aspects related to contents creation and their limitations on learning platforms. There is, however, little that has been done to investigate the user engagement for e-learning contents deployed on both mobile and web-based design interfaces. This study investigated the e-learning contents deployed on both mobile and web-based design interfaces to address the gaps in the literature.

STUDY'S AIM AND RATIONALE

The study's aim is to measure the effectiveness of e-learning contents for active learning when deployed on mobile and web-based design interfaces using the Multi-Motive Information Systems Continuance (MISC) Model.

BACKGROUND OF THE STUDY

The literature shows that active learning is growing as a greater area of interest for many higher institutions of learning in recent years (Ma & Rao, 2017). Ma & Rao (2017) explain that, to date, there have been many efforts to make learning seamless by integrating technologies and moving away from traditional learning approaches on the one hand, and, on the other hand, that digital technologies have changed the way e-learning contents are accessed regardless of the location and technology devices.

Recent developments in e-learning technologies have created new opportunities for learning management systems (LMS) to play an important role in the way learning approaches are used to transfer and share knowledge (Aldraiweesh, Alturki & Athabaska, 2016). The authors argue that there have been studies investigating user interface issues in LMSs; however, little is said about the deployment of e-learning contents for mobile and web-based interfaces concerning user engagement to promote active learning. Venkatesh, Thong & Xu (2016) argue that theories and models such as the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technology Acceptance Model (TAM) have been extensively used in Information Systems (IS) research to investigate user perceptions and use of user interfaces and designs. There is, however, little that is said in the literature as to how engagement models are incorporated in LMSs to cater for mobile and web-based design interfaces to promote active learning.

Research questions

RQ1: What is the extent of the effectiveness of e-learning contents deployed on both mobile and web-based design interfaces?

RQ2: How is active learning promoted by mobile and web-based design interfaces in e-learning?

Research objectives

The following research objectives are aligned with the research questions:

RO1: To measure the effectiveness of e-learning contents deployed on both mobile and web-based design interfaces.

RO2: To develop a framework for mobile and web-based design interfaces to promote active learning.

LITERATURE REVIEW

This section discusses the literature review. The following aspects are reviewed in this section: user engagement is discussed followed by mobile and web-based learning design interfaces after which usability of interface and implications for active learning are outlined.

User engagement
The context of user engagement has been associated with user experiences. Extensive research has indicated that the context of user engagement has been around for years and is often represented in the way users interact and engage with ISs from shopping, gaming, and web searching to name a few (Thomas, O'Brien & Rowlands, 2016). The authors argue that the extent of user engagement has been critical in the way e-learning contents are presented to engage users and transfer information or knowledge. The ability of an IS to captivate users' attention to engage with a product is one dimension of what a user can experience with a system (Thomas et al., 2016).

Sur & Yazici (2017) explain that engagement is a desirable human response to computer-mediated activities. In the context of learning, user engagement refers to a positive response and activities that include interactions with, discussions on and actions by users on multimedia (Sur & Yazici, 2017). User engagement is also considered as the quality of the user experience that emphasises the positive aspects of the interaction, and, more importantly, the results associated with being captivated by the system's user interface and design, thereby being motivated to use it (Kim & Seo, 2009; Ijsselsteijn, Ondracek & Turetken, 2019). The authors explain that ISs' user and design interfaces are not only about their features and functionalities but about their ability to engage the audience. Depending on the context, variables and metrics that have been used to assess the effectiveness of ISs' functionalities and features, there is little in the literature that speaks about the effectiveness of e-learning contents deployed on both mobile and web-based design interfaces and how these e-learning contents engage users to promote active learning.

Thomas et al. (2016) argues that user engagement manifests in the form of variables such as the captivation of the audience's attention, intrinsic interest, motivation, and curiosity, which lead to positive feedback and responses to engage with a user interface. Furthermore, Thomas et al. (2016) explain that user experience has been identified in many instances as the source for user engagement concerning the flow of activities, which ultimately engages with human-computer aesthetic interaction, experience, and user motivation.

Although the literature provides several definitions regarding user engagement in a user interface setting, this study views user engagement as important feedback and positive response session that translates into enjoyment and satisfaction to meet user learning experiences. This study also approached the various contexts of user interfaces for e-learning contents deployed on both mobile and web-based design interfaces in framing the case of an LMS. Without diverging from the key concepts of user engagement and variables or metrics that might be used to assess the effectiveness of user engagement, the following section discusses the functionalities and features of an LMS in the context of this study.

The literature shows that learning institutions use LMSs to deliver e-learning contents (Aldraiweesh et al., 2016). Athabaska et al. (2016) further explain that many LMSs are readily available on the market, and these come in various formats with customisable and configurable features to suit the needs of their users. Also, Athabaska et al. (2016) explain that learning institutions have customised free open-source versions of LMSs to suit specific needs and which accommodate related activities such as class discussions, instructional contents, class presentations, quizzes administration and wiki creation.

Evaluation mechanisms of user engagement concerning e-learning contents deployed on both mobile and web-based interfaces have not been extensively researched and this study was interested in investigating these gaps to bring its contributions to the body of knowledge.

User engagement for ISs' interfaces needs a combination of variables such as users' perceptions and attitudes, their intrinsic or hedonic motivations, other heuristic variables, interface design principles, and affective variables to take place. Badawood & Steenkamp (2013) explain that e-learning contents deployed on ISs, such as an LMS, can pose many problems from accessibility and usability to configuration and systems requirements. The user interface requirements associated with the mobile and web-based design interfaces concerning user engagement have been identified in many instances as not providing a satisfactory user experience (Ssekakubo, Suleman & Marsden, 2013). The authors argue for the customisation of ISs in the example of LMSs. Although guiding users in many instances does exist, the user engagement for e-learning contents deployed on both mobile and web-based user interfaces still needs much attention.

Mobile and web-based learning design interfaces

To establish the context of mobile and web-based learning design interfaces, there is a need to discuss these two design interfaces to relate them to the context of this study. This section comprises two sub-sections: the first subsection discusses mobile-based learning design interfaces, and the second sub-section discusses web-based learning design interfaces.

a) Mobile-based learning design interfaces

Mobile technology advances, portability and affordability have driven the usage of mobile devices with a strong emphasis on mobile learning approaches (Ma & Rao, 2017). Increased capabilities and network technologies such as General Packet Radio Services (GPRS), Wi-Fi, 3G, 4G or 5G features have provided users with opportunities to engage with mobile-based learning contents (Mehdipour & Zerehkafi, 2013; Pittarello & Pellegrini, 2017). This section discusses mobile-based learning design interfaces about user engagement in the context of this study.

The term 'mobile learning' was coined with the use of mobile devices such as cell phones, smartphones, Personal Digital Assistants (PDAs) and tablets for learning (Ma & Rao, 2017). One of the important considerations for mobile-based learning design interfaces is the flexibility of users to use e-learning contents on their devices (Ma & Rao, 2017).

With the extent of use and the availability on the market of mobile devices, this literature explains that various studies have been conducted to integrate e-learning contents to support users in the way they intend to access them (West, 2013; Shyshkanova, Tetyana & Zaytseva, 2017). The authors argue that the extent of these studies regarding the way users access e-learning contents on mobile devices has opened needs and opportunities such as personalized learning and customization of learning contents. There is, however, little in the literature to ascertain the effectiveness of e-learning contents deployed on both mobile and web-based design interfaces concerning user engagement to promote active learning.

Behera (2013) and Vishwakarma (2015) suggest the following advantages of mobile learning:

- Increased mobility and flexibility: the learning can take place at anytime and anywhere

- Saving cost: as compared to traditional learning interfaces, mobile learning has provided users with opportunities for cost-saving as well as saving on travel costs because of accessing e-learning contents

- Immediate feedback and one-on-one interaction, which sometimes prove to be challenging in traditional learning environments and classroom settings

- Customized e-learning contents for expected needs with greater learning stimulation emphasis

- Enhanced communication with greater exposure to contents sometimes outside the frame of learning processes

- Personalised and spontaneous learning with great emphasis on the maximisation of learning opportunities.

The design interface of mobile devices is critical to establish the context of this study with user engagement. In terms of the portability of mobile devices as one of the interfaces where e-learning contents are deployed, the literature explains that there have been limitations in the way design interfaces have been developed for active learning concerning user engagement (Thomas et al., 2016; Shyshkanova et al., 2017). Sur & Yazici (2016) explain that limitations in the design interface for mobile interfaces have been identified in the form of design requirements and usability principles, which have been identified as playing an important role in the way users engage with e-learning contents deployed on mobile devices.

This study was interested in investigating these gaps. The literature explains that the integration of technologies and network resources has extensively contributed to e-learning contents' accessibility (Ma & Yaw, 2017). There is still, however, little that is known in the literature regarding mobile and web-based design interfaces for e-learning contents deployed on these two interfaces about user engagement.

b) Web-based design learning interfaces

Learning through web-based design interfaces has been associated in many instances with the use of the World Wide Web and several supporting systems to communicate and share knowledge or learning contents (Sur & Yazici, 2017). Establishing the context of web-based learning, Sur & Yazici (2017) explain that terms such as 'online education', 'e-learning', 'Internet-based education', and 'virtual and remote learning' have been associated with web-based learning. This study approached web-based learning in the context of online based-education supported by technologies to deliver online learning contents.

New technological advances have allowed web-based interfaces to use distributed networks to make e-learning contents available to users in a blended fashion, accessible regardless of the location (Khodeir, Elazhary & Wanas, 2018). The authors explain that many learning experiences are using web-based interfaces that have been identified such as the flexibility of the learning contents provided to a larger audience, and technology more effectively supported e-learning contents where live instructions are designed to cater for a target audience with flexibility to engage and practice contents at one's own pace. Furthermore, the literature suggests that users can choose from a variety of e-learning contents that suit their learning needs with simulations where applicable in a non-predictive manner while keeping learning relevant to users' needs (Ayyagain et al., 2013; Vishwakarma, 2015).

There was a need in this study to establish technologies behind the delivery of e-learning contents in a web-based design interface to align with the context of this study. Technologies behind powering e-learning contents in a web-based design interface include programming languages such as JavaScript and HTML codes that are connected to a server (Gerow et al., 2013; Sur & Yacizi, 2017).

Web-based design interfaces have presented many limitations to cater to the different target audiences and student demographics (Arkorful & Abaidoo, 2015). The authors argue that issues associated with accessibility, navigation, usability, and low connectivity, among others, make web-based learning challenging. The creation and deployment of e-learning contents have been cited as another area of complexity for content developers as these require training and awareness when the user and design principles are concerned (Sivakumar, Venkataraman, & Gombiro, 2015; Vishwakarma, 2015; Wanas et al., 2018).

Usability of interface and implication for active learning

The usability of a design interface plays an important role in the way users perceive e-learning contents deployed on mobile and web-based interfaces (Chan, 2019). The author argues that a user interface

should be able to integrate technological tools and features that allow the effective distribution of learning contents to support active learning. Furthermore, the author explains that a user design interface, which is user-friendly and interactive, should be able to function in various contexts and support bidirectional communications amongst various actors involved in the learning process, and, as such, provide consistent feedback on learning progress and assessment.

In a study conducted by Samarakou et al. (2015), the authors present a case of an LMS to evaluate a text comprehension theory. The authors explain that an active learning platform must be adaptive and should possess features for instant feedback, which is vital in monitoring and measuring learning progress. In addition, the study suggested that an effective and interactive system should be able to cater for different student profiles and move away from a 'fit all' type of an IS (Samarakou et al., 2015). What the literature does not speak about is the extent of interface design integration in two platforms in the example of mobile and web-based interfaces to promote active learning.

As discussed in the above, attitude towards a system might influence a system continuance and intention to use it (Chan & Stephan, 2019). In addition, Chan & Stephan (2019) explain that positive performance translated through active learning could be demonstrated in the number of efforts of the user to master an IS and the technical competence of the instructor to support the user. In the context of this study, little is said about the alignment of e-learning contents deployed on both mobile and web-based design interfaces and the degree to which instructors support users to promote active learning.

In his study, Al-Juda (2017) assessed the usability of one online learning interface to ascertain the degree of users' engagement with e-learning contents. Al-Juda (2017) argued that there was evidence of a positive relationship between users' engagement and the easiness of the system because of the benefits gained from the system design, adequate training provided, and technical support provided to users. What has not been extensively researched in the literature is the extent to measure the effectiveness of e-learning contents deployed on both mobile and web-based design interfaces.

Al-Juda (2017) used the Technology Acceptance Model by Davis (1989) to assess factors that influence students' intention to use an IS and their continuation of that use. The author suggests that an IS was able to enhance active learning when the following contributing factors, namely satisfaction with an IS, perceived ease of use, perceived usefulness, self-efficacy, and attitude. In addition, Chan & Stephan (2019) highlight concepts of interest such as customisation, innovativeness, adaptability, and completeness of the information in the context of this study. These concepts are important in supporting active learning for contents deployed on user design interfaces.

Al-Juda (2017) argues that to enhance user acceptance of an IS, e-learning contents and user interfaces design should be such that external variables that have a direct effect on usage are considered. The author explains that a variable such as adaptability from the users' perceptive may enhance ease of use and further influence attitude toward adopting an IS.

Although the focus of this study is to establish how learning contents deployed on both mobile and web-based design interfaces promote active learning, sections of the literature present limitations associated with the acceptance of an LMS such as constant innovations in telecommunications and infrastructure, strategic planning, content creation and deployment of learning contents (Makhaya & Ogange, 2019). This study is interested in assessing these limitations in the context of e-learning contents deployed on both mobile and web-based design interfaces to evaluate how these hinder active learning.

THEORETICAL FRAMEWORK

With the aim of the study to assess the effectiveness of online contents deployed on both mobile and web-based design interfaces to promote active learning, there was a need to identify a theory that would be able to assist the researchers in investigating the variables discussed in this study. Many studies to understand the features and variables associated with user perceptions, design interfaces, and systems' expectations have been conducted (Venkatesh et al., 2016).

There was a need to identify a theory or model that caters for user engagement, motivation, continuance intentions and satisfaction while providing the researcher with tools to evaluate the system performance and effectiveness to engage with e-learning contents to achieve an outcome and in this case, to promote active learning.

Gaps relating to user engagement, motivation, continuance intentions and user satisfaction are worth investigating to align those gaps with the context of this study (Lowry, Moody & Gaspin, 2015). Lowry et al. (2015) developed the proposed Multi-Motive Information Systems Continuance Model (MISC) because of gaps previously identified in the literature to demonstrate the need and role for met and unmet expectations of an IS used to engage and interact while addressing concepts associated with user motivations in a context of interface design to promote an outcome. This study pays attention to this proposed model as it can shed light on the gaps previously identified in the literature using a combination of variables to promote active learning.

User perceptions in IS research have been extensively studied to understand issues such as usability, desires, utility, and productivity (Davis, 1989; Kim & Kankanhalli, 2009; Pittarello & Pellegrini, 2017). There is a need to explore the gaps identified by Lowry et al. (2015) in the context of this study to examine areas that address intrinsic and extrinsic motivations that influence outcome variables such as active learning on both mobile and web-based design interfaces.

It is essential in this paper to elaborate further on the proposed MISC model by Lowry et al. (2015) given its ability to incorporate many constructs that pertain to design interface to promote outcomes and, in this case, active learning. The sections that follow briefly discuss the adopted model and constructs that emerged from the model. Previous studies on human-computer interaction design have pointed to system use and perceptions, which have ultimately presented limitations to generalising user motivations and engagement across various types of design interfaces (Pittarello & Pellegrini, 2017). There was also a need to understand user expectations from a system design perspective, which was considered as another limitation in previous theories and models (Venkatesh et al., 2016). Lowry et al. (2015) believed the proposed MISC model would be able to address these limitations.

The MISC model establishes concepts of great interest in the design area to better understand the role of the system performance and user expectations, the link between different types of users' motivations, and the stimuli toward user engagement and desired outcomes (Lowry et al., 2015). This study views e-learning as intrinsic motivations. Furthermore, this study perceives motivations created in using e-learning contents deployed for both mobile and web-based design interfaces as a direct antecedent of expectations. This study further views user expectations as key components of all interactions and user engagement.

The choice of the MISC model is motivated by its ability to investigate constructs associated with motivations, user engagement, design intents, design interfaces and features, and user evaluations or parameters to measure outcomes in one context (Lowry et al., 2015). From the user and system perspectives, the following variables are worth defining:

- Expectations: They are viewed in this study as one's beliefs about future events (Zhen, 2018); they are instrumental in the way the user perceives the acceptance and engagement of an IS.

- Disconfirmation: This is viewed in this study as the extent to which an event is evaluated as either exceeding or falling short of expectations (Pittarello & Pellegrini, 2017).

- Attitude: This is viewed in this study as the degree to which a user likes or dislikes a behaviour (Rijt et al., 2019). This can have a positive or negative effect on the system or design usage and intentions. Furthermore, Lowry et al. (2015) argue that motivations and expectations may directly affect attitude toward using a system, which subsequently may affect the engagement of the user with a system.

- Performance: This is viewed in this study as the user's beliefs about how an IS performs (Zhen, 2018). The author further explains that expectations can positively or negatively influence user performance.

This study approaches user satisfaction as a positive cognitive and emotional evaluation that results in a sense of contentment and fulfilment (Zhen, 2018). The degrees of one's expectations with one's system experience are usually evaluated in relation to the perceived performance of a system design (Diogo, Oliveira & Tam, 2018). Better user experience with a system design or performance can affect the way the user perceives the system to influence the engagement positively or negatively with an IS (Pittarello & Pellegrini, 2017)

Some constructs used in the MISC Model (Lowry et al., 2015) that are of great interest to this study are the Design-Expectations Fit (DEF), Perceived Ease of Use (PEOU), and the design aesthetics that need to be elaborated further in the context of the study.

DEF has been referred to as an important construct in the MISC Model, and has, therefore, the likelihood to affect the disconfirmation process (Lowry et al., 2015). The authors argue that there is a need to establish the gaps between the IS and the tasks to be evaluated. In the context of this study, it was essential to establish the gaps between e-learning contents deployed on both mobile and web-based design interfaces and effective tasks designed to promote active learning.

PEOU is viewed in this study as the degree to which the user perceives using the system as free from effort (Tommaso et al., 2017). This construct has been extensively investigated in IS research (Davis, 1989; Venkatesh et al., 2003; Delone & Mclean, 2004; Santiago, de Blas & Perez-Victoria, 2018). Lowry et al. (2015) further explain that the usefulness of an IS can lead to positive evaluations also known as disconfirmations of the interactions and user engagement. Additionally, PEOU has been observed in IS research as affecting the degree to which the user positively engages with the IS, which can be assessed with system performance (Moret-Bonillo, Mosqueira-Rey & Alonso-Rios, 2018).

Design aesthetics are viewed in this study as the appropriateness and professionalism of the design interface (Li & Yeh, 2010; Moret-Bonillo et al., 2018). In the context of this study, a mobile and web-based design interface that is appropriately designed and highly appealing to users has the potential to engage users and promote desired outcomes. This may promote in return positive user evaluations and interaction experience to achieve the desired outcome. Aesthetics design may include content layouts and presentations, navigations, learning instructions, trust and quality of contents design and creation, which are often perceived as useful and enjoyable (Lowry et al., 2015; Moret-Bonillo et al., 2018).

There is a need to present the constructs that influence the design interface that is used in the MISC Model (Lowry et al., 2015). Among these are human motivations, traditionally represented as intrinsic and extrinsic motivations: intrinsic motivation is viewed as what users can do without external reward or inducement, as opposed to extrinsic motivation that is viewed as what users can do because of users' external inducement or reward (Lowry et al., 2015). The literature explains that when users are intrinsically motivated to use

an IS to achieve a desired goal or outcome, they might not seek external rewards; however, it might be that external rewards such as marks might not be sufficient to keep the user motivated to achieve a task or desired outcome in the absence of supplemental, intrinsic motivations (Gong, Lee, Liu & Xeng, 2018). This could be translated in the examples of rewards in the form of marks counting toward a formative or summative assessment, which might be an important contributing factor to keep users motivated to using a system.

Lowry et al. (2015) argue that intrinsic motivations are closely tied to related processes, expectations, and outcomes on one hand, while extrinsic motivations are focused on the outcomes rather than on the processes that lead to outcomes, on the other hand. One middle ground between intrinsic and extrinsic motivations is hedonic motivation, which can be defined as behaviours motivated by the feeling of using a system (Lowry et al., 2015).

The study adopted a proposed taxonomy of major motivations for system design use from Lowry et al. (2015) to suit the purposes of this study, and these motivations are presented in Table 1.

Table 1:
Proposed taxonomy of major motivations for system design use adapted from Lowry et al. (2015)

Motivation main category	General motivation (desired goals or outcomes)	Specific motivation (desire for)
Hedonic	System pleasure	Play/enjoyment/fun
		Entertainment
		Escape/relax
	System motivation	Challenge (the degree to which an activity matches the skills of a user)
		Satisfy curiosity and contents of interest
		Explore/discover new knowledge
		Stimulate practical experience
Intrinsic	System accomplishment	Influence others for learning purposes
		Improve reputation/receive approval
		Leading effective/successful experiences
		Autonomy/freedom
		Gaming achievement
	System learning	Knowledge acquisition
		Knowledge sharing
		Computer skill acquisitions
		System informative nature
	System socialisation	Affiliation with a learning community of interest
		Social communication
		Collaboration with others
		To engage with others

Motivation main category	General motivation (desired goals or outcomes)	Specific motivation (desire for)
Positive extrinsic	System personal gain	Receive positive action from system interaction
		Receive reward and image enhancement
		Receive marks toward completing a task
	System transact	Meet learning objectives
		Meet learning objectives/requirements
	System improve work	Promote best learning practices
		Be more productive, increase performance
		Collaborate/community remotely
		Enhance decision-making
Negative extrinsic	System self-preservation	Avoid threat or injury
	System harm others	Manipulate/extort others
		Cause injury
		Pursue revenge
		Carry out fanatical political agenda
	System misbehaviour	Access proprietary information illegally
		Make mischief
		Computer abuse/non-compliance

A model initially proposed by Bhattarcherjee & Premkumar (2004) is presented below in Figure 1.

Figure 1:
Bhattarcherjee & Premkumar's (2004: 242) Model
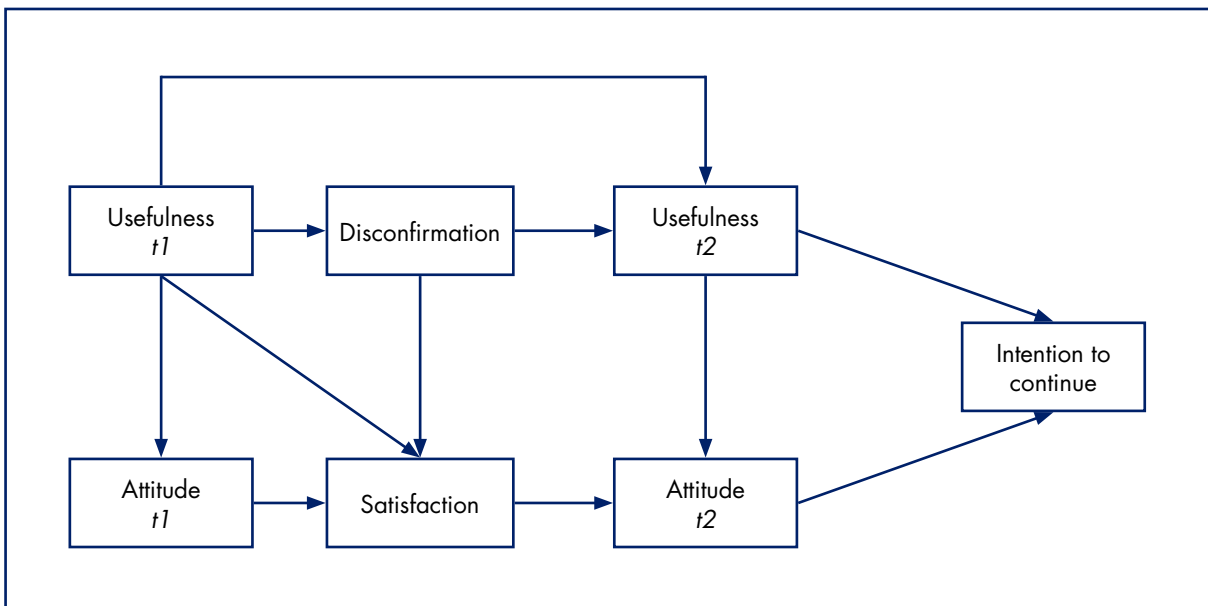
The proposed MISC model by Lowry et al. (2015), developed from Bhattacherjee and Premukumar's model (2004), is presented below. It includes the three additional expectations that are common across many kinds of ISs or interface designs: DEF, Perceived Ease of Use and Design Aesthetics. The other constructs that are included in the MISC proposed model are the three dominant forms of motivations, namely intrinsic, hedonic, and extrinsic.

Figure 2:
The proposed MISC model by Lowry et al. (2015:15)
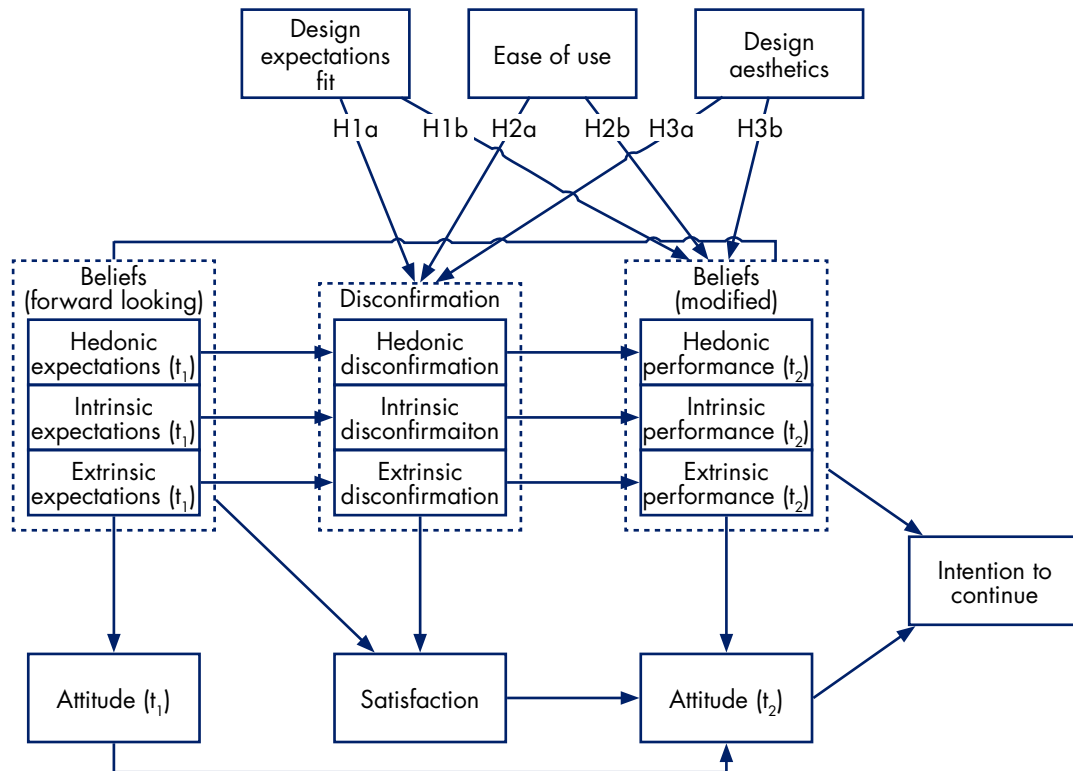
RESEARCH METHOD

This section outlines an overview of the research design and methodology used in this study. This study follows a Design Science Research (DSR) paradigm, and the following are discussed: research paradigm, research strategies, and data collection methods.

Research paradigm

The literature presents many research paradigms to outline the values, assumptions and different viewpoints shared in an intellectual discipline (Schliesser & De Lange, 2017). The Design Science Research was proposed as a paradigm since this intends to introduce novel artefacts while supporting a pragmatic research paradigm (Vaishnavi & Kuechler, 2015). In the context of this study, the paradigm and knowledge are gained through the process of artefacts design (Vaishnavi & Kuechler, 2015).

Research strategies

While many research strategies are used to answer research questions (Saunders, Lewis & Thornhill, 2019), DSR is first and foremost a problem-solving strategy with the main aim to develop innovative artifacts. DSR presents many forms, and these include models, constructs, methods, instantiations, and better theories (Livari, 2015). With the aim of this study to evaluate the gaps in the deployment of

e-learning contents on mobile and web-based design interfaces to recommend solutions to promote active learning, the DSR strategy used in this study proposes to develop a model.

From the Design Science Research methodology's perspective, this study follows the Kuechler & Vaishanavi (2012)'s Design Science Research methodology, and it is comprised of awareness of the problem, suggestion, development, evaluation, and conclusion. Applying the DSR cycle to this study, the following phases were tackled:

1. **Awareness of the problem**

   The researcher started by evaluating the extent of the problem relating to promoting active learning for contents deployed on mobile and web-based design interfaces. Gaps that were identified in the literature were evaluated against best practices in the development of learning contents deployed while assessing their effectiveness to promote active learning.

2. **Suggestion**

   Given the various iterations of LMSs as platforms for deploying learning contents considering the context of this study, the literature analysis was used to identify some of the design principles and interface approaches that will be suitable for integrating online contents deployed on mobile and web-based interfaces to promote active learning.

3. **Development**

   This study used one single development cycle to identify and design the components of the proposed framework. The researcher made use of a single development cycle in the provision of contributions while analysing literature and identifying gaps. The analysis of the literature followed the following steps, awareness of the problem, suggestion, and development in one single cycle.

4. **Evaluation**

   The proposed framework was evaluated against existing principles in the literature where gaps were previously identified in the awareness phase of this study.

5. **Conclusion**

   This phase presents reflection on the development of the proposed framework to bring the study's contributions to the body of knowledge.

Data collection methods

Following the DSR methodology, several collection methods may be used (Saunders et al., 2019). This study used literature review and analysis to identify gaps and evaluate existing methods or approaches in the development of the proposed framework to promote active learning.

DISCUSSION

There is a need in this paper to provide practical contributions to address the gaps in the literature concerning the challenges facing the mobile and web-based learning design interfaces. The researcher points out that the complexity of using best practices in developing design interfaces has been highlighted in previous literature. Hence the researcher proposes to formulate approaches that can be used by educators and interface designers to develop mobile and web-based contents while considering the limitations that each approach might bring.

The proposed framework below provides steps that educators and interface designers might need to consider when developing e-learning contents for both mobile and web-based design interfaces. The interface design steps are adapted from Djamasbi & Strong (2019) and are presented in Figure 3 below.

Figure 3:
The interface design steps
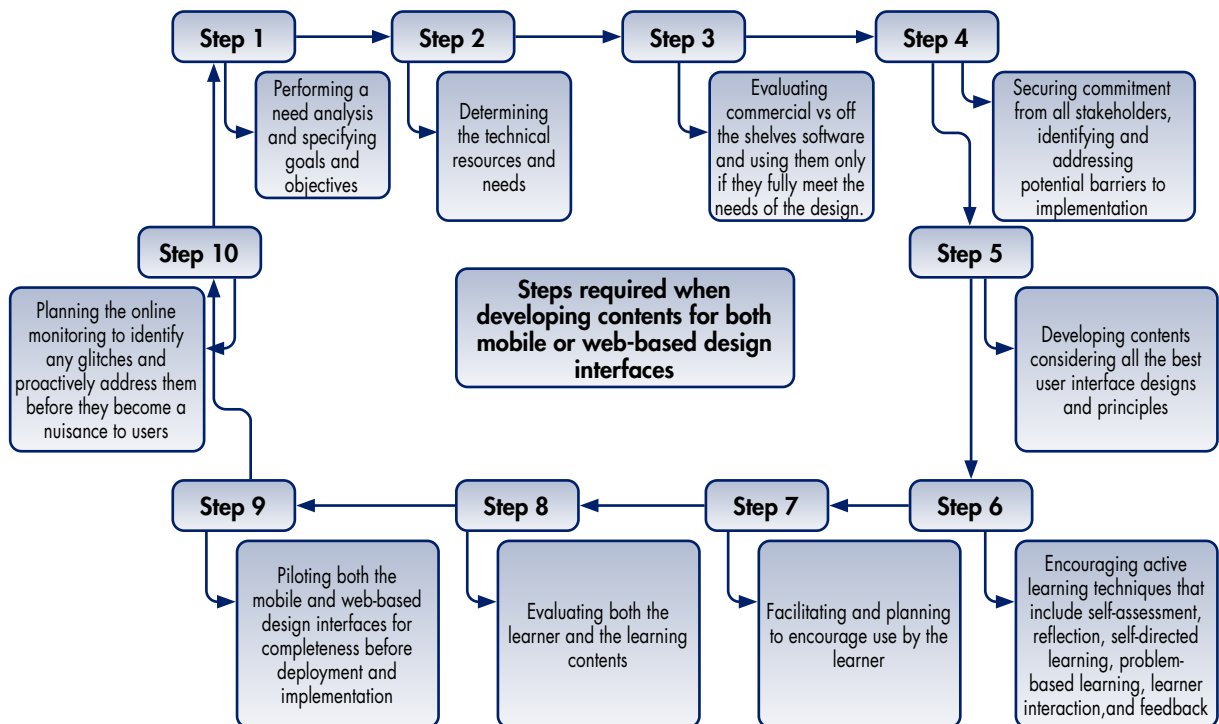
Adapted from Djamasbi & Strong (2019: 224)

The section below elaborates further on the steps required from the framework for deploying contents for both mobile and web-based design interfaces.

Step 1: Performing a need analysis and specifying goals and objectives

This step starts by defining the scope of the user interfaces design for both mobile and web-based environments and the need for e-learning contents that will be deployed. The interface development or design team must spend time together with stakeholders involved in the process to identify the main needs of the online contents as well as the audience who will be using the contents to promote active learning (Strohmeier & Honrbaek, 2017). In completing this step, the team involved in performing this activity needs to assess the level of learners and this assessment includes the knowledge about, skills in terms of, attitudes about and behaviours towards online learning contents deployed both on mobile and web-based environments (Strohmeier & Honrbaek, 2017). Assessment designers need to pay attention to perceived educational needs and preferences while addressing any barriers that might become a stumbling block for learning.

There is also a need to understand the objectives of the learning contents and how these will be deployed. Strohmeier & Honrbaek (2017) argue that the mobile and web-based interface design is, to an extent, driven by the willingness of the learner to learn on his or her own with little technical or academic intervention, hence the need to address all limitations that may hamper a good learning environment while providing the learner with a role that promotes active learning.

Step 2: Determining the technical resources and needs

While the mobile and web-based design interfaces come with some associated user experience principles, one would need to pay attention to the technical requirements. Moret-Bonillo et al. (2018) argue that for

an effective course to be translated into active learning, an understanding of both the subject and the instructional medium, and, in this case, the intersection of requirements needed for both the mobile and web-based user interfaces, is required. There is a need in this step to make use of a multidisciplinary approach with team members understanding the principles and complexities associated with the mobile and web-based design interfaces.

Moret-Bonillo et al. (2018) argue that while the designs for mobile and web-based user interfaces may present different challenges and different nuances from accessibility, navigation, and deployment to name just a few, understanding the technical resources is crucial in accommodating learners from various backgrounds to promote active learning. Moret-Bonillo et al. (2018) further add that technical resources encompass system requirements, network capacity, internet speed and technologies associated with both the mobile and web-based design interfaces.

Step 3: Evaluating commercial vs off-the shelves software and using them only if the fully meet the needs of the design

The evaluation of the type of software required to meet the need of the learning contents where these will be deployed to support learning for both mobile and web-based design interfaces is critical in the process of supporting a seamless learning process (Djamasbi & Strong, 2019). After completing steps 1 and 2, the design team should consider the affordability, ease of use and viability of either commercial or off-the-shelf software that will be suitable for the learning needs while addressing the requirements of both the mobile and web-based design interfaces.

Djamasbi & Strong (2019: 219) propose four key points in the selection process of suitable software:

1. Decide whether the chosen software aligns with the design team's goals and objectives

2. Determine whether the proposed software works across various networks using both the mobile and web-based design interfaces

3. Evaluate the effectiveness of the interface designs as to whether they meet the design principles for online learning contents

4. Evaluate the effectiveness of the online contents deployed on both mobile and web-based design interfaces as to how these promote active learning.

Step 4: Securing commitment from all stakeholders, identifying, and addressing potential barriers to implementation

User interfaces design consists of various aspects that need to come together for a successful deployment of the learning contents for a pleasant user experience (Strohmeier & Honrbaek, 2017). Djamasbi and Strong (2019) argue that the user interfaces design is not only about the deployment of the contents but about having a good understanding of both the learning contents, which involves skills and knowledge from an educational background, the technical skills and expertise that come with the mobile and web-based interfaces. As such, the realm of stakeholders involved in the successful deployment and implementation of learning contents is complex to meet all the stakeholders' objectives.

Strohmeier & Honrbaek (2017) explain that successful deployment and implementation of the learning for interface design for both mobile and web-based platform requires highlighting potential barriers from each field of speciality, which is encompassed in the experience of, skills in terms of, and knowledge and perceptions about the curriculum and alignment of the learning contents and as to how these promote active learning. Strohmeier & Honrbaek (2017) further argue that the commitment strengthens the collaboration of the design team for a rewarding project in meeting the learning objectives to promote active learning.

Step 5: Developing contents considering all the best user interface designs and principles

The key to effective e-learning is to develop contents while considering all the user interface design principles discussed in the sections of this literature (Pittarello & Pellegrini, 2017). Practices such as posting notes and creating contents may not serve the purpose of promoting active learning (Pittarello & Pellegrini, 2017). Pittarello & Pellegrini (2017) further argue that a strong emphasis on the learning content, syllabi or curriculum should be the central focus in aligning the learning contents with the necessary modifications where applicable to promote active learning. Pittarello & Pellegrini (2017) further argue that the traditional approach, if used in the context of this study, will likely not contribute to improving satisfying online conditions and experiences that would promote active learning.

In addressing the requirements that arise during this step, Pittarello and Pellegrini (2017) offer a few hints that are often overlooked when designing user interfaces for the online contents in the context of both mobile and web-based platforms. While the online user interfaces design provides the design team with the possibility to add contents, it is sometimes easy to overdo, thereby providing more than what is required (Pittarello & Pellegrini, 2017). To address such limitations, it is essential to stick to learning objectives and teaching purposes. Basic usability principles and integration of multimedia need to be carefully assessed.

In addition, Khodeir et al. (2018) argue that simply adding multimedia could be distorting for a better learning experience; hence, this needs to be assessed carefully to add value to the online learning experience. The download and upload speed are areas sometimes underestimated following the multitude of resources available from both technical and curriculum perspectives (Khodeir et al., 2018). The authors explain that, from a technical perspective, mobile and web-based interfaces present two different platform environments that come with different sets of designs as discussed in the sections of this literature. The successful implementation of contents and resources for the download and upload largely depend on principles and parameters set for a better learning experience (Khodeir et al., 2018). Tools used such as videos, graphics, animation and other illustrations, speed, size of the frame used, device efficiency to handle large files may contribute to a better online learning experience.

Preparation and planning are the last two items sometimes overlooked by the design team (Vishwakarma, 2015). The complexities and challenges posed by the requirements for both mobile and web-based interface designs are considered critical in the learning trajectory (Vishwakarma, 2015). The author indicates that the lack of preparation and planning often leads to poorly structured learning pages, and unattractive, inefficient, and confusing layouts, which are far from promoting active learning on one hand. On the other hand, time dedicated to preparing online contents for both mobile and web-based interface designs, reduces the pressure from the design team to anticipate problems that might hamper the learning experience (Vishwakarma, 2015). Vishwakarma (2015) further claims that good preparation and planning during the process allows sufficient time to develop well-aligned contents, create and identify appropriate multimedia, develop active learning techniques, prepare evaluation approaches, and pilot the interface design before full deployment and implementation.

Step 6: Encouraging active learning techniques that include self-assessment, reflection, self-directed learning, problem-based learning, learner interaction, and feedback

Vishwakarma (2015) argues that the key to active learning is the involvement of learners in the learning process while providing the right platform to apply new information. The author further argues that encouraging active learning is the most challenging aspect of developing an educational experience; however, it is often its most interesting and enjoyable aspect. To address the complexities associated with developing a user interfaces design to deploy learning contents for both mobile and web-based interfaces, there is a need to apply a combination of creativity, planning and content expertise (Lionel, Bansal & Lutge, 2020).

Khodeir et al. (2018) provide four principles that can be used to develop online contents that promote active learning for both mobile and web-based design interfaces. Research has indicated that there might be many other approaches that set themselves apart from a traditional approach. For this study, principles by Khodeir et al. (2018) will be briefly discussed below:

- **Instruction and feedback:** While the traditional approach in a face-to-face environment values the importance of the instructor in class to promote active learning, online learning deployed for both mobile and web-based interfaces seem to put a lot more emphasis on the planning and presentation capabilities of the online contents (Khodeir et al., 2018). The facilitation of active learning in the online environment can be promoted by the appropriate use of multimedia, stimulation of imagination and creativity, clarity around relationships and concepts and the provision of a clear map of how these relate to the learning outcomes or objectives, and the promotion of in depth-study of topics of interest while paying attention to self-assessments and learner interaction (Khodeir et al., 2018).

- Pittarello & Pellegrini (2017) argue that feedback consists of an important aspect of active learning. Embedded tools in both mobile and web-based design interfaces should be able to meet the need of the learners synchronously or asynchronously by providing feedback. Pittarello & Pellegrini (2017) further argue that regardless of the way feedback is provided to learners, it is essential to acknowledge the importance of the instructor and the communication capabilities established in the process to promote active learning.

- **Application, Self-assessment, and Reflection:** The paradox between establishing the current and desired level of knowledge constitutes an important aspect of reinforcing active learning (Lionel et al., 2020). Online learning provides students with time and flexibility to manoeuvre the learning pace while encouraging active learning (Lionel et al., 2020). Embedded online learning tools may include pre-tests and post-tests with correct answers and justification provided immediately where applicable.

- **Self-directed, Evidence-based and Problem-based Learning:** While the mobile and web-based user interface designs provide flexibility for the learners to monitor and control the learning pace, it is essential to relate to the effort by the learners toward self-directed learning initiated in asking questions and answering theirs (Lionel et al., 2020). The authors argue that self-directed learning should tackle a multitude of questions related to the learning contents and should be supported by reading as well as interaction with other learners. The challenge experienced with self-directed learning is usually associated with intense searches of information to understand a concept (Lionel et al., 2020). The learner sometimes becomes overwhelmed with the amount of information returned from an Internet query.

- **Learner Interaction:** Lionel et al. (2020) explain that what sets learners apart in the context of mobile or web-based interfaces is the ability to interact with learning contents. Lionel et al. (2020) further argue that learner interaction plays a dual role which highlights both a social function and a stimulus to promote active learning.

Step 7: Facilitating and planning to encourage use by the learner

Khodeir et al. (2018) argue that learners need to be taken throughout the learning process regardless of the integration of the multimedia tools available in the mobile and web-based design interfaces. Multimedia tools should enhance learner participation to further guide the learner in meeting his or her learning objectives.

Khodeir et al. (2018) explain that three key issues need to be taken into consideration when designing tools to encourage the learner in the process of active learning. Firstly, make the user interface accessible

and user-friendly; secondly, provide time for learning; and, thirdly, motivate and remind the students of what they learnt, consider rewards, and assess consequences if any (Wanas et al., 2018).

Step 8: Evaluating both the learner and the learning contents

Teaching modalities for mobile and web-based interface designs bring new dynamics to the online landscape. Pittarello & Pellegrini (2017) argue that it is essential to evaluate what the learner does and can accomplish online together with the learning contents deployed on the interface designs (both mobile and web-based).

Step 9: Piloting both the mobile and web-based design interfaces for completeness before deployment and implementation

Vishwakarma (2015) explains that testing both the mobile and web-based design interfaces for completeness is crucial as this serves as an important step for successful implementation and future maintenance. Vishwakarma (2015) further argues that mobile and web-based interface designs go through various stages in the design process; hence, the design team needs to evaluate the development process, and review the contents and associated multimedia before full implementation.

Step 10: Planning the online monitoring to identify any glitches and proactively address them before they become a nuisance to users

Pittarello & Pellegrini (2017) explain that enough time is needed to monitor and moderate e-learning contents. The authors further explain that to successfully plan the online monitoring, there is a need for ongoing faculty involvement from the curriculum perspective. Furthermore, Vishwakarma (2015) adds that as the implementation of e-contents progresses, the user requirements often decrease with time after completion of the development phase; however, maintenance will still be necessary.

Vishwakarma (2015) proposes the following three activities to be undertaken to succeed in planning online monitoring:

1. One needs to plan to address the technical challenges that constantly arise from the system perspective. To address these technical challenges, the design team needs to hand these types of technical challenges to a specialist in the field.

2. Internal and external URL links need to be tested periodically. The challenge often arises with external links as these may change frequently, and these may unexpectedly fail.

3. Content should be updated regularly based on the course evaluation as well as any relevant or updated information.

CONCLUSION AND FUTURE RESEARCH

The debate about the context of active learning at higher institutions of learning remains of great interest and these institutions will continue investing large amounts of resources and personnel to meet their stakeholders' academic needs. This paper presented practical contributions and approaches that might be applied in promoting active learning. The complexities posed to date by the technological design of mobile and web-based interfaces to integrate e-contents for learners at various locations need to be addressed purposely to meet the learners' needs.

This paper started by introducing the topic under investigation, followed by the purpose of the study. The background of the study was then presented along with the research questions and objectives of the study. The literature review was also provided to clarify the context of both mobile and web-based design

interfaces, as well as the perspectives used in this study to create awareness about active learning to bring about practical contributions.

The Multi-Motive Continuance Model was used as a lens through which the researcher aimed to investigate complex issues associated with designing learning contents deployed both on mobile and web-based design interfaces.

This paper highlighted the need to review closely the interface designs for contents deployed on both mobile and web-based design interfaces. Areas that remain of great concern in IS research include challenges associated with deploying e-contents following the amounts of data available. While these challenges have decreased in the last decade, the literature indicates that there is still some work that needs to be done in terms of the challenges associated with the design and implementation of LMSs.

Contributions brought about in this paper will go a long way in reviewing aspects related to active learning while establishing challenges associated with addressing e-learning contents for both mobile and web-based design interface designs.

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Factors constraining teacher integration of ICT in Gauteng schools[1]

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ABSTRACT

This article reports on research undertaken as part of a provincial government initiative to transform education practices through the integration of digital technologies. A case study was done in the Gauteng province to understand the factors constraining the uptake of ICT in schools instead of peddling a unified globalist account. It was also an effort to understand why some teachers integrate ICT and others do not. There were 1 330 questionnaires distributed to 133 randomly selected schools, and 837 respondents returned their questionnaires. The response rate was 63%. It is within these methodological constraints and parameters that the results and related discussion should be viewed. Data analysis using descriptive statistics and Pearson correlation analysis revealed that teachers' limited technological pedagogical knowledge and low experience in integrating computers into the classroom has had impact on ICT uptake. There is a dearth of practices for ICT integration in the classroom; however, there was congruence with the global perspective that context is key. The recommendations are to ensure ongoing technical and pedagogical support, to increase ICT professional development opportunities for teachers, and to conduct a systematic longitudinal study to provide a better understanding of various technologies in teaching and learning.

Keywords: ICT integration, digital technologies, Information and Communication Technology (ICT), Gauteng schools, ICT in education

INTRODUCTION AND HISTORICAL PERSPECTIVE

Over the years, many South African studies (Dlamini & Mbatha, 2018; Livingstone, 2012; Mofokeng & Mji, 2010; Moll & Matshana, 2006; Wilson-Strydom, Thomson, & Hodgkinson-Williams, 2005) agreed with Wallet (2015) on the need to prepare teachers to use Information and Communication Technologies (ICTs) for teaching and learning. It has been argued that digital technologies are the principal driver of economic development, educational change and pedagogical innovation. ICTs have slowly become an integral part of the educational ecosystem. Though the integration of ICT in education has been a contentious issue, there is no way to ignore it because of the pedagogical benefits in the classroom and the policy statement that 'every South African will be information and communication technology capable

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by 2013' (Department of Education [DoE], 2003: 17). Therefore, the realisation of this policy means all schools in South Africa will be equipped with ICT infrastructure and computer literate educators and in the process, learners develop their digital fluency.

The presence of ICT in education started an unparalleled transformation in knowledge representation and pedagogical practices. Indicators show that South Africa has the most modern and best developed telephone system in Africa and a vibrant ICT sector, with massive capital investments by mobile operators alone amounting to ZAR 23.8 billion (Gillwald, Mothobi & Rademan, 2018). However, the implementation of ICT in schools is not an easy task because of the challenges related to context, technology and competencies. There is evidence that 'the intersections of class, gender, race or ethnicity—are unable to harness the Internet to enhance their social and economic well-being' (Gillwald et al., 2018: 8). Thus, beyond the digital divide is the issue of affordability and access, which remain essential in the implementation of digital education and the pedagogical integration of ICT in the classroom.

In 2004, a National ICT Strategy Policy was formulated and the Department of Education (DoE) responded with the e-Education policy and the motif of 'transforming learning and teaching through information and communication technologies' (DoE, 2004: 3). In 2007, the *Guidelines for Teacher Training and Professional Development in ICT and Training* (DoE, 2007) was developed as an instrument to enable the National ICT Strategy Policy. These two documents framed ICT in the education policy environment in an effort to provide 'modern technologies to schools in order to enhance the quality of learning and teaching' (DoE, 2004: 6). In the process, what transpired was the development of teachers' technological knowledge. This was an effort to align with the White Paper on e-Education (DoE, 2003), which states that every educator and learner should be ICT capable by 2013. In order to realise the gazetted policy stipulated in the White Paper it became a requirement to train and develop educators' digital fluency. The reality is that in a 'knowledge-society', a classroom is not complete without access to digital pedagogies. However, there are complexities in the education ecosystem that demands more than digital technologies, and especially innovation and creativity are needed to improve learners' attainment.

The key is to position ICT based on educational needs instead of technological possibilities. In the Gauteng Department of Education's (GDE) strategic priorities, pillar number 6 is 'ICT in Education' and is intended to bridge the ICT access and integration gap in schools to transform education. The GDE priorities is also in line with a broader national government economic, social and development strategy on ICT. At the highest level in government, ICT has a role in promoting economic growth, job creation, social development and global competitiveness. There are two dedicated policy documents on the integration of ICT in education (DoE, 2004, 2007) to inform the agenda on integrating ICT tools into teaching and learning. The GDE has made progress in the process and a considerable amount of ICT resources have been procured and made available to schools, which justifies the place of ICT tools and applications in education. However, the GDE's knowledge of the impact the use of digital technologies has on teaching and learning is still insufficient.

While technological affordances are well documented, it requires preparation in terms of ICT skills and innovative pedagogical practices supported by ICT. Thus, this work investigated the factors constraining teachers to pedagogically integrate ICT in their classrooms. The study is premised on the argument that 'situational and personal-social contexts' contribute towards certain behaviours and beliefs, especially in the process of integrating digital technologies in teaching (Li, Yamaguchi & Takada, 2018: 106). The research questions that guided the study are:

- What factors are constraining teachers' integration of ICT in Gauteng schools?

- To what extent have schools adopted, appropriated and integrated ICTs into teaching and learning?

The gaps in the conceptual understanding of the extent of ICT uptake in teaching and learning, school-level conditions, and pedagogical practices must be closed. This research was an attempt to examine the factors constraining the uptake of ICT in schools in Gauteng. The DoE (2004) explained that computers will improve how educators teach and learners learn. This was premised on the ICT affordances, and especially, on how tablets make the learning process more exciting, motivating and creative.

THEORETICAL AND CONCEPTUAL FRAMEWORK

The purpose of this study was to conduct an in-depth analysis of the factors constraining the uptake of ICT in schools given the huge investment made by the GDE to resource schools. In 2015, the GDE piloted a project tagged 'The Big Switch On'. The project aimed for a paperless education system to give pupils access to learning material, workbooks and other subject matter through ICT (Dlamini & Na'Allah, 2015). To develop a deeper understanding of the dynamics of 'capitals' as resources to pedagogical ICT integration and access to ICT affordances, we adopted the cultural capital theory as the lens through which to conduct the study (Bernstein, 1990; Clark, 2005). Cultural capital is defined as 'the accumulation and knowledge, behaviours, and skills that one can tap into to demonstrate one's cultural competence' (Cole, 2020: 1). In essence, teachers enter the education system with different levels of cultural capital and ICT know-how based on their social background (Tondeur et al., 2011). The notion of cultural capital is viewed as 'a theoretical hypothesis which makes it possible to explain the unequal scholastic achievement …' among teachers from different social classes (Bourdieu, 1986: 243). Therefore, the level of teachers' preparedness and the school ICT environment have the potential to influence the uptake of ICT in teaching.

According to Bernstein (2000), all pedagogical practices are generated from the same fundamental rules but may vary in strength in relation to knowledge boundaries and boundaries between teachers and learners. These are invisible structures that continue to create barriers to ICT affordances and the transformative digital pedagogies. In this research it became clear that digital literacy is privileged in the invisible structures making it difficult for those with limited social and cultural ICT capital to have access to digital pedagogies. Through Bernstein's theoretical lens we were able to engage with structural variables at school level, teacher level and systems level. Thus, there was no way in the analysis to ignore the incongruence among teachers' socioeconomic divide as it became obvious that some schools were fully ICT equipped but the uptake was poor. In those invisible structures people become acquainted with digital literacies and skills that may not be accessible to teachers coming from more disadvantaged socioeconomic backgrounds.

Bernstein's theory of pedagogic discourse provided a language of description that worked very well with the Second Information Technology in Education Study (SITES) (Law, Pelgrum & Plomp, 2008; Carstens & Pelgrum, 2007). The analytical framework for SITES was used to investigate teachers' characteristics, pedagogical practices and ICT use; school factors; and system and other external factors. The aim was to document factors contributing to the state of ICT integration in schools and the conditions on the ground influencing the adoption and appropriation of new technologies into teaching and learning. Using the SITES 2006 framework, the focus was on four domains, namely school factors, system factors, teacher factors, and pedagogical practices in the classroom. The decision to focus on these four domains was informed by the statement in the *White Paper on e-Education* (DoE, 2004) which avers that the introduction of ICTs in education represents an important part of the government's strategy to improve the quality of learning and teaching across education and training environments. However, it was not clear how ICT infrastructure provisioning alone will result in the attainment of higher levels of cognition, given teachers' ICT skills and curriculum limitations (Dlamini & Na'Allah, 2015). This research aimed to develop an understanding of teachers' knowledge about using ICT, their ICT pedagogical practices and the school conditions to enable change.

RELATED LITERATURE REVIEWED

Ubiquitous computing has created an environment where access and interaction with a variety of computers are inevitable. This has enabled ubiquitous learning - the new mantra - making it a must for educators to develop the skills and competencies to use ICT to promote continuous learning (Macià & García, 2016; Sheninger, 2019). In Singapore (Ng, 2010), South Korea (Kim, 2010; Choi, An & Lee, 2015; Jang, Yi & Shin, 2016) and Malaysia (Razak et al., 2018), for example, schools are using cutting edge technologies in an effort to link schools to society in order to fuel innovative and creative teaching and learning and to improve school management and administration capacity. South Africa has made similar efforts, and projects such as the Gauteng Paperless Classroom (Motshekga, 2015) and ICT for Rural Education Development (ICT4RED) (Botra, Rerselman & Ford, 2014) were undertaken to promote the dissemination and use of digital technologies in the South African school. It is hoped that teachers will use these to implement digital pedagogies that fit the 21st century. With current learners immersed in the world of digital technologies and with properly planned ICT rollout projects, this could provide 'educators with a valuable resource to support teaching and learning' (Harrell & Bynum, 2018: 13). The opportunity to engage broadly allows teachers to develop their social networks, which is critical to professional development growth, especially in the development of best practices in the integration of ICT in the classroom.

However, there is evidence that simply providing teachers with professional development opportunities related to ICT does not translate into high levels of integration in the classroom (Wilkerson et al., 2016; Harrell & Bynum, 2018). The distribution of digital infrastructure and ICT resources in schools must be backed with support to increase its uptake and effects on teaching and learning (Kempkey, 2016; Ozerbas & Erdogan, 2016). Laurillard (2008: 144) argued that technology could be part of the education solution but argues that 'the solution has to be responsive to the teaching community's perceptions of what they need'. Hence the need for teachers to understand the 'complex relationship between three knowledge bases that include technological knowledge, pedagogical knowledge and content knowledge' (Kempkey, 2016: 10). There is no doubt about the technology affordance; however, teachers must adjust their practices and embrace the constructivist pedagogical approach, which are intertwined with the integration of technology in the classroom (Kempkey, 2016; Dlamini & Ndzinisa, 2020). Teachers' understanding of the three knowledge bases is critical as they must manage various technologies while adjusting their pedagogical approaches.

There is confirmation that 'ICTs greatly facilitate the acquisition and absorption of knowledge' (Aktaruzzaman, Shamim & Clement, 2011: 116). However, the GDE's ambition needs to respond to the teaching community's perceptions of what they need in order to meet their educational aim. As such, technology can provide resources to transform instructional activities and broaden learners' engagement in their learning. Learners can now use social tools to participate in knowledge production and to share this with a wider networked community of learning (McLoughlin & Lee, 2007, 2008). Capitalising on these opportunities may help ensure that learning becomes a participatory and social activity.

There is also a discourse focusing on globalisation and the internalisation of national economies with technology at the forefront (Voogt et al., 2013). Therefore, to fully live and participate in the complex global economy, learners will have to be conversant with 21st century skills such as collaboration, communication, digital literacy, digital citizen, problem solving, critical thinking, creativity, and productivity skills (Voogt et al., 2013). Voogt et al. (2013) argued that these skills are not well implemented in current pedagogical practices because of a lack of competent teachers. Hence the demand for the school system to change so that learners have the right ingredients to live and succeed in the global economy. Interestingly, the implementation of digital learning platforms in schools is 'creating a transformational shift in how institutions architect their learning ecosystems for learners and instructors' (Brown et al., 2020: 9).

For this reason, many school systems around the world are making an innovative paradigm shift to turn traditional classrooms into digitally enabled smart classrooms. However, a systematic approach informed by instructional design principles is central to the paradigm shift (Dlamini & Ndzinisa, 2020).

Mere access to technology and the implementation of digital learning platforms will not translate into fundamental changes in teachers' teaching (Cuban, 2009). Teachers also need to be equipped with 21st-century skills and be trained for pedagogical approaches that leverage the use of digital tools (Aktaruzzaman et al., 2011; Voogt et al., 2013; Brown et al., 2020). Digital technologies have the potential to help teachers meet the needs of their learners and provide them with the best learning experiences. The gap in ICT knowledge between the digital native learners and their teachers should not be a deterrent to the adoption process. However, the gaps should be met with ICT teacher development opportunities with robust computational learning resources. Aktaruzzaman et al. (2011: 117) regarded ICTs as tools that can 'enhance the quality of education' by increasing 'learner motivation and engagement'. However, these can only be achieved if ICTs are used appropriately. Thus, digital literacy is an essential precondition for equitable access to digital pedagogies to transform the classroom. Teachers' self-efficacy needs to be increased through extended support and professional development opportunities (Barbour et al., 2017). According to Dlamini & Ndzinisa (2020: 56), in order to realise the potential of digital technologies there is a need to engage with the 'invisible structural variables at curriculum level, societal level and institutional level' that create barriers to digital fluency and pedagogies.

Context is another reason why ICT initiatives collapse, since the educational benefits of ICTs are not automatic. This was supported by Aktaruzzaman et al. (2011: 118) who suggested that there should be an

> understanding of the potentials of different ICTs when applied in different context for different purposes, and an awareness of priority education needs and financial and human resource capacity and constraints within the country or locality.

Lai (2011: 1269) insisted that 'the potential of digital technology lies in its capacity for supporting a more interactive and communicative process'. A UNESCO (2010) report established that ICT tools are used in the education system to communicate, collaborate, and manage and deliver subject content knowledge fruitfully. This suggests that teachers, as key administrators of the classroom, are no longer a source of knowledge but a facilitator of knowledge; their role has changed. The pedagogical affordances of ICT resources and the adoption of technology driven pedagogies that support ICT integration and promote ubiquitous learning depend on the social and economic realities of the teachers, learners and schools.

RESEARCH METHODOLOGICAL APPROACH

The research used a quantitative research approach with a survey of 1 330 teachers from 133 randomly selected schools. Quantitative research is useful to indicate what may be happening and may provide statistical evidence of activities taking place on the ground. Within the 15 districts in the Gauteng province, a simple random sample of schools was drawn from a list of 370 schools characterised as ICT equipped schools. We distributed 1 330 questionnaires, and only 837 respondents returned their questionnaires. The study achieved a response rate of 63%.

Questionnaire

The questionnaire completed by teachers from the Further Education and Training phase Grade 10 to 12 included 15 main questions. Six of the main questions had multiple sub-questions that were measured on a Likert-type scale. The scales were as follows: (1) *Strongly Agree* (2) *Agree* (3) *Neutral* (4) *Disagree* (5) *Strongly Disagree* (6) *No Opinion*; (1) *Most Important* (2) *Important* (3) *Neutral* (4) *Least Important*

(5) *Not Important*; and (1) *Well Experienced* (2) *Experienced* (3) *Neutral* (4) *Not Experienced* (5) *Not Well Experienced*. The first part of the questionnaire provided a description of the research study with instructions for completing the questionnaire. The second part of the questionnaire included questions about the demographic information of the participants, and the rest of the questionnaire had multiple dimensions, including items on the experience, professional development needs for various technologies, their understanding of technology in their profession, and their thoughts on what it is for educators to successfully integrate ICT in teaching. The data generated provided general information of how individual-level and school-level characteristics influence teachers' pedagogical integration of ICT in their classrooms.

Reliability of the Instrument

The reliability of the instrument was tested by calculating Cronbach's alpha (α) coefficients. This was to ensure that the study contributes acceptable findings and insights. Cronbach's alpha coefficient was calculated to check the internal consistency of the items in the questionnaire (Taber, 2018). The overall instrument had acceptable reliability of $\alpha = 0.79$, which is higher than 0.7, and therefore, it can be considered valid.

Data Processing and Analysis

After data cleaning and coding, the data were processed and mean and standard deviation calculated. We used the Pearson correlation analysis to understand the relationship between variables. Peck, Olsen and Devore (2015: 228) stated that 'the Pearson correlation coefficient only measures the inherent strength of the linear relationship between two numerical values'. In this case, we used Evans and Karras's (1996) guide on strength of correlation to determine whether the relationship of the correlation is positive, negative or no correlation in the following way:

- .00–.19 "very weak"
- .20–.39 "weak"
- .40–.59 "moderate"
- .60–.79 "strong"
- .80–1.0 "very strong".

RESULTS

This research provides insights into the factors constraining ICT integration in schools. The findings presented shows varying understandings of ICT and preparedness to integrate ICT into teaching. There is lack of a conceptual understanding and awareness of ICT in schools, and there is a considerable diversity in the apparent understandings of ICT tools. The wide range of ICT conceptual understanding and interpretations are problematic. Figure 1 provides an overview of teachers' experience with different technologies.

Figure 1:
Teachers' experience with different technologies
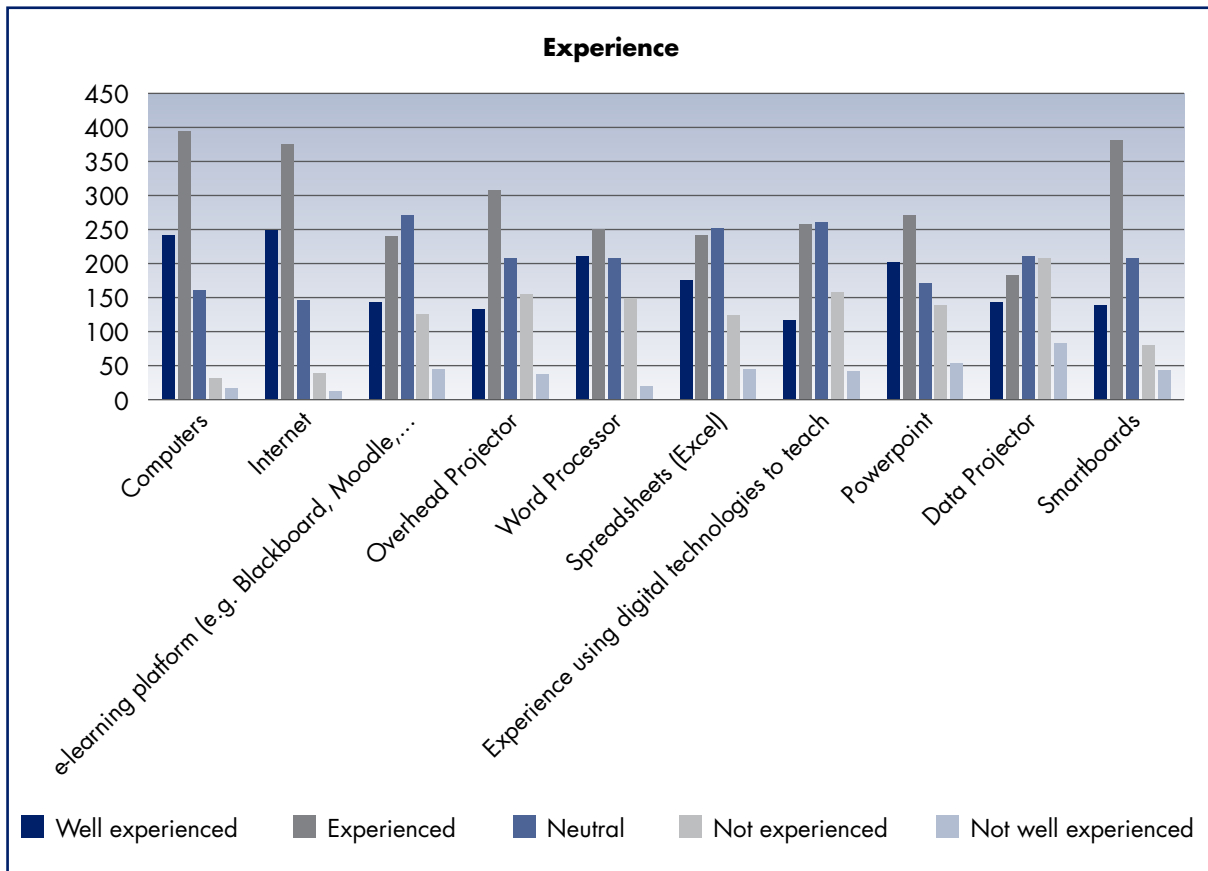
It is evident that teachers' use of technologies is skewed. This is because of the wide variations in their skills and competencies. There is no doubt that teachers know how to use the internet and computers, but the issue is that they do not know how to use these to teach. Figure 2 provides a clear view of the professional development needs of teachers in order to increase the uptake of various technologies to enhance teaching and learning.

Figure 2:
Professional development needs in specific areas
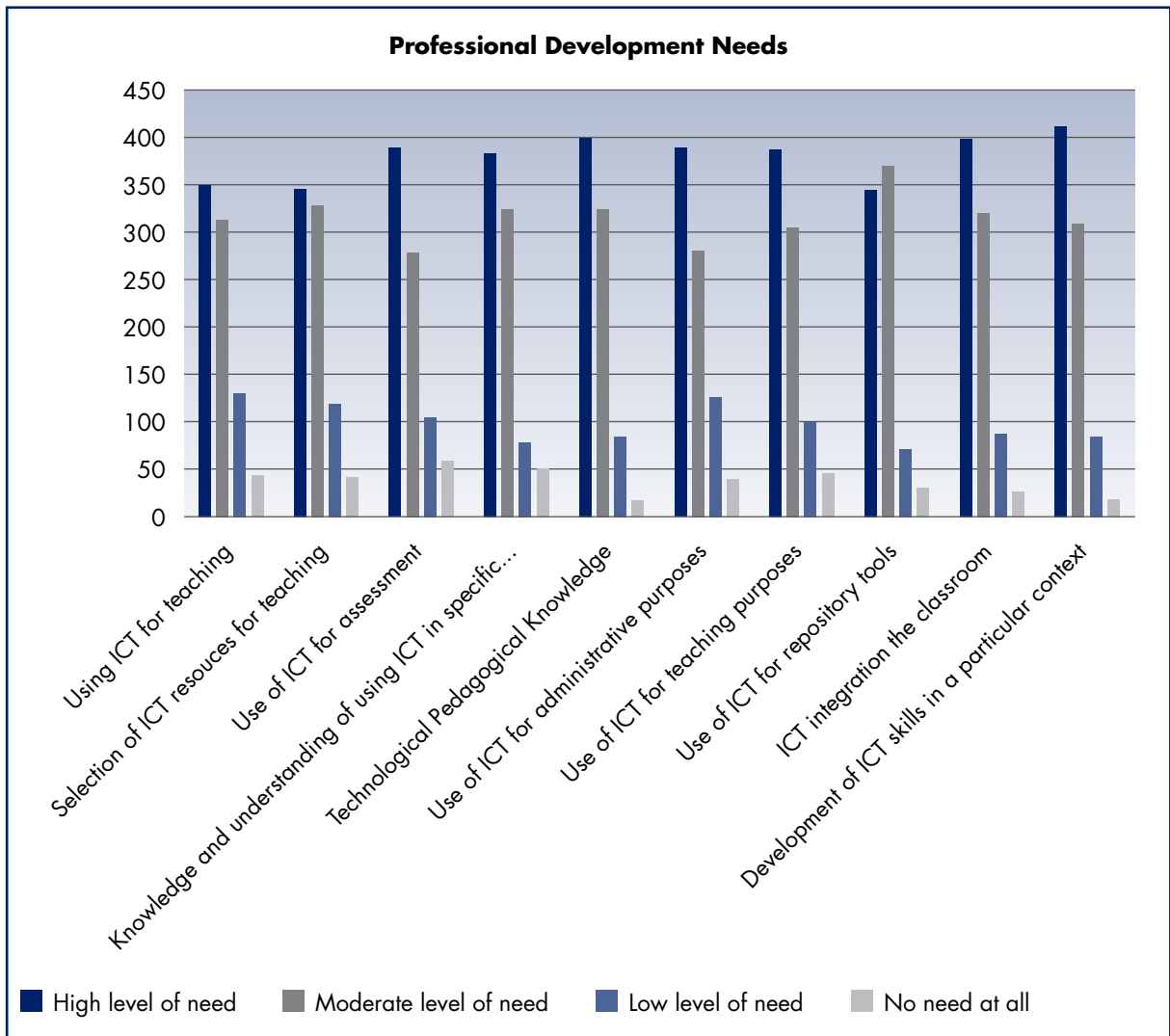
Teachers' levels of ICT professional development needs (Figure 2) correlate with their various experiences with different technologies (Figure 1). Although Figure 3 demonstrates that the situation is not all bad as teachers are fairly distributed in the different levels of integration. This data must be viewed as a 'snapshot' of one province.

Figure 3:
Level of ICT Integration
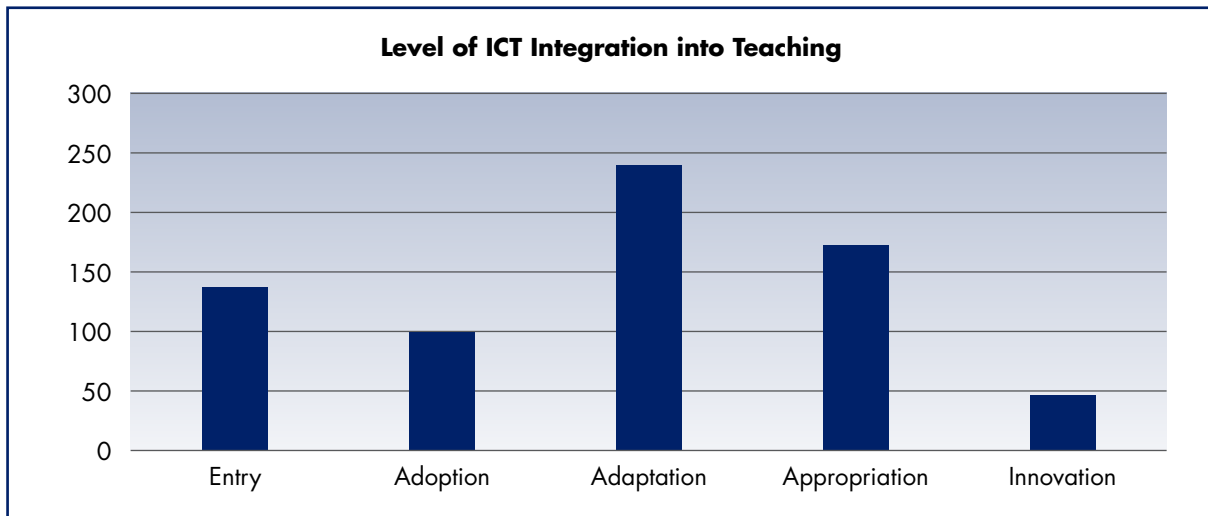
The findings demonstrate fairly distributed teacher proficiency levels (Figure 3) on the use of ICT in the classroom. Clearly, the integration trend is almost hierarchical with the innovation level at the top. Teachers must go through the stages as shown in Figure 3 in order to develop both skills and creativity for the meaningful integration of ICT into teaching and learning. In Figure 3 there is evidence that 20% of teachers are computer literate at the entry level; however, these participants need proper training and development on the use of various ICT tools, especially for pedagogical integration in the classroom. The dominant technology used by teachers at all the levels was PowerPoint presentations. Only 9% of the teachers were at the innovation level, which means that these teachers leverage the power of digital devices to enhance learners' classroom experience. This should be a concern for the GDE because access to technology might not be a major concern, but the investment does not correlate with the uptake.

It is critical that we leverage emerging technologies' affordances to transform teaching and learning, but we also must understand the context of the teachers, especially their level of ICT integration. Technology knowledge gaps among teachers varied, suggesting that social and cultural capital remain the biggest issues. According to Bourdieu (1986), cultural capital can be a source of social inequality, especially in an unequal society. Dlamini and Dewa (2021) asserted that teachers' social standing and contextual factors are not homogenous, and therefore, there is a great need for a variety of ICT teacher development opportunities to expand their technological pedagogical knowledge. Figures 1, 2 and 3 provide evidence of varied technological knowledge and skills. The fact is that teachers in South Africa live in an unequal society where access to digital knowledge is very limited in some places and their interaction and networking happens within their surroundings.

FACTORS CONSTRAINING ICT USE IN EDUCATION IN GAUTENG

While there have been success stories in other parts of the world, South Africa, is confronted with varied technological knowledge gaps as presented in Figures 1, 2 and 3. In order to achieve ICT integration in the classroom, the development of digital fluency should not be divorced from the realities of the provinces' socio-cultural context. The level of ICT integration in teaching (Figure 3) revealed that all teachers are using some form of technology in the classroom, demonstrating the willingness of teachers to appropriate digital tools in their classrooms. However, Table 1 demonstrates a moderate correlation between ICT skills and confidence, so it is important to boost teachers' confidence through continuous training. Notably, there is weak correlation between ICT skills and attitude, signifying that ICT skills development is not dependent

on attitude. Moreover, there is a strong correlation between confidence and attitude. Therefore, there is a need to provide upfront training before teachers develop a negative attitude towards ICT tools or digital devices.

Table 1:
Pearson Correlation Analysis

Pearson Correlations						
	1	2	3	4	5	6
Technological Pedagogical Knowledge	1	.020	.028	.033	.117**	-.098**
Use of Computers		1	.079*	-.112**	-.107**	.010
Skills			1	.499**	.386**	.054
Confidence				1	.618**	.134**
Attitude					1	.079*
Use eLearning to Teach						1

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

In a context where teachers refer to themselves as BBTs (Born Before Technology), confidence plays an important role in ICT integration, especially as it has a strong correlation with attitude. For teachers to develop confidence in the use of ICT in their profession, they must have access to development opportunities. It is clear that if confidence is low, they easily develop a negative attitude towards ICT tools. In Figure 4, the participant teachers' years of service are shown in the graph and most teachers have more than 20 years of working experience. This is an indicator that continuous professional development must be central to all ICT initiatives because the push to pedagogical ICT integration is new. This profile confirms access to multidimensional insights on the conceptualisation of ICT in teaching, and thus, provides a rich ICT pedagogical landscape that shows what it means to go for a system-wide adoption and integration of ICT in schools.

Figure 4:
Teachers' working experience

Professional Development Needs
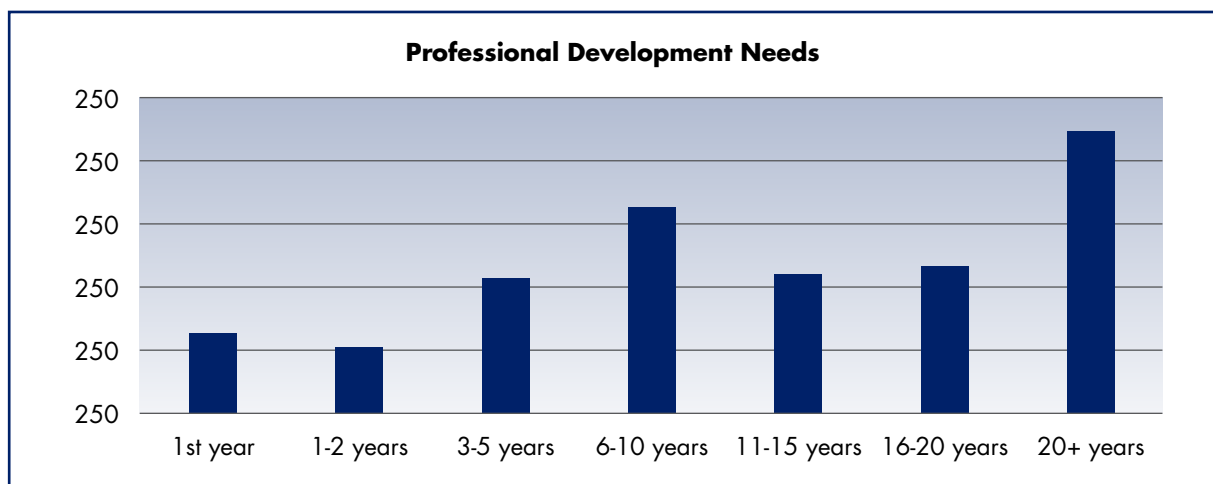
To improve ICT skills among teachers, there must be a systematic approach to ignite teachers' passion for digital pedagogies, which are invaluable in the 21st century classroom. This could help put teachers within a controlled environment where their progress can be monitored and evaluated as they go through the development levels outlined in the White Paper on e-Education (DoE, 2004). As shown in Figure 2, the education system needs to provide continuous support to bridge the gaps in the development levels. Figure 5 clearly shows the variability of the mean and the standard deviation.

Figure 5:
Mean and Standard Deviation Distribution
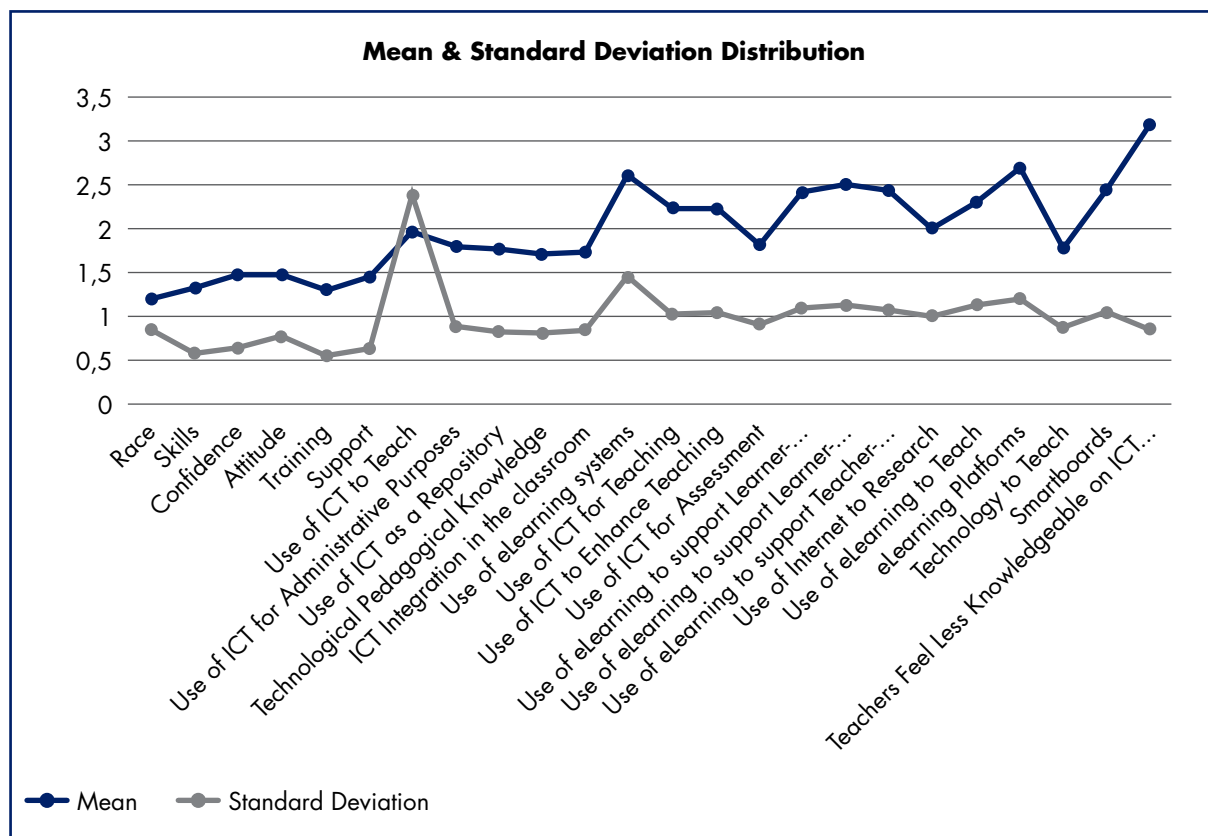
It seems there is progression in the use of ICTs as teachers are distributed across the different levels. Most are at the 'Adaptation Level', where they are using ICT to support their everyday classroom activities. Figure 5 shows that the data are very spread out and even the distance between the mean and standard deviation is large. Within a highly resourced constrained environment there must be a balance between ICT infrastructure availability and ICT professional development opportunities; this highlights the need to have an in-depth understanding of the key factors that influence the integration of ICT into teaching and learning. Standard deviation is the summary measure of the differences of each observation from the mean. The use of ICT is widely spread out, which tells us that there is a lot of work needed to achieve a normal distribution in the use of ICT in the classroom.

There are gaps in the coordination of ICT implementation in the province as some teachers have acquired ICT skills through training activities, but they are working in schools that do not have ICT infrastructure in place. At the same time, some teachers feel digitally 'bankrupt' as they are not on par with their learners. There is a need to move teachers' ICT skills and their conceptual understanding of digital tools in their profession to an acceptable level. Bringing teachers to the adoption level will be a good start and bringing

them to the acceptable level will help them develop a deeper understanding of the contribution of ICT to teaching, learning and transformational pedagogies.

RECOMMENDATIONS

- Teachers need meaningful and well-coordinated ICT development activities to increase their technological knowledge and, in the process, develop technological pedagogical knowledge in order to integrate ICT tools into teaching and learning.

- This research provides a snapshot through which government officials can develop an understanding that successful implementation of ICT in the classroom warrants careful planning as it is a complex and multidimensional process.

- Future research could undertake a more in-depth longitudinal study. The view as a 'snapshot' is synonymous with Dewey's (1938) concept of continuity; in this case the process of ICT integration is incremental and iterative.

- From these findings a comprehensive strategy could be developed to inform the ICT-based teaching and learning environment in every school.

- There is a need for the provincial government to develop a responsive approach informed by the following variables:

    o A scalable scenario-led design process for developing digital pedagogies

    o An ICT classroom toolkit accessible through an online & offline platform

    o Case scenarios of ICT teacher pedagogical practices in specific subjects.

CONCLUSION

The experience of teachers' use of different technologies was distributed across the levels of ICT integration as shown in Figure 3, demonstrating that teachers do have access to basic computing infrastructure in their schools. There is clear evidence that digital fluency regulates how teachers respond to the adoption of ICT into teaching and learning. Arguably, access to ICT infrastructure is crucial, but developing confidence and solid digital skills have the potential to inform how teachers use ICT tools to enhance their instructional delivery. Klopfer et al. (2009) said that technology can have a reciprocal relationship with teaching. Hence it is important for educators to develop the necessary skills and competencies to adopt these technologies to enhance learners' classroom experience and learning beyond the physical boundaries. On the issue of ICT integration in Gauteng, there are considerable disparities between availability of ICT infrastructure in schools and the availability of digital skills among teachers. There are instances where schools have access to ICT resources, while teachers in those schools lack the ICT skills to pedagogically integrate ICT into teaching and learning. In some instances, the computing hardware is available while there are no appropriate educational software and technical support on the ground.

At a broader conceptual level, the findings expand on the little that is known from various mini-studies conducted mostly by postgraduate students to contribute knowledge and insights on technology usage, infrastructure and technological knowledge among teachers across the school system. Lack of information on the enabling and constraining factors in the adoption and utilisation of technology in teaching and learning is a major challenge in the province. Thus, this research has the potential to inform strategy and planning initiatives related to the use of ICT in education and confirms the need for coordinated activities to prevent the duplication of efforts.

There is evidence that the preparation of teachers for pedagogical ICT integration in the classroom is complex and multidimensional, as ICT skills among teachers do not solve the problem of ICT infrastructure

inadequacies, and the availability of ICT infrastructure does not guarantee ICT integration into teaching and learning. In order for teachers to develop digital pedagogies, they must have access to professional development opportunities to move them through the stages in Figure 3. Although most teachers still lack the needed creativity and innovation for pedagogical integration of ICT in their teaching, there is light at the end of the tunnel as most of them were using some form of technology. However, technical competencies and confidence must be achieved in order for teachers to adopt and appropriate technology in their classrooms. Evidently, ICT integration is not prescriptive, as it comprises different interlinked professional and technical activities.

Teachers have been 'blamed for the failure of technology to fulfil its promise' (Convery, 2009: 25), and yet, they have not been given adequate support, especially in the early stages of rolling out of ICT projects. Teachers as the 'pedagogical crafts persons' must be given continuous professional development opportunities to transform their teaching approach. Furthermore, through effective leadership, training and continuous support, teachers' mind-sets could be changed so that they adopt and appropriate ICT in the classroom to enhance teaching and learning. Table 1 confirms that teachers' confidence and attitude is dependent on their ICT competencies. There is a need for best practices for the integration of ICT in various subjects so that teachers have access to these guidelines. Those at the forefront could model to other teachers the creative ways to integrate ICT to enhance their teaching and learning experiences. Social structures to collectively support teachers at the different stages of the ICT integration continuum also need to be introduced.

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The influence of gamified e-learning quizzes on students' motivation – a case of programming students at a South African higher education institution[1]

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ABSTRACT

Institutions globally have been grappling with the sudden shift to e-learning due to lockdowns related to the pandemic. However, challenges associated with motivation and student engagement continue to persist. While it is expected that e-learning will become more entrenched in higher education, ignoring these challenges can affect the sustainability of e-learning. Therefore, it is imperative to explore approaches to overcome the challenges. Utilising a case study approach, supported by a focus group, the authors explore how gamified quizzes influenced the motivation of programming students. In this study, it was found that participants experience increased motivation when afforded autonomy, are given a chance to learn socially, and rewarded. However, motivation decreases when students perceive pressure or are not rewarded. Findings also indicate that gamified quizzes contribute to increased understanding and confidence. Ultimately, gamified quizzes are more suited for low stakes learning activities that reward engagement but do not penalise non-engagement or poor performance.

Keywords: gamification, motivation, gamified quizzes, engagement, educational technology

INTRODUCTION

Across the globe, Higher Education Institutions (HEIs) have not harnessed fully the potential of e-learning due to lack of consensus on the value of e-learning and due to mixed results of using e-learning (Laufer et al., 2021). As a consequence, institutions and academics have adopted e-learning at different levels with many institutions not adopting e-learning altogether. In recent times, the rapid spread of COVID-19 served as a catalyst for the adoption of e-learning at HEIs (Kandri, 2020). In the face of the pandemic, most institutions were unable to plan their e-learning strategies, an endeavour that typically takes years to plan, design, and execute (Hodges et al., 2020). As a result, HEIs' e-learning attempts during the pandemic were bound together by threads delivering what Hodges et al. (2020) describe as emergency remote teaching rather than purposefully planned e-learning.

To exacerbate the situation, e-learning faces significant challenges relating to motivation and engagement (Zhang et al., 2004). The current situation presented by the pandemic demands urgency in finding solutions to these challenges to ensure sustainable utilisation of e-learning, as improper implementation could be e-learning's Achilles heel (Lederman, 2020).

In the South African context, HEIs also attempted to introduce some form of e-learning amidst infrastructure challenges and resistance from student bodies, since many students could not access e-learning during lockdown (Ngqakamba, 2020). From the onset of lockdown, e-learning is now more prevalent in the South African context. However, students enrolled in HEIs might still not engage online, even if they have access to the necessary facilities due to personal circumstances and socio-economic factors (Mukeredzi, Kokutse & Dell, 2020).

In exploring the role of gamified quizzes to address the challenges of motivation and engagement in e-learning, the authors provide a review of existing literature and then outline the research design and methodology adopted in this study. The findings of the study are then presented along with a discussion on the implications thereof. The authors then conclude with practical recommendations for lecturers, institutions, e-learning platform developers, and researchers, to implement gamified quizzes.

LITERATURE REVIEW

The evolution of e-learning

E-learning is a form of learning supported by technology aimed at improving the quality of teaching and learning (Tagoe, 2012; OECD, 2005). Selim (2007) builds upon this by explaining that e-learning facilitates the achievement of learning outcomes in an online setting. Urdan and Weggen (2000) further contribute by explaining that e-learning is the delivery of course content using various forms of electronic media and communication technologies – thus bringing the 'e' to e-learning.

E-learning can promote student-centred, self-directed learning free from time constraints and geographical limitations whilst encouraging knowledge re-utilisation and broad collaboration (Zhang et al., 2004). On the other hand, e-learning is confronted by challenges, including a lack of engagement and high dropout rates due to the increased demand for discipline, absence of real-time feedback, and the isolated nature of e-learning compared to traditional classroom-based learning (Karnad, 2014; Zhang et al., 2004). Additionally, the absence of suitable infrastructure, connectivity problems, and digital literacy skills, more particularly in developing contexts, also affect e-learning initiatives negatively (Bharuthram & Kies, 2013).

Like all technologies, e-learning has evolved since its inception. E-learning 2.0 harnesses elements of collaborative tools like social media to allow students to engage and learn with the help of peers and extended networks (Ehlers, 2009). Another evolution of e-learning was the shift towards MOOCs (massive open online courses) which were expected to disrupt and transform the higher education landscape (Vardi, 2012; Karnad, 2014). However, that transformation has not materialised (Reich and Ruipérez-Valiente, 2019). Notwithstanding the evolution over the past few decades, the challenges around motivation and student engagement continue to persist.

Student engagement online

In a classroom setting, academics can utilise audience engagement platforms (AEPs) to engage with students, obtain feedback and test students' knowledge (Ayres, 2015; Rudolph, 2018; Vallely & Gibson, 2018). These platforms facilitate a teaching and learning environment where academics may interact with students in real-time through their own devices. On an AEP platform like Mentimeter, which was utilised in this study, an academic may initiate a live session from their device that students access with

a unique code using their personal devices. Open- and closed-ended questions may be posed via the platform to students. Using the responses obtained, an academic can ascertain student sentiment and levels of understanding, resulting in a more pro-active manner of teaching and learning (Rudolph, 2018). Beneficial to students is the fact that while responses are visible to all students, AEPs provide anonymity which is useful to students who are less likely to participate if their identities are known (Ayres, 2015; Rudolph, 2018). Using these web-based platforms, academics can harness the potential of widely-used mobile devices in their class rather than imposing restrictions on these devices (Rudolph, 2018).

AEPs allow students in traditional classroom settings to provide opinions, engage in discussion, and voice concerns (Vallely & Gibson, 2018). Furthermore, students can participate in formative assessments, provide responses, receive feedback and increase their understanding (Wong & Yunus, 2020). When considering the context of science, technology, engineering, and mathematics (STEM) courses, AEPs have been found to enhance students' learning experience, increase motivation, and foster collaboration (Crump & Sparks, 2018). However, AEPs are limited in that while they encourage engagement, they do not necessarily drive higher-order creative and critical thinking (Andriani, Dewi & Sagala, 2019). While AEPs unlock student engagement, those that incorporate gamification can engage students to an even greater extent.

Gamification of learning

The foundations of gamification lie in the reality that games and playfulness have always been central pillars of human motivation (Nacke & Deterding, 2016). Gamification is defined as an objective-driven user-centred approach or methodology that integrates game elements into real-world contexts to motivate behaviour (Adam, 2017).

Examples of game elements that can be integrated into e-learning include the utilisation of points, badges, leader boards, progress bars, and storylines (Adam, 2017; Seaborn & Fels, 2015; Sailer et al., 2013). Points serve as a numerical measure of success or achievement, badges serve as visual titles of honour or achievement, leader boards provide insight into a player's success in relation to others in a game, progress bars depict level of success, and storylines provide a medium through which a scenario may be set to give context to a gamified activity (Seaborn & Fels, 2015; Iosup & Epema, 2014; Kim, 2015).

These elements may be incorporated into e-learning where students are rewarded for aspects like attendance, participation, individual submissions, group activities, constructing arguments, displaying critical thinking skills or completing assessments (Adam, 2017). Previous studies indicate that gamification can be a time-consuming activity for academics, particularly when attempting to reward higher-order skills (Iosup & Epema, 2014; O'Donovan, Gain & Marais, 2013). Since academics may opt to steer clear of gamification due to its time-consuming nature, this study sought to explore gamified quizzes which is a gamification approach that could be setup in a short space of time using a tool that resembles presentation software, that academics typically utilise (Rudolph, 2018).

The nexus of gamification and AEPs

From the game elements described above, the most predominantly used game elements in gamified AEPs include leader boards, points and time limits (Rudolph, 2018; Vallely & Gibson, 2018). Examples of AEPs that incorporate gamification include gamified quiz tools like Kahoot and Mentimeter that allows academics to incorporate gamification into their sessions in the form of a quiz with a leader board (Rudolph, 2018). In a session, students are presented with quiz questions with predefined options and time limits (Figure 1). They are then able to provide their responses using a mobile device (Figure 2). Responses are then evaluated, and points are awarded based on correctness of answers and speed in responding, which then translate into points on a leader board (Figure 3).

Figure 1:
Presenter screen in Mentimeter
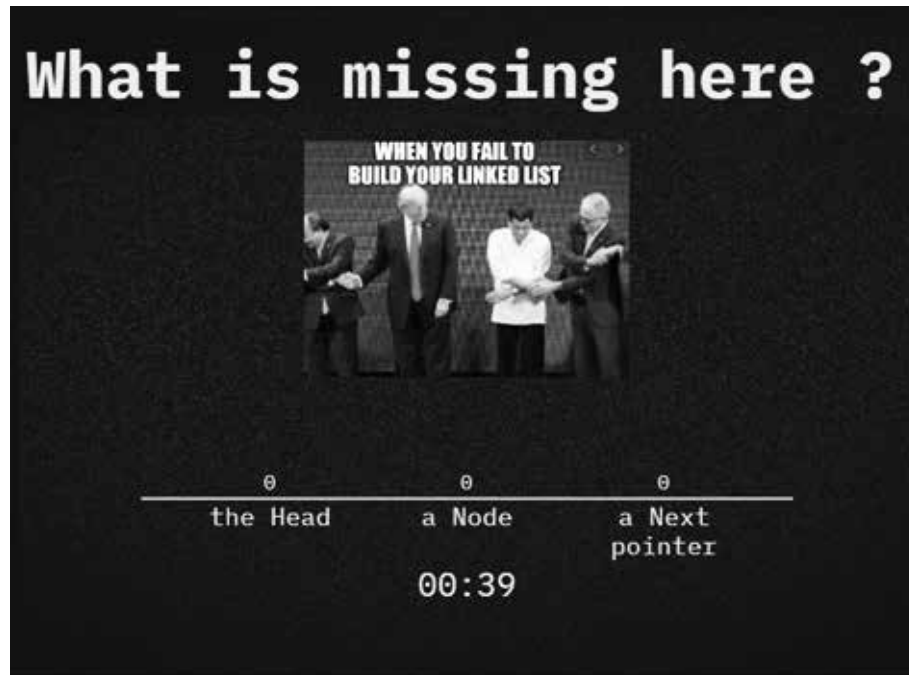
Figure 2:
Participant screen in Mentimeter
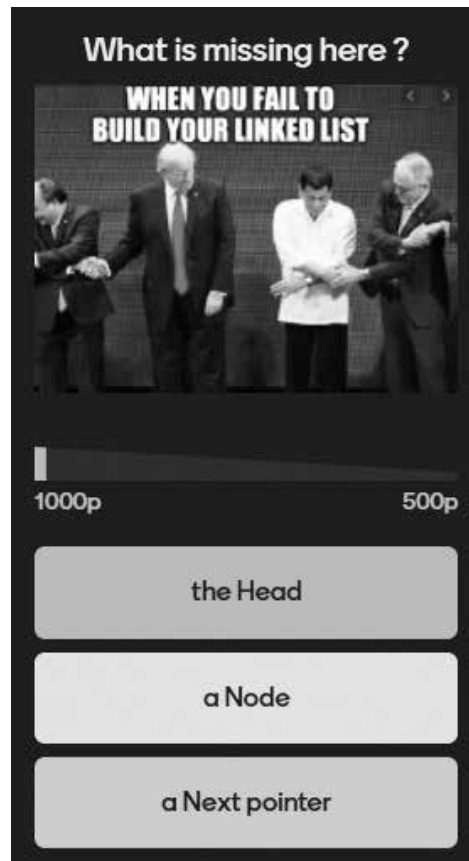
Figure 3:
Mentimeter leader board (adapted to maintain students' anonymity)
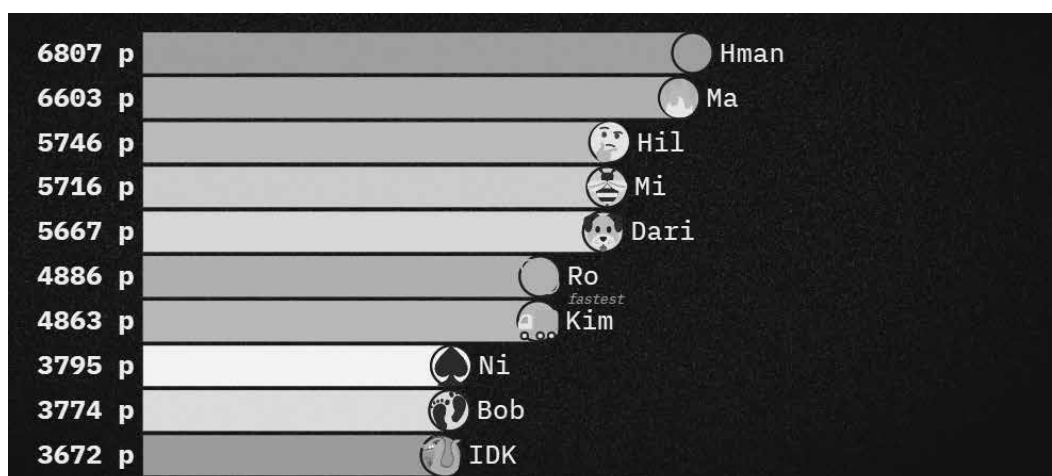
Earlier studies on gamified quizzes

Earlier studies show that utilising gamified quizzes enhances e-learning by increasing academic performance, enhancing attendance, developing greater understanding, driving engagement with online resources, and ultimately, enhancing student motivation (Fotaris et al., 2016; Buckley & Doyle, 2016). In utilising a combination of gamified quiz platform Kahoot, interactive elements within CodeAcademy and a classroom version of *Who wants to be a millionaire?*, Fotaris et al. (2016) found that students who were exposed to gamification and game-based learning tended to display better attendance, accessed material more often and performed better academically. Furthermore, motivation among students and academics were enhanced.

Another concept which emerges in literature is the notion that social learning and connectivism, enabled by gamification, can positively motivate students. The role of gamified quizzes for social learning, particularly in the context of Mentimeter was explored by Crump & Sparks (2018) who utilised the tool to allow students to anonymously rate peer-presentations in real-time. It was observed in their study that students were more honest in their responses and consensus was reached more easily (Crump & Sparks, 2018).

In another study on the utilisation of a customised gamified social platform, de-Marcos et al. (2016) found that allowing students to connect with each other as an important ingredient in the learning process. It was also observed that students who fared well in a gamified environment are more motivated than peers by virtual of their social position (de-Marcos et al., 2016).

If we are to consider the findings of Wong and Yunus (2020) that Mentimeter is perceived as useful to students and that participants would be likely to share it with friends, it emerges that students appreciate the opportunity to learn with peers provided that the learning activity is perceived as beneficial and engaging (Wong & Yunus, 2020).

As can be gleaned from the literature above, gamified quizzes do allow students to improve their academic performance, motivation and engagement whilst also enabling social learning. Social learning integrates strongly with gamification since gamification can allow participants to earn rewards from engaging from one another.

Gamified e-learning in a developing context

The integration of gamified quizzes can bring about several benefits to e-learning. However, in a South African context, the challenge of Internet connectivity and accessibility for students may inhibit the effectiveness of e-learning initiatives (Adam, Blewett & Wassermann, 2015; Ngqakamba, 2020).

When South Africa went into lockdown, it was observed that institutions transitioned to online learning to varying degrees with some institutions moving online in a matter of weeks whilst others lagged behind for longer periods of time predominantly due to the availability of content, devices, and broadband connectivity (Ngqakamba, 2020). Whilst institutions shifted the academic calendar partnered with technology providers to lessen the impact, the shift to online learning was described as elitist as many students were unable to engage online (Mukeredzi et al., 2020).

The situation poses significant implications for the utilisation of gamified quizzes in the context of South African e-learning. It may be argued that if students cannot access online lectures and resources, they are also excluded from participation in any gamified learning activity. This widening of the digital divide could demotivate students who are already excluded from e-learning due to their circumstances.

THEORETICAL FRAMEWORK

Since a central tenet of this study is motivation, it follows that it would be appropriate to adopt a theory that is centred in motivation. Self-Determination Theory (SDT) explores factors that enhance or inhibit motivation through the lens of the socio-contextual conditions that may influence motivation (Deci & Ryan, 2000). As depicted in Figure 4, Deci and Ryan (2000) posit that autonomy, relatedness, and competence are three essential needs that should be fulfilled in order to motivate an individual intrinsically. SDT acknowledges that motivation is not static. Instead, motivation sits on a continuum ranging from intrinsic motivation towards extrinsic motivation and amotivation (Deci & Ryan, 2000). In individuals, motivation fluctuates on the continuum based on the extent to which each of a person's essential needs are fulfilled (Deci & Ryan, 2000).

Figure 4:
Self-Determination Theory
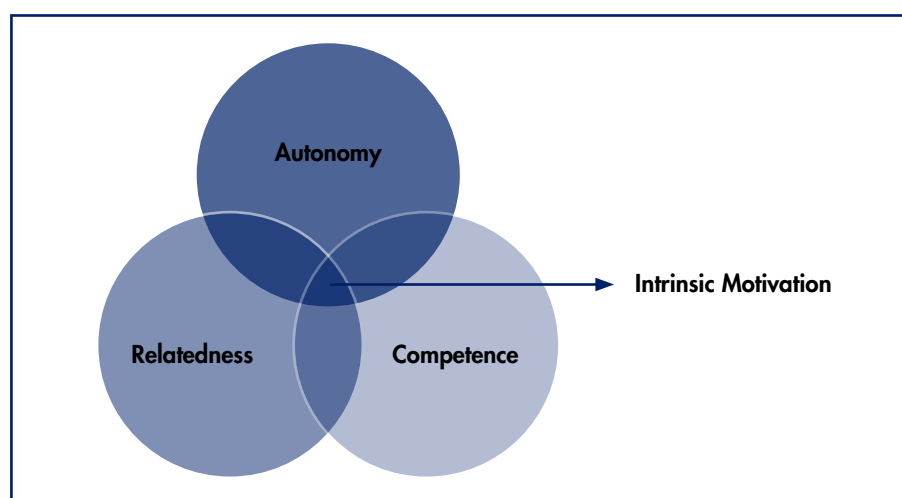
Adapted from Deci and Ryan (2000)

Autonomy is defined as an individual's ability to exercise volition over their decisions; relatedness refers to an individual's perceived likeness with counterparts when engaging in a task; and competence is an

individual's perceived effectiveness in completing a task (Deci & Ryan, 2000). In the context of learning, when students perceive choice in what and how they learn, without external pressure or undue constraints being placed on them, then autonomy prevails (van Roy & Zaman, 2017). Relatedness is established through collaborative and shared experiences, and mastery is developed through progression and achievement, with meaningful feedback (van Roy & Zaman, 2017). SDT has been used in e-learning and gamification studies previously where the three essential needs, when achieved through gamification, led to positive outcomes (Chen & Jang, 2010; Suh, Wagner & Liu, 2016).

Within the context of the existing literature that has been reviewed, it emerged that study of gamified quizzes to enhance student engagement in a developing context is necessary. Thus, it was apparent that there is a need to understand the influence of gamified quizzes on students' motivation in the context of e-learning – the purpose to this study.

RESEARCH METHODOLOGY

Having explored the existing literature, focus can shift towards the methodology. In order to fulfil the purpose of the study, two specific dimensions were explored: students' experiences of gamified quizzes and how gamified quizzes motivate students in an e-learning context. This gave rise to two research questions underpinning this study:

- What are students' experiences of participating in an online gamified quiz?
- How do online gamified quizzes motivate students in the context of online learning?

The first research question stemmed from the fact that students were experiencing a change in how they were learning due to the lockdowns as a result of the COVID-19 pandemic. As such, their experience might affect their motivation to learn. This question sought to explore participants' experiences of the gamified quizzes as well as their experiences of the game elements used in Mentimeter. The second research question sought to understand how students are motivated by online gamified quizzes through the lenses of the three essential needs as identified by SDT.

On the basis of an interpretivist paradigm, the authors aimed to understand the subjective experiences and motivational drives of students in the context of using gamified quizzes in e-learning. An interpretivist paradigm has been used previously to understand students' interactions with tools like Kahoot & Mentimeter across other disciplines (Xi & Chen, 2020; Ristiniemi, 2019) and when working with programming students (Heni, Nurdin & Suparman, 2019). Adopting an interpretivist paradigm has implications for the research design and methodology selected (Patel, 2015).

In this study, the aim was to gain in-depth insight of the phenomenon under investigation, rather than to establish generalisable results. As a result, a qualitative case study approach was adopted in line with the recommendations of Leedy and Ormrod (2016b). Since the authors aimed to understand the influence of gamified quizzes in an e-learning context, it follows that the population for this study include tertiary students in a module offered with e-learning as a significant component, which was widely prevalent during lockdown. Therefore, the population utilised in this study encompassed 91 students registered for a Programming Module at a South African HEI.

From these 91 students, a sample of seven students was selected purposively on their participation with the gamified quizzes that were used in online lectures. The researchers contacted potential participants through a class-wide WhatsApp group inviting participants to express interest to participate in a study. The potential participants were informed of the nature and aims of the study as well as the commitment that would be required from their side. Potential participants contacted the researchers to express their interest,

and the purposive sample of seven were selected. This purposive sampling approach was necessary to ensure that research participants were able to provide insight into their experiences of online gamified quizzes having actually experienced them.

Given the lockdown, a 90-minute online focus group discussion was held, with video and audio, to allow participants to provide insights irrespective of their physical location (Sekaran & Bougie, 2016). Furthermore, an online focus group with video and audio minimises human contact whilst still having the potential of yielding required research data (Ravitch, 2020). Whilst the authors were cognisant that some participants might have been reluctant to share insights online, this was not a hindrance, as all participants had already established rapport with the author who conducted the focus group and were also familiar with each other as they attended classes together pre- and during lockdown.

The authors maintained credibility and trustworthiness by ensuring that the focus group discussion schedule aligned with the theoretical framework and did not deviate from the research questions as recommended by Leedy and Ormrod (2016b). As outlined by Leedy and Ormrod (2016b), prior to conducting the focus group discussion, feedback was obtained from other researchers with experience in designing qualitative research instruments and recommendations to avoid leading, unnecessary or confusing questions, wihc was implemented. Participants were also provided with confidentiality with their names being redacted during analysis and each participant being referred to using a number (e.g., P1, P2, etc.). Thus, whilst they were known to the authors, their identities are not published.

Before commencing data collection, written permission was obtained from the institution where students were enrolled to conduct this study. Additionally, informed consent was obtained from each participant and participants were provided with details of the study and informed that participation was voluntary, and they could withdraw at any time without repercussion. Written permission was obtained from participants to record the focus group discussion to make provision for subsequent transcribing.

Once data were collected and transcribed, different themes and categories were identified in alignment with the theoretical framework and existing literature (Leedy & Ormrod, 2016a, 2016b). The transcript was then coded in the NVivo software package and irrelevant information was discarded in line with recommendations by Leedy and Ormrod (2016b). Thereafter, the remaining data were analysed, and findings were recorded.

ANALYSIS OF RESULTS

Students' experiences of gamified e-learning

As stated, in the first research question, the authors sought to understand students' experiences of gamified quizzes. To answer this question, the students' experience, their perceptions of their own learning online using gamified quizzes, and their perceived academic success due to gamified quizzes, were explored. Furthermore, insights were sought from participants relating to specific game elements like points, time-limits, and leader boards.

When participants were given an opportunity to share their experience of e-learning during the COVID-19 lockdown, it emerged that some participants appreciated the convenience of being able to study from home flexibly whilst others struggled with e-learning during lockdown.

Some participants shared the following positive feedback relating to online learning:

> I actually liked it because we could be comfortable at home… you can wear what you (are) comfortable wearing, you can eat like a full lunch at home. So, I thought the online lectures were really nice in terms of that. (P1)

When it came to stuff like you know the actual online lectures, I did not mind it being online, the group work was quite fun and even then, because it was online lectures and stuff like you watching from your laptop whatever you could do like eat while you were working, you just worked as time fitted for you. (P2)

As can be observed in the data, some participants described themselves as self-motivated individuals who felt that they could exercise self-discipline.

On the other hand, other participants indicated that online learning was not beneficial to them due to several reasons:

I did not like online learning at all. I prefer coming to campus than learning online. I mean learning face to face. (P3)

I found it very difficult to be at home. (P4)

I just could not discipline myself. (P5)

On further investigation, it became clear that these participants were affected negatively by distractions of the environment at home and preferred coming onto campus due to the conducive environment with peers and lecturers. They shared the following experiences:

I like being with friends … who can help and share the same ideas. (P4)

I love bouncing off ideas off my lecturers and getting feedback instantly. (P5)

Thus, it seems that the campus environment which facilitated social interaction with peers and academics were beneficial, and these seemed to be missing in e-learning. Given the varied experiences of shifting into e-learning, results suggest that motivation and self-discipline are a concern in the online space and other students who struggle with this cannot adjust to e-learning.

Furthermore, as the lockdown progressed, some participants experienced a positive shift into a new routine with online classes and gradually created their own ability to work independently. They shared the following experience:

After you get a good flow, it starts to get a little bit easier, and you obviously learn how to research on your own. (P6)

As time went by, we actually got used to it. (P7)

The findings above suggest that students experienced the shift to online learning in different ways, with some finding the experience positive, some taking a while to adjust but eventually finding their feet and others struggling to adjust altogether. These varying levels of experience in the shift to online learning undoubtedly affected students' motivation and had an effect on whether to engage online. It also signals the need to accommodate students in an online space and to, in future, prepare students more adequately for online learning.

When exploring gamified quizzes as an online tool to motivate students, results suggest that the use of Mentimeter can increase students' interest and engagement when learning online. One participant offered the following experience:

Menti sort of broke up like the monotony of class because like you sitting doing the lecture following around and all of a sudden you are part of it so like I feel that it is also something that helped in keeping students engaged. (P2)

This finding suggests that students ordinarily lose interest easily when learning online due to the seemingly passive nature of online classes. However, being engaged actively is beneficial to their learning - a phenomenon we observe commonly in traditional classes as well. A similar phenomenon was observed by Heni et al. (2019) and Crump and Sparks (2018) in their studies which reported that students' level of engagement and interest were increased when using gamified quizzes. However, there emerges contention on the extent to which Mentimeter encourages active participation. On the one hand, students benefitted from using the reply of peers to learn and correct their own knowledge:

It made me learn better because we were doing it while we were doing online (classes) … and Mentimeter helped because I learnt more from seeing other people's responses. (P3)

If you put up an answer and it was wrong and you wondering what other people think. (P4)

This finding aligns with the findings of Crump and Sparks (2018) and Wong and Yunus (2020) who also found that their students benefitted from the social interaction offered by gamified quizzes.

On the other hand, it became apparent that not all participants benefitted from participating as some preferred to simply spectate or utilise answers from the Internet without critically reflecting:

Sometimes because you know someone is going to answer you can just keep quiet. (P1)

People will just Google and like take the first thing that they find (on Google) and paste it so that they have an answer there. (P6)

While students were given the option on whether or not to participate in the gamified quizzes, it emerged that non-engagement by some students tended to demotivate their peers:

The demotivating aspect is when people do not participate. I just feel if they not doing it, why am I doing it? (P5)

These findings suggest that students benefit from what they perceive to be collaborative learning where all peers participate actively. Tension is experienced when some students opt not to invest in their participation or not to participate at all. The authors maintain that if one were to make participation compulsory to overcome this issue, it will increase the stakes of the learning activity and participation but will not result in invested participation from students.

When exploring the game elements used, participants focused predominantly on the utilisation of the leader board within Mentimeter, which materialised as the most apparent and controversial element. Some participants found that being given recognition on the leader board among peers was motivating to them:

I just want people to know that if come out front it is me. (P6)

Nacke et al. (2011) explain that this may be attributed to the fact that this individual may be motivated by being recognised and that other participants may be motivated differently. This was evident in this

study as there were participants who were not motivated by leader boards since only high achievers were displayed:

> Let's just say that I came out last personally I would feel bad, I would feel horrible, I am the dumbest person in this room. (P5)

This participant went on to reason that there was the still value of only showing top participants to avoid demotivation:

> Not having the last person (is) really nice because you have the best and the people (only and those) who would not make the cut just wouldn't be displayed there. (P5)

The influence of the leader board as being motivational to some and demotivational to others was also found by Adam (2017) who attributed this to the different motivational drives of each student. Furthermore, the perception that someone placed last is not making the grade suggests that students perceive gamification rewards as being a direct reflection of how well a student has learnt. This finding suggests that if a leader board is limited to top participants, it can demotivate students who were correct as they would not receive recognition due to receiving less points which could have happened as they might have taken longer to respond. This could in turn affect their self-confidence. This is reinforced by an argument put forward by a participant that there is a downside to showing a leader board limited to only top participants:

> I just wanted to mention that not getting a reward from getting the right answers, I am sure that demotivates most people. (P7)

Another factor to consider is that some students may feel a degree of indifference towards a leader board:

> I am not competitive, so I don't care where my name is in on a leader board. (P2)

As can be gleaned from the findings discussed above, the tension experienced with the leader board is difficult to overcome. Regardless of the choices made, it seems as though there will always be a demotivated student. An approach to mitigate the demotivation faced when using leader boards is to incorporate other game elements like points, badges, storylines, and progress bars into the learning activity but this may prove time-consuming (Adam, 2017). Notably, in this study, whilst Mentimeter also integrates points and time limits that determine who is placed on the leader board, the leader board itself seemed to have taken centre stage, with participants not always focusing on the points for each question whilst also not always considering the fact that questions had time limits associated with them.
Other than simply being placed on a leader board, there was a call for rewards to bear real-world value:

> If like in the long term you could get extra marks, bonus points that would actually be good. (P7)

The use of real-world rewards ties into earlier studies where examples include de-Marcos et al. (2016) providing the ability to use in-game rewards to purchase extra marks and avatars and Adam (2017) allowing students to use badges to purchase freedom to choose their own project groups and to request recommendation letters from lecturers.

In essence, it emerged that students adjusted to e-learning during lockdown in different ways and gamified quizzes increased engagement and motivation, but at different levels. While students were exposed to different game elements, the leader board was predominant and most controversial with the potential to motivate some strongly and to demotivate others equally strongly. Lastly, associating real-world value to gamification rewards can prove to be an additional motivating factor.

Influence of gamified quizzes on students' motivation

In the second question, the authors sought to understand how gamified quizzes influence motivation through the lens of Self-Determination Theory (SDT). These findings provide deeper insight into students' perceived autonomy, relatedness, and competence, and in turn provide understanding of students' motivation and the reasons behind their motivation.

Autonomy

When considering autonomy, several themes emerge including the choices to control their identity, the choice of whether to participate in the gamified quiz, and the choice to engage in a learning activity without necessarily risking their marks.

In terms of identity and expression, participants indicated preference to use an alias when signing into a gamified quiz as it eased the pressure on them in a social setting:

> I feel like using your real name will put a lot of pressure on you and a lot of people would not actually want to do that because if they got a question wrong everyone would know exactly who they are. (P7)

This finding ties in with a finding of Rudolph (2018) who explains that a central feature of Mentimeter is the use of aliases.

A level of autonomy was experienced by a participant which was termed as 'freedom of input' since the platform allowed them to include ASCII characters that allowed creation of ASCII art to be more expressive among peers:

> Thing was the freedom of input. You could even put ASCII there, the wildest things. (P5)

Findings also indicate that participants experienced a strong degree of autonomy when choosing whether to participate in the gamified quiz and whether to answer all questions or only those they wished to answer:

> Freedom of choice was nice because I could have just watched you streaming your Mentimeter instead of actually engaging with it. So, I got the choice whether or not I was going to use it and I felt that was nice. (P1)

> When you put up a question for us to answer there is nothing forcing you to answer the question. You can answer it, or you can leave it blank because the next question will pop up and you could leave the question blank. (P6)

When exploring the reason for perceived autonomy, it transpired those participants viewed gamified quizzes as a fun learning activity due to the nature of a gamified quiz (i.e., not counting for marks). Participants indicated that had marks been associated with a gamified quiz, it would have affected the dynamic of how learning takes place by making the gamified quiz a serious activity:

> Making it extremely high stakes would make you ignore the fact that you know it is a game and it is meant to be enjoyable. (P5)

This is in direct contrast to the earlier finding that gamified quizzes should yield real-world value. Thus, it seems like participants are motivated by gamified quizzes that allow them to earn extra marks or recognition whilst not exposing them to the possibility of losing marks. This suggests that gamified quizzes

are better suited to low-stakes learning activities as opposed to higher-stakes activities. This finding is also supported by Crump and Sparks (2018).

Relatedness

When considering relatedness, several themes emerge including the benefits of social learning, the need for anonymity in a social setting, and possible negative perceptions of being given rewards where peers are not rewarded.

It was found that participants were motivated by seeing the responses of peers whilst engaging in a shared learning activity:

> I really liked how it managed to bring the whole class together and engage everyone at once. I think seeing everybody coming together and working on the same thing was really motivating. (P4)

> The motivating factor for me was seeing everyone engaging with the learning material. There are different people, different point of view so giving your point of view and receiving other peoples' points-of-view was actually motivating for me because you get to see how other people think about a particular concept and how you could also try to adjust to see how you could do better in a particular concept basically. (P7)

These findings suggest that gamified quizzes drive social learning, encourage participation, increase reflection, and allow students to tweak their understanding of content. Similar results are observed in literature where students exhibited similar experiences as a result of gamified quizzes (Crump & Sparks, 2018; de-Marcos et al., 2016; Heni et al., 2019; Wong & Yunus, 2020).

Whilst social learning is beneficial, it exists against the backdrop that some participants appreciated anonymity:

> Mentimeter is a good platform that allows students to engage without fear because of the fact that it is anonymous. (P7)

The value of anonymity in gamified quizzes was also observed in literature (Vallely & Gibson, 2018), which suggests that students do not want to be judged for wrong answers and that introverted students also can engage without feeling a sense of intimidation (Crump & Sparks, 2018).

Anonymity was also beneficial to participants who scored highly on the leader board but did not want to be known to peers:

> I slightly prefer being anonymous like if they are going to put your names on a leader board just because like if you score really high then you have all of these students like looking at you. (P2)

A similar finding by Adam (2017) found that being in first place could be likened to a target on one's back.

Competence

When considering competence, subthemes emerge relating to engagement and mastery. Participants experienced increased attention and enhanced engagement when using Mentimeter for learning activities:

I found the entire experience really engaging as well like it really had my full attention when we were doing those sessions. (P4)

When you put like a Mentimeter quiz up I was like oh yes, we get to do this, it is exciting, I want to see what everyone else says, and I want to actually see how I understand the concept because I knew you would go through it and like talk about each answer. (P6)

The notion of increased attention has precedent in earlier research (Crump & Sparks, 2018). From these findings, it becomes apparent that besides increased attention and enhanced engagement, gamified quizzes inculcate a sense of excitement and confidence within students who feel as though their learning is being enhanced. One participant offered the following anecdote:

I felt like I would take what I learnt from the lessons and just apply it to my work because I found it easier to remember sometimes because it was just fun. (P4)

The notion of using gamified quizzes for knowledge mastery has precedent as these quizzes can help with remembering facts and enhancing the understanding of new concepts (Andriani et al., 2019; Heni et al., 2019).

When exploring mastery at a deeper level, participants were motivated by getting credit when they answered correctly and when seeing others recognised as well:

There is definitely a little bonus when you answer the question right and like okay cool, I actually understand this section, so it helped me feel more competent as a learner. (P1)

Seeing everyone's answers come together and seeing it as a whole and seeing it being addressed by the lecturer, I think that made me a better student. (P5)

The phenomenon of being awarded for mastery has been observed in previous studies where students celebrating smaller achievements have been found to boost confidence (Crump & Sparks, 2018; Wong & Yunus, 2020).

Ultimately, when considering autonomy, it emerged the students are motivated by anonymity and choice on whether to engage in gamified quizzes. When considering relatedness, students prefer the social interaction enabled by gamified quizzes but may wish to enjoy anonymity. When considering competency, rewarding learning can lead to mastery and inculcate a sense of confidence in students.

DISCUSSION

In this study, we sought to understand students' experiences of online gamified quizzes and how gamified quizzes influence motivation. The key findings in the context of literature are discussed.

Students' experiences of participating in an online gamified quiz

In terms of experience with gamification, participants reported varying experiences, with some participants being motivated by learning and obtaining rewards. This finding is not unheard of as students who earn rewards are more motivated than those who do not (Adam, 2017). A question of re-engaging these demotivated students emerges here and the authors propose the frequent use of quizzes or follow-up quizzes to re-engage demotivated students.

It was also observed that from all game elements, in strong part due to its visibility, the leader board emerged as a game element that elicited varying levels of motivation. This finding corresponds to the

finding of O'Donovan et al. (2013) and Seaborn and Fels (2015) who also reported varying levels of motivation. This can be explained by different students' preferences since some individuals are motivated by being triumphant or being recognised among peers whilst others are motivated by personal mastery or shy away from the spotlight (Nacke et al., 2011; Adam, 2017).

How gamification influences motivation

When considering autonomy, students were motivated when afforded autonomy in how to engage the gamified quizzes and findings in this study correlate with that of Adam (2017) who observed that students preferred choice in how they participate in gamified e-learning.

As was discussed in the literature review, the role of social learning enabled by gamification is integral, even in this study. Most participants in this study, much like participants in the studies by de-Marcos et al. (2016), Vallely and Gibson (2018) and Wong and Yunus (2020) were highly motivated by a sense of relatedness and by opportunities for voluntary collaboration. It also emerged in this study that students were demotivated by peers not engaging, a concept not widely explored in the literature. Furthermore, participants were motivated by being rewarded in low stakes activities and learned better with gamified quizzes. A similar finding was observed Vallely and Gibson (2018) who observed value of gamification in formative assessments where students tended to participate at a higher level.

RECOMMENDATIONS

This study contributes to the broader discourse and raises awareness on gamification as an approach for the effective use of e-learning tools to engage students in higher education, which is even more relevant in the current circumstances that will continue to influence how our students learn.

Based on the results and discussion, there are several implications for lecturers, institutions, e-learning platform developers, and researchers on adoption of gamified online quiz tools to motivate and engage students. Having considered the findings of this study, the following recommendations are made:

Recommendations for lecturers and institutions

The results indicate that gamified quizzes are effective to engage students in an e-learning setting, but there needs to be cognisance of the factors that could demotivate students. The authors recommend that lecturers begin to integrate gamified quizzes gradually into their teaching to better understand how their students might respond. Such integration can be within the context of an individual lecture or class activity and can grow with time and in line with what students find appealing.

When integrating gamified quizzes, it is recommended that lecturers afford students anonymity and adopt gamified quizzes for low stakes learning activities that reward participation but do not penalise non-participation. Moreover, it is also recommended that HEIs need to provide the necessary subscriptions and educational technology support to their teaching staff. There are also free platforms like Kahoot and Socrative that can be explored further.

Recommendations for future research

In this study, the authors explored the influence of gamified quizzes on student motivation at an HEI in a developing context. There are several areas for potential future research. Firstly, this study may be extended across institutions to begin to understand how the phenomenon unfolds with different students. Secondly, this study may be extended into developed contexts to understand multiple students' experiences. Lastly, this study was conducted among programming students who were arguably confident with technology, but further cross- and inter-disciplinary research is needed.

Recommendations for e-learning platform developers

Results suggest that e-learning platform designers and developers need to ensure that gamified e-learning platforms are transparent in scoring mechanisms and reassuring to students in order to ensure that they remain engaged and motivated. Additionally, it is recommended that gamified quiz tools continue to offer anonymity whilst providing opportunities for social learning. Furthermore, it is also recommended that platform developers integrate anti-plagiarism mechanisms into their platforms to prevent 'copy-pasting' from the Internet to gain an edge in a gamified quiz.

Lastly, it is recommended that the design of gamified platforms allows academics the opportunity to reward students using a variety of game elements, rather than giving weight to a single game element, to keep all students motivated. In encouraging personalised e-learning experiences, students could be asked to select a game element they prefer and that could be the way they are given feedback. For example, students motivated by a leader board are presented with the leader board to measure themselves against peers while students motivated by badges are presented with badges and individual feedback as they get answers correct, with an optional leader board.

CONCLUSION

In this study, the authors sought to understand the influence of gamified quizzes on student motivation. It became clear that gamified quizzes can motivate students to varying degrees. After analysing these findings against the backdrop of existing literature, we provided recommendations for lecturers, HEIs, future research, and e-learning platform developers.

Ultimately, it is essential that, in a local and global context where e-learning will continue to hold a more central role, academics seek out approaches to engage and motivate students. Gamified quizzes are one of several available tools. It is anticipated that future studies will explore gamified quizzes, other gamified quiz tools, and other gamified e-learning tools and techniques even further.

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Understanding the efficiency of teaching through YouTube vs PowerPoint on concept acquisition by second-year chemistry pre-service teachers[1]

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ABSTRACT

Studies indicate that YouTube and YouTube EDU are very popular tools for digital teaching and learning. However, students from disadvantaged communities have significant gaps in experiences, knowledge of the world, and access to enrichment options such as YouTube. The objective of this study was to test the effectiveness of YouTube versus PowerPoint presentation as a teaching tool to improve overall conceptual understanding of the topic, States of Matter, by 62 second-year pre-service teachers. A quasi-experimental design was used to select the groups conveniently; one group was used as an experimental group (n=31) and the other group was the control group (n=31). A pre-test for both groups was conducted on the first day at the same venue at the time when academic activities commenced at the university. The experimental group as well as the control group consisted of seven (7) males (22.58%) and 24 females (77.42%). A paired-samples t-test was conducted to evaluate the effectiveness of teaching through YouTube versus PowerPoint presentation. There was a statistically significant difference between the experimental (p=0.000) and control group (p=0.003) results. The findings of this study indicate that science lecturers can convey information to their students via digital media, devices, and techniques to improve the understanding of chemistry content. This creates sustainable teaching and learning spaces that will improve overall teaching and learning.

Keywords: digital teaching, teaching through social media and YouTube EDU, undergraduate chemistry education

INTRODUCTION

Studies have indicated that South African undergraduate students are underprepared to cope with the demands of higher education, resulting in a high level of student failure and subsequently higher drop-out rates (Du Plessis & Gerber, 2012; Kaburise, 2014; Mahabeer & Pirtheepal, 2019). Evidently, students from disadvantaged communities have significant gaps in experiences, knowledge of the world, and access to enrichment options such as YouTube (Bytheway et. al., 2010). This study researched alternative ways of teaching and learning to improve students' attention and participation, in particular relating to improving their understanding of chemistry content. Evidently (Jackman, 2019; Sakkir, Dollah & Ahmed, 2020), Millennials display a preference to using social media and platforms such as YouTube. The research

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objective of this study was to investigate the use of YouTube as an alternative teaching and learning medium, by investigating its effectiveness to improve concept understanding by second-year chemistry pre-service teachers registered for a second-year degree course at a South African university of technology.

> The important thing in science is not so much to obtain new facts as to discover new ways of thinking about them - Sir William Henry Bragg (Dagytė, 2010, p.7).

Inspired by the quote above, the goal of this research was to examine the use of digital skills in pedagogical content knowledge (TPACK) and 21st-century effective teaching methods in chemistry. The concept of TPACK was first introduced to provide a theoretical framework for teachers who were integrating technology into pedagogical content knowledge (Koehler & Mishra 2005, 2009; Mishra & Koehler, 2006, 2011). Twenty-first-century teaching methods and skills require a different approach as opposed to how teachers have learned their subject and its contents (Niess, 2005). The fourth industrial revolution has made it virtually impossible to live without the Internet. Digital technology has dramatically influenced most areas of human life, such as shopping and playing (Kim et al., 2017). To produce learners with a high level of critical thinking ability remains one of the greatest challenges faced by South African educators. Much attention is given to the learner-centred or inquiry-based approach to learning recent policy initiatives by departments in the South African government (Department of Education, 2007; Department of Basic Education, 2011).

It has been observed that the attention span of chemistry students has declined appreciably in the past decade, and these pre-service student-teachers are addicted to electronic devices (Pearson, Tobola & Fowler, 2010). The problem is how this short attention span problem can be solved because to do well in most of the science subjects one needs five D's, namely, dedication, determination, discipline, diversity, and direction (Nair, 2016). It appears as if the younger generation of digital natives, whether in terms of biological age or terms of the heart, are addicted to the Internet in such a way that life comes to standstill without the Internet. Goldberg's (1995) first description of Internet addiction was based on measures similar to those used to study substance abuse. The area of Internet addiction is advancing rapidly even without its official recognition as a separate and distinct behavioural addiction and with continuing disagreement over diagnostic criteria (Cash, et al., 2012). YouTube is the world's most popular online video-streaming site which has gained an audience of billions of users, including educators and scholars. YouTube EDU offers institutions the ability to choose only the videos they require, and which are free from controversial comments. Recently YouTube has launched the YouTube Go app, which is designed for places with poor connectivity or expensive cellular data prices (Timeslive, 2018). Moreover, research has indicated that YouTube can be used as an alternative teaching tool for chemistry education (Bohloko et al., 2019; Černá & Borkovcová, 2020; Gallardo-Williams et al., 2020; Limpanuparb et al., 2020; Pekdağ, 2020).

LITERATURE REVIEW

The theoretical framework chosen for this study is not only based on the educational theories of constructivism and social learning (Vygotsky, 1992), but also includes concepts of digital storytelling (Robin, 2008), personal learning environment (PLE) (Dabbagh & Kitsantas, 2011) and flipped classroom (Bishop & Verleger, 2013) as part of the TPACK framework. According to Vygotsky, cognitive growth occurs first on a social level followed by the individual emphasis on a zone of proximal development (Vygotsky, 1978). Thus, a social constructivist classroom environment is democratic, and learners are actively involved. Constructivists believe that the current knowledge of learners forms the basis of constructing new knowledge and learning cannot be passive (Hoover, 1974) while Piaget believes that understanding is to discover, or the reconstruction of understanding leads to rediscovery (Piaget, 1973). Based on these theories, the researcher believes in constructing a classroom, which is custom-built to fit the individual and creates a suitable environment in the class of students of today's digital world. A powerful teaching and

learning tool that has emerged over the past few years is digital storytelling. This medium offers numerous opportunities for teachers not only to engage and assess learners but also to enhance and accelerate their comprehension (Burmark, 2004). Digital storytelling not only connects technology and the curriculum, but it is also becoming a part of a powerful 21st-century teaching method (Deron, Kerper & Landis, 2011). A personal learning environment (PLE) is also a potentially promising pedagogical approach for integrating both formal and informal learning using social media and supporting student self-regulated learning in higher education contexts (Dabbagh & Kitsantas, 2011). The flipped classroom is a new pedagogical method which employs both video lectures and practice problems as homework, and active, group-based problem-solving activities in the classroom (Bishop & Matthew, 2013). In addition, pedagogical content knowledge (PCK) is the way a teacher transforms the understanding of content knowledge of a certain subject through illustration, representation and by using various examples (Shulman, 1986), while the technological pedagogical content knowledge (TPACK) refers to the knowledge required by teachers for integrating technology into their teaching in any content area (Schmidt et al., 2009). Research in educational technology has often been criticised for a lack of theoretical grounding (Mishra and Koehler, 2006). The debate to produce high-quality science teachers is ongoing (Kind, 2009) and the Royal Society of Chemistry, United Kingdom argues as follows:

> The best teachers are those who have specialist subject knowledge and a real passion and enthusiasm for the subject they teach…The Royal Society of Chemistry believes that young people deserve to be taught the sciences by subject specialists (RSC,2004, quoted in Kind, 2009: 2).

Traditional teaching methods alone can no longer eliminate all the problems experienced in science education (Osborne & Collins, 2001); as such, the use of video teaching can provide a potential solution (Sanger & Greenbowe, 1997; Burke et al., 1998; Ebenezer, 2001; Kelly & Jones, 2007). Havlik (2014) identified the applications to promote science and digital literacy, including Facebook, Twitter, YouTube, Feedly, Vine, Easel.ly, Google Docs, Pinterest, and WordPress. Literature alludes (Ramachandran et al., 2019; Fitzgerald, 2019; Jolley et al., 2016) that familiar platforms (e.g., YouTube videos) offer teachers the opportunity to further develop skills and self-efficacy as explained in the TPACK framework and could encourage them to use more new technologies. Teachers are more inclined to integrate new technologies when it forms part of their community of learning, and where there is verbal and technical support (Blonder, 2013). However, many teachers may still not have the requisite understanding in the application and inclusion of these technologies in their teaching praxis (Judge, Puckett & Cabuk, 2004). The Office for Standards in Education (Ofsted) sums up the issue as follows:

> Teacher familiarity, confidence, and skill in choosing software and integrating technology into the curriculum are dependent on teacher training and time for self-directed exploration and learning. Due to the relative newness of computer technology, many teachers have not received adequate training to select appropriate technologies and lack support to use them (Ofsted, 2008: 17).

Most educators and policymakers have one common goal in practice, namely motivation, which is the critical ingredient for learning. Thus, 21st-century teachers have to learn effective ways to engage students with the help of multimedia techniques. A study conducted by Castro-Romero (2015) indicated that student-student interactions, student-educator interactions, development of skills, and level of satisfaction can potentially be improved by the use of social media. Many researchers (Al-Aufi & Fulton, 2014; Hamid et al., 2015) have discussed the broad benefits of social media in higher education. Research has indicated that social media have benefited conversation and community as well as improving student life satisfaction, trust and participation (Anshari et al., 2015; Romero, 2015; Valenzuela, Park & Kee, 2009), student motivation and effective learning (Mazer, Murphy & Simonds, 2007), enhancing student learning and teaching engagement (Paul, Baker & Cochran, 2012) as well as students' personal emotional support

and self-confidence (Sobaih & Moustafa, 2016). Research has been ongoing whether to use or not to use social media in higher education in developing countries (Sobaih et al., 2016). YouTube has been used extensively as a teaching and learning tool at various levels of instruction, not only in chemistry but in various other subjects (Szeto, Cheng & Hong, 2016; Blonder et al., 2013; Moghavvemi et al., 2018). YouTube is relatively too new to be considered as an educational tool to facilitate teaching and learning by researchers; however, educationists and researchers have suggested that videos have the potential to enhance any classroom lessons (Mullen & Wedwick, 2008; Buzetto-More, 2014). Recent studies in chemical education suggest that student-generated videos have been used by the educationist to maintain the visual nature of chemistry (Gallardo-Williams et al., 2020).

RESEARCH DESIGN

The objective of the study was to test the effectiveness of YouTube versus PowerPoint presentation as a teaching tool to improve overall conceptual understanding of the topic, State of Matter, by second-year pre-service teachers to examine the use of digital skills in technology, pedagogy, and content knowledge (TPACK) and 21st-century effective teaching methods in chemistry. A quasi-experimental design was used to select the groups conveniently; one group was used as an experimental group (n=31) and the other group was the treatment group (n=31). Data collected for this study were analysed by using SPSS 25.

Originally the sample of second-year pre-service teachers consisted of more than 75 respondents. However, only, those who participated in the pre-test as well as in the post-test were included in the data for statistical analysis. A total of 62 pre-service teachers in the second-year undergraduate programme were selected to participate in this research. Stratified random sampling was done according to gender and age to determine whether there are any statistically significant differences in the given strata. It was a mere coincidence that an equal number of participants was found for treatment as well as for the control group. Ethical clearance to conduct this research was obtained before commencing this study. In addition, informed consent was obtained from the participants notifying them about privacy, confidentiality, and anonymity, and that they were free to terminate their participation at any stage. Further, it was ensured that both treatment and control groups had an equal number of participants based on gender. Treatment group participants also indicated that they had access to the Internet at home. Thus, the pre-test and post-test questions were based on gaseous state, kinetic molecular theory postulates, and its application to explain various fundamental properties associated with states of matter. A multiple-choice questionnaire was administered by the researcher for both groups when academic activities for the module commenced at the institution. A questionnaire was developed by the researchers based on the prescribed textbooks for the degree course and the questionnaire was also checked by another colleague lecturing the same module of chemistry. The control group was taught by the researcher using PowerPoint presentations at the institution and YouTube videos were carefully selected by the researcher for the treatment group; these videos were played in the institution where the researcher was present. This process was carried out to ensure that videos were shown in a controlled environment, that the cost of data was curbed by using institution facilities and that the video could be replayed upon request. The chemistry laboratory was used as a venue for the groups to show selected YouTube videos and to teach groups using PowerPoint. The selection of YouTube videos was aligned with the contents of the second-year pre-service teachers' undergraduate programme of the institution. It is important to mention that the treatment group was taught by means of YouTube videos only. However, once the post-test had been concluded, both group participants were exposed to similar teaching tools in that the presentations and the YouTube videos were also shared with pre-service teachers of the second-year undergraduate programme. This was done at the request of the respondents at the end of the post-test. The memorandum of the questionnaire was also discussed in length to provide feedback to all respondents.

The following research hypotheses were tested:

H_0 =　There is no statistically significant difference in the mean scores for time 1 (pre-test) and time 2 (post-test) results of the treatment group and experimental group.

H_1 =　There is a statistically significant difference in the mean scores for time 1 (pre-test) and time 2 (post-test) results of the treatment group and experimental group.

H_0 =　There is no statistically significant difference between male and female students in time 1 (pre- test) and time 2 (post- test) results of the treatment group and experimental group.

H_1 =　There is a statistically significant difference between male and female students in time 1 (pre-test) and time 2 (post-test) results of the treatment group and experimental group.

H_0 =　There is no statistically significant difference between students aged 18-20 and students aged 21-28 in time 1 (pre -test) and time 2 (post-test) results of the treatment group and experimental group.

H_1 =　There is a statistically significant difference between students aged 18-20 and students aged 21-28 in time 1 (pre-test) and time 2 (post-test) results of the treatment group and experimental group.

While administering the questionnaires, it was found that respondents comprise two different age groups, and respondents aged 21 and above are considered as adults. The researcher sought to determine the effect of maturity level on this study.

DATA ANALYSIS AND FINDINGS

A pre-test (Time 1) was conducted on the first day on which academic activities commenced at the university and the post-test (Time 2) was conducted three weeks after the intervention. The control and treatment samples each consisted of seven (7) males (22.58%) and 24 females (77.42%). A paired-samples t-test was conducted to evaluate the effectiveness of teaching through YouTube. Data collected were analyzed by SPSS version 25. The problem associated with small sample size was eliminated by calculating effect size in addition to the p-value (Pallant, 2016). Scores of pre-tests ranged from 12 to 42 and all respondents were included in the study. However, similar studies conducted by other researchers suggest that in future studies respondents with perfect pre-test scores can be excluded (Ramachandran et al., 2019).

There was a statistically significant difference between the pre-test and post-test scores of the control group as well as those of the treatment group.

Table 1:
Comparison of scores Time 1 and Time 2

		M	*SD*	*t*	*df*	*p*	*d*
Control group				-6.86	**30**	**0.00**	**0.61**
	Pre-test	36.61	6.62				
	Post-test	44.94	9.25				
Treatment group				-10.13	**30**	**0.003**	**0.77**
	Pre-test	33.61	7.06				
	Post-test	47.32	8.17				

The calculated effect size for the treatment group is 0.77, indicating that there was a large effect, with a substantial difference in the scores obtained before and after the intervention. Independent sample t-tests were used to compare the mean scores of pre-service teacher respondents based on their gender and age. Leaven's test of equality of variance was more than 0.05 in both these cases; thus, the results confirmed that the assumption of homogeneity of variance was not violated. The pre-service teachers performed significantly better on the treatment post-test ($M=47.32$, $SD=8.17$) than on the pre-test ($M=33.61$, $SD=7.06$) $t (30) =-10.13$, $p<0.001$ in comparison with the control group post-test ($M=44.94$, $SD=9.25$), $t (30) =-6.36$, $p=0.000$.

Thus, the research hypothesis was accepted, and the null hypothesis was rejected. The initial findings for the research sample are in alignment with the chemical education studies where YouTube videos were used to prepare students for analytical chemistry prelab sessions and general chemistry undergraduate sessions (Jolley et al., 2016; Ramachandran et al., 2019).

Table 2 gives a summary of the results which show that there was no significant difference based on gender and the efficiency of teaching through YouTube on concept acquisition by these pre-service teachers, while the effect size calculated was found to be very small.

Table 2:
Comparison of male and female pre-service teachers and efficiency of teaching through YOUTUBE on concept acquisition (n =31: male 7 and female 24)

	Test	N	M	SD	df	t	p	d
Control group					29	0.46	0.65	0.007
	Pre	Male	36.34	8.06				
		Female	35.20	5.90				
	Post	Male	43.00	9.21				
		Female	47.00	9.33				
Treatment Group					29	1.27	0.213	0.05
	Pre	Male	36.57	6.70				
		Female	32.75	7.70				
	Post	Male	52.00	8.02				
		Female	47.96	7.87				

The calculated effect size **for the treatment group** is 0.05, indicating that there was a small effect before and after the intervention. Independent sample t-tests were used to compare the mean scores of pre-service teacher respondents based on their gender. The pre-service female teachers performed significantly better on the treatment post-test ($M=47.96$, $SD=7.87$), than the pre-test male teachers ($M=36.57$, $SD=6.70$) $t (29) =1.27 p>0.05$ in comparison with the control group female post-test ($M=47.00$, $SD=9.33$), $t (29) =1.27$, Thus, the null hypothesis was accepted, and the research hypothesis was rejected.

Pre-service teacher respondents were further categorised based on their age and were divided into two age groups, namely 18-20 and 21-28, to measure whether the level of maturity plays any role while teaching using social YouTube. The results of the independent sample t-test conducted are shown below in Table 3.

Table 3:

Comparison of 18–20-year-old and 21–28-year-old pre-service teachers and efficiency of teaching through YouTube on concept acquisition (n =31: 18-20 years old N = 15 and 21-28 years old, N = 16)

	Test	Age group	Mean	SD	df	t	p	d
Control group					29	-0.28	0.78	0.003
	Pre-	18-20	35.27	6.70				
		21-28	35.94	6.75				
	Post-	18-20	43.00	9.21				
		21-28	46.00	9.33				
Experimental group					29	-0.11	0.275	0.000
	Pre-	18-20	32.25	6.70				
		21-28	35.06	6.75				
	Post-	18-20	47.75	9.60				
		21-28	46.86	6.62				

The calculated effect size **for the treatment group** is 0.00, indicating that there was no effect before or after the intervention. Independent sample t-tests were used to compare the mean scores of pre-service teacher respondents based on their age groups. There was no significant difference in the scores of the two age groups.

The post-test result of the comparison of treatment age group 18-20 (M=47.75, SD=9.60) and the post-test of the control group age group 18-20 (M=43.00, SD=9.21), t (29) =-0.28, p=0.03 indicated that the treatment group performed better; however, the effect size was very small.

The post-test result of the comparison treatment age group 21-28 (M=46.86 SD=6.62) t (29) =-0.11, p=0.00, and the control group age (M=46.00, SD=9.33), t (29) =-0.28, p=0.003, indicated that the effect size was very small.

The p-value is greater than 0.05; thus, there was no statistically significant difference between the two age-groups of respondents and the type of intervention at the pre-test and post-tests. Therefore, the research hypothesis was rejected (Cohen, 1988). The calculated effect size was found to be very small.

RECOMMENDATION

The findings of this study support the notion that social media such as YouTube can easily be used to enhance the efficiency of teaching chemistry and concept acquisition. Millennials, being digital natives, are comfortable using the Internet and social media. Classifying them based on age and gender revealed no significant difference in this study. Test-tube and YouTube can work together to improve teaching and learning (Pekdağ, 2020; Limpanuparb et al., 2020). However, studies suggest that replacing laboratory work for videos is not feasible, especially not in rural areas where access to the Internet is difficult and unreliable. (Soares et al., 2020). There was a difference between the results of the pre- and post-tests on a selected topic, and further studies must be conducted for bigger groups, including the various levels of undergraduate pre-service science teachers.

The growing use of social media by digital natives begs further research and, subsequently, further considerations by policymakers. In the search for suitable teaching methods for the 21st century, and to meet the challenge of reducing cognitive load, the use of YouTube videos may shift the teaching approach from teacher-centred to learner-centred so that formerly passive learners can participate actively. However, teachers need further technical training on how to select an appropriate video or medium so that e-flooding on social media is avoided (Borup, Graham & Velasquez, 2010). Future research will be conducted involving chemistry lecturers and pre-service teachers on various science subjects such as physics and biology. The constructs of TPACK should be developed during a group discussion in the meetings involving science teachers and various tools can be designed to test and monitor the effectiveness of social media teaching. The use of YouTube videos and any other social media requires better infrastructure, stable Internet connectivity, and a wide network coverage remain major challenges in rural Africa (Tungela & Iyamu, 2019). It is recommended that science lecturers should consider delivering a significant proportion of information to their students through digital media, devices, and techniques (Maziriri, Gapa & Chuchu,2020). The researcher was aware of the inadequate access to the Internet at respondents' homes, depending on their location, income, and access to electricity. However, this was avoided in the current studies because institution Wi-Fi and facilities were used to show the carefully selected YouTube videos to the experimental group because the net generation likes YouTube (Moghavvemi et al., 2017). The study findings suggest that YouTube can be used as an alternative tool for teaching and learning as it was positively received by these net generation students.

LIMITATIONS OF THE STUDY

The questionnaire used during the first leg of research did not include a vast variety of numerical and analytical thinking level questions because the aim of the researcher was not only to determine the effectiveness of YouTube videos as a possible alternative teaching tool but also to understand the readiness of these pre-service teachers for the second-year degree-course contents of chemistry. Furthermore, there was limited time to administer the experimental and the control group based on the timetable and space availability. Respondents were not given a choice to select the videos on their own, but videos were selected which were aligned to the contents of prescribed textbook and the syllabus. All videos were shown to the experimental group under a controlled environment. Under no circumstances is the researcher trying to replace contact sessions and the necessity of laboratory sessions in chemistry.

The study was limited to the participants of second-year natural sciences pre-service teachers at a South African university of technology. The researcher plans to include the qualitative aspect and a bigger sample for future studies, including the questions based on calculations, analytical thinking, and descriptive section on various levels of undergraduate chemistry course contents.

CONCLUSIONS

Although the study was conducted for a limited time and included videos on only one section of the undergraduate chemistry contents for pre-service teachers, the use of YouTube as an alternative tool for concept understanding was positively received. The findings that were limited to this sample suggest that information conveyed by science lecturers to their students can by means of digital media, devices, and techniques. The results support the postulated hypotheses and limitations of the study and suggest that future studies are required in the African setting to evaluate the effectiveness of TPACK and the use of YouTube as an alternative platform to facilitate teaching and learning which will create sustainable teaching and learning spaces that will improve overall teaching and learning.

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Digital Learning: Challenges experienced by South African university students' during the COVID-19 pandemic[1]

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ABSTRACT

The novel coronavirus pandemic continues to wreak havoc globally, and lockdowns added to the disruption. In South Africa, higher education was thrust into online learning almost instantly. Before the lockdown, online learning was not taken very seriously, and the rollout was delayed. Many higher learning institutions scrambled to switch over to online teaching and learning, and this move highlighted the disparities and profound inequalities among students, which have further exacerbated the digital divide. Students in the urban areas seemed to be better off than their counterparts who live in rural areas. Students living in rural areas struggle without having proper digital devices and poor internet connectivity. Now that the COVID-19 restrictions are removed, it is vital to reflect upon the lessons learnt; therefore, this paper focused on the challenges experienced and how higher education can be transformed digitally by ensuring that all its students can benefit. The paper adopted a quantitative research approach with 125 undergraduate students participating. The paper was conceptualised using the Technological Acceptance Model and the Social Constructivism Theory. The findings reveal that students are not satisfied with the current state of online learning and the key challenges confirmed the lack of digital resources, internet connectivity, availability of electricity, and high data costs. It is recommended that higher education develop strategic plans coupled with digital literacy and resources to equip both students and academics to address the digital gap.

Keywords: COVID-19 pandemic, digital divide, digital transformation, higher education, online learning

INTRODUCTION

Over the past two years, we have witnessed how the coronavirus pandemic has profoundly changed the lives of many across the world. UNESCO (2020) provides an estimate that 1.6 billion learners constituting 72.4% of total enrolled learners across 177 countries were impacted because of the temporary closure of educational institutions to contain the spread of COVID-19. Some countries opted for no lockdowns (Sweden); others a complete lockdown (South Africa, India) to contain the impact of this contagious disease/slow the spread of COVID-19. This abrupt disruption caused the normal functioning of educational

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systems across the globe to close their campuses and abandon face-to-face teaching. Many had to seek alternative measures to sustain their academic programmes.

The World Bank noted that higher education institutions understand the educational, logistical, and also high-tech challenges to these timely measures. Most of the higher educational institutions in low-and middle-income countries, including students and academics, lack access to high-speed broadband or digital devices needed to arrange online learning options fully. Thus, a shift from contact teaching to emergency online learning opened the cavernous digital divides between and within schools and countries, particularly among low-medium income countries like South Africa (World Bank, 2020). In South Africa, there is an acute digital divide in which the coronavirus pandemic is once again exposed (Du Preez & Le Grange, 2020). The digital divide refers to the gap between people who can access different types of information and communication technology (ICTs) and those who are unable to have access to it (Pather, Booi & Pather, 2020).

Mlaba (2021) notes that South Africa was given by the World Bank in 2019 the title of being the most unequal country economically and socially. Another disparity is digital inequality. Digital access and literacy continue to increase s inequality gap in South Africa. Jantjies (2020) also reflects on the reality of South Africans, the varying digital skills of teachers and students plunged into the COVID-19 lockdown. With schools and universities switching to online learning, this further placed students at a disadvantage since the affordability of data limits their online learning activity. Moreover, the COVID-19 pandemic has revealed that having and using technology can no longer be regarded as a luxury but as essential to a person's education.

THE PROBLEM STATEMENT

As noted above, South Africa is regarded as the most unequal country in the world (Friedman, 2020). The digital divide further disadvantages most people, especially students and academics. Lockdown forced academics and students to navigate through online learning even though the required skills are lacking. While both students and academics realise that this is a 'do or die situation and attempt to embrace this approach, their success is limited since they lack the tools and knowledge on how to.

Jantjies, (2020) avers that South Africa's digital divide is driven by broken down into three factors,

> access to hardware, understanding digital means of communication, and internet affordability. These factors are harming two of the country's best chances at development and equality, those being access to education and access to employment opportunities.

Naidoo and Israel 2021 add that learning becomes challenging due to not having a digital device, the lack of internet connectivity and the high cost of data.

Joshi (2021) believes that the opportunity offered by COVID-19 can be used by the education officials and policymakers in South Africa to introduce new learning modes like online learning to make their education systems more resilient. This can enable them to cope with current disruptions, recover from them, and prepare for future emergencies. However, we cannot turn a blind eye to the various challenges faced by students to transition to online learning. According to Aguilera-Hermida (2020), it is important to take into account students' challenges and their preferences; these will assist in forming strategies that will help should some other such waves or disasters can occur in the future.

These issues need to be addressed so that no student is left behind amid the COVID-19 pandemic. This research was conducted at the University of Zululand, a rural-based university in South Africa with many of its students coming from rural communities. Therefore, the research seeks to answer the following question:

What are the challenges faced by students at the University of Zululand in transitioning to online learning during the COVID-19 pandemic?

The objectives of the study are:

- To evaluate the challenges faced by students in transitioning to online learning during the coronavirus pandemic
- To provide strategies aimed at curbing these barriers to online learning during the pandemic.

LITERATURE REVIEW

The digital divide

Pather et al. (2020) stress that over several years we have witnessed a sense of urgency with which governments have attempted to tackle the digital divide. However, the COVID-19 pandemic resulted in a situation where lecturers who are accustomed to on-campus contact teaching had to migrate to the emergence of online teaching hastily. Dhawan (2020:7) indicates that online learning is defined as learning experiences in synchronous or asynchronous environments using different devices with internet access, where students can be anywhere (independent) to learn and interact with instructors and other students. With the help of online teaching modes, we can reach many students at any time and in any part of the world.

Within the turmoil of the pandemic, academics are left trying to navigate the online landscape, which for some is new turf, trying to find the best option that will suit the needs of students and getting all students onboard has been challenging within the digital divide that exists in South Africa. Higher education institutions are becoming gradually aware of the diversity of their learners. COVID-19 pandemic has become a promoter of digital pedagogy, and it is a concept that has increased in momentum within educational circles. This allows education to advance in this technological world. To fully realise this benefit, educators must be adequately equipped with proper training (Naidoo & Naidoo, 2021). Orlando and Attard (2015) indicate that teaching with technology is not a one size fits all approach as it rests on the types of technology in use at the time and also the curriculum content being taught. In these trying times, the concern is not about whether online teaching-learning methods can provide quality education; it is rather about how academic institutions will be able to adopt online learning in such an immense manner (Carey, 2020).

The digital divide has impacted higher education over the years, and not much was done to address this gap. These inequalities have been stacking up long before South Africa became free from apartheid. According to Pather et al. (2020), in the post-apartheid era, we have witnessed a massification in the higher education system, which has compelled all universities to improve the provisioning of on-site learning resources. Educational institutions faced many challenges with infrastructure, financial shortages, and huge student debt. Pather et al. (2020) further state that due to the inequality in the socio-economic status of many students, they lack access to resources, and some rely on the use of computers and free Wi-Fi on campus, as they lack these tools at home. It is important to understand that the disparities vary in communities; while some homes may connect online with great expense, a larger group - the low-income students - find it difficult to migrate to online learning. They are unable to access these digital tools and end up falling behind or dropping out.

Lockdown disconnects face-to-face teaching and learning and forces face-to-screen virtual learning and does not take into account these existing challenges (Dlamini & Naidoo, 2022). Dlamini and Ndizinisa (2020) agree and note that ICTs at universities have essentially altered teaching and learning from lecturers having much personal contact with students to a socially oriented activity. However, this switch was not

a silver bullet; the lack of skills, connectivity, load shedding, lack of digital devices, and no or expensive data costs was not considered. Nevertheless, academics and students have been trying to connect through apps as well as learning management systems such as Moodle. Colleges and universities, in addition to using these modes of communication, are holding webinars and video conferences to ensure that learning goes on Joshi (2021).

Challenges of digital transformation

Exponential advances in ICTs have forced traditional universities to consider changes in education delivery models. They have had to invest heavily in digital technologies to embrace online learning and adapt to the changing landscape (Dlamini & Ndizinisa, 2020).

StatsSA (2016) reported that only 9.5% of the South African population have internet access at home. Joshi (2021) acknowledges that, as noted above, during COVID-19, emphasis on greater uses of online learning and lack of affordability of devices and inaccessibility of internet connectivity appears to be discriminatory and distortional in terms of expanding inequity and likely to widen existing disparities and have serious adverse implications for the South Africa economy and society.

However, it was imperative to save the academic year to avoid further widening inequalities for vulnerable and disadvantaged students. This meant universities had to transfer their teaching and learning activities to digital online platforms. As universities began to upgrade LMS,

> the reality that many students reside in rural areas where connectivity is a problem began to surface as part of discussions between Students Representative Councils and universities' Senior Executive Teams' (Dlamini & Ndizinisa, 2020: 60).

Despite the increased access to information and communication technologies, South Africa still trails behind the other BRICS (Brazil, Russia, India, China and South Africa countries).

Dlamini and Ndizinisa (2020) postulate that South Africa has yet to recognise its educational capacity. Many academics have not been adequately equipped to transition to online learning and do not have the necessary technological skills, further to that, the South African landscape is still demarcated by areas with no or poor connectivity and unstable electricity and the technical abilities of most students (Dlamini & Ndizinisa, 2020). Dengarian (2020) argues that a radical rethinking of education is needed, and the COVID-19 crisis is accelerating the debate around non-classroom teaching methods, novel methods of examinations, and education overall. Kopp, Gröblinger and Adams (2019) indicate that digital transformation is not a new phenomenon, and it has been accompanying higher education institutions for some years now. The digital divide encompasses challenges that include the lack of infrastructure and limited digital literacy within low- and middle-income groups. Joshi (2021: 55) insists that if implemented properly, it can help in checking the 'digital divide' and reaping 'digital dividends'. Going digital is the way forward for the education sector. Orlando and Attard (2015) stress that together with the increasing digitalisation of many workplaces, new types of learners' surface, who may be more digitally competent than previous generations due to their 'digital native' status.

Pather et al. (2020) maintain that one of the primary challenges that exist in South African universities' plight to transform the programme delivery is that of the resource readiness of the average South African university student. The task is to ameliorate social structures that could deepen disparities and limit access to higher education (Dlamini 2018). Habib (2016: 36) points out that instead of rationalising education, the profound challenges must be understood so that universities are 'reactive to the goals of equity, efficiency, democratic participation, and development'.

Kopp et al. (2019) point out five common assumptions that are considered more hindrances to the digital transformation of higher education institutions as against contributions to its realisation, and these assumptions are related to (i) change, (ii) pace, (iii) technology, (iv) competencies, and (v) financing. Students can feel a sense of anxiety and be out of their comfort zone despite the best intentions of academics. Long-term online learners can feel in an isolated place where they may also have varying levels of competency and proficiency using different forms of IT and are therefore somewhat on their own when it comes to the online learning environment through different learning management systems (LMS).

Aboagye et al. (2020) suggest that students were not ready to adapt and lack of motivation during online learning. Pather et al. (2020) declare that given the fundamental role of both devices and access to broadband internet for university student success, it stands to reason that the student without access to these tools of the digital age would be at risk of failure.

Conceptual Framework

The Technological Acceptance Model (TAM) and Social Constructivism Theory provide a conceptual view for this study. These two models are most suitable for amplifying the challenges of digital transformation and exploring a framework for digital compliance that could assist with the transition to online learning at universities in South Africa.

The Technological Acceptance Model (TAM)

Davis et al. (1989) use the Technological Acceptance Model (TAM) to provide a graphical perspective of behaviour that deals with one who chooses to engage with technology. This paper unpacks the challenges of online learning, which depend greatly on the use of technology. TAM offers an understanding of how people respond to technology usage. The model proposes the following primary factors: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). These concepts influence the overall attitude of the user. Perceived Usefulness refers to the belief that technology enhances job performance. This means that attitude towards online usage, whether positive or negative, is shaped by how students perceive the usefulness of technology in teaching and learning. While PEOU highlights the notion that effort will not be required and thus will directly affect the students' attitudes.

Figure 1:
Technology Acceptance Model
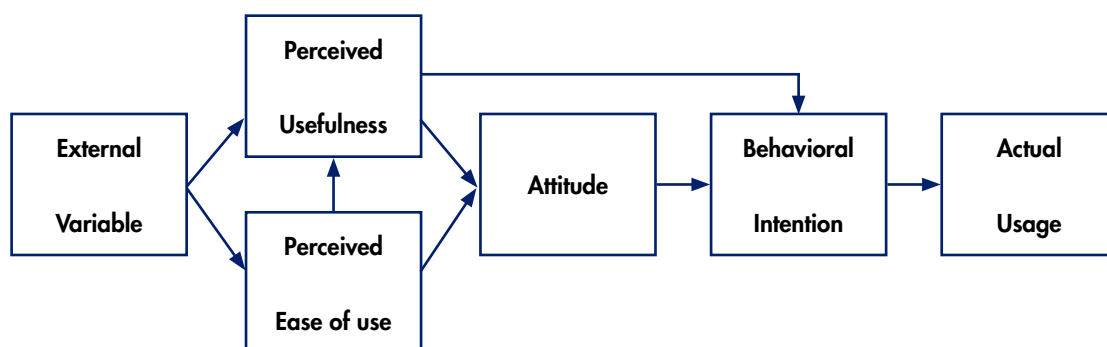
Adapted from Davis et al. (1989)

The TAM concepts are discussed with relevance to this study:

- **External variable:** within the higher education landscape, the coronavirus pandemic is the external variable that resulted in the overnight transition to online learning due to the lockdown in South Africa.

Lockdown was aimed at reducing the spread of the virus and reducing the number of fatalities. The external variable (COVID-19) impacts the concepts of perceived usefulness and perceived ease of use. However, there are various disparities among students that leave them challenged with embracing online learning.

- **Perceived Usefulness:** the transition to online learning from the traditional setting has not been easy for students and academics. There are digital tools that are required for online learning, such as access to a stable internet connection and devices. Students may agree to online learning as an alternative to enhance learning during these circumstances, however, they lack the tools to achieve this. Hence the university began distributing laptops to qualifying students and implemented zero-rated data required to access Moodle (LMS).

- **Perceived Ease of Use:** while making the transition and having access to devices. Many academics and students still lack the basic digital literacy skills that will enable them to move to online learning smoothly. This expatiates the current digital divide that exists in South Africa.

- **Attitude:** The challenges of accessing digital tools to address the perceived usefulness together with the level of digital literacy skills to address the perceived ease of use will impact the attitude of students toward online learning.

- **Behavioural intention:** Access to digital tools and digital literacy skills will influence whether students will modify their behaviour and utilise the online learning platform. Many students still lack the motivation to embrace online learning.

- **Actual Usage:** All these factors coupled together will determine whether students embrace digital transformation for the actual usage of online learning.

Social Constructivism Theory

Social constructivism theory created by Vygotsky (1978) maintains that learning is not purely an internal process, nor is it passive, but that culture and context are highly important in forming understanding and hence the beginnings of deep learning. The theory emphasises students rather than academics. Regrettably, constructivism creates a gap among students - those who have preceding knowledge and experience and those who do not. Students who have not been exposed to technology and have no previous knowledge will need to be equipped with basic digital skills (Merve, 2019).

ICT Framework for digital compliance in online learning

Higher education institutions must ensure that they are well equipped for the future of teaching and learning. Naidoo (2019) provides a possible framework in Figure 2 that proposes an ongoing process of developing both academics and students into becoming competent digital teachers and digital learners.

Figure 2:
ICT framework for Digital compliance in teaching and learning
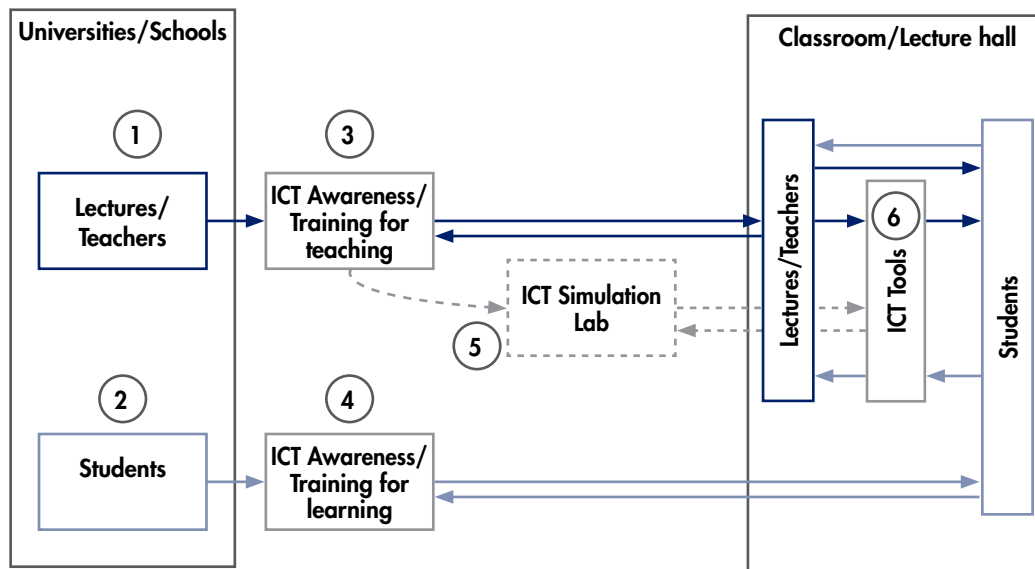
Adapted from Naidoo (2019: 13)

Naidoo (2019) implies that students, as highlighted in number 4, must be provided with ICT awareness and training for learning regularly to be kept abreast with any new ICT developments they may require for online learning. Number 3 in Figure 2 indicates that academics must be equipped with ongoing ICT awareness and teaching for learning. Number 5 provides academics with additional practice to enable them to accurately familiarise themselves with teaching technologies before going to class with the added option to continue until they become proficient with using ICTs for teaching (Naidoo, 2019).

METHODOLOGY

The study used a quantitative survey design. Data collection was done using a survey questionnaire administered online via Google forms. The design of the questionnaire was constructed considering the constructs of TAM, perceived use and the usefulness of online teaching and learning. Social Constructivism was used as the general research approach. Approximately 200 respondents were contacted for this study, and 125 responses were received and analysed. Respondents comprised undergraduate students from the University of Zululand, Department of Communication Science, Richards Bay Campus. Random sampling was used so that all students had an equal opportunity of being selected. Kumar (2011) indicated that random sampling gives each element in the population an equal probability of being part of the sample, and all choices are independent of one another. Welman et al. (2005) also emphasised that simple random sampling allows each member of the population a chance of being included in the sample. In line with ethical considerations, all respondents participated voluntary and could withdraw from the research at any time if they so desired.

Singh (2014) postulates that validity and reliability escalate transparency and decrease opportunities to supplement researcher bias in qualitative research. Forza (2002) insists that without measuring the reliability and validity of the research, it will be difficult to describe the effects of measurement inaccuracies on theoretical relationships that are being measured. Mohajan (2017) implies that reliability is determined by the correlation of the scores from two or more independent raters or the coefficient of agreement of the judgements of the raters. The commonly used internal consistency measure is Cronbach's Alpha (α), which is usually interpreted as the mean of all possible split-half coefficients. This was first named alpha by Lee

Joseph Cronbach in 1951, as he had intended to continue with further coefficients (Mohajan, 2017). This research utilised Cronbach's Alpha to measure the reliability of the study. What was the response rate? What was the Cronbach alpha on the survey items?

Reliability Statistics

Table 1:
Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardised items	N of items
.859	.824	06

The vitality subscale, consisting of six items, was found to be reliable. The value for Cronbach's Alpha for the questionnaire was α =.859.

DISCUSSION OF RESULTS AND RECOMMENDATIONS

This paper sought to uncover the challenges faced by students at the University of Zululand in transitioning to online learning during the COVID-19 pandemic. Random sampling was used to distribute questionnaires online (via email, Moodle and WhatsApp) and after that analysed. MoonStats and Microsoft Excel were used for statistical analysis of data regarding the respondents' information and graphical analysis of data.

Figure 3:
Type of community you reside in
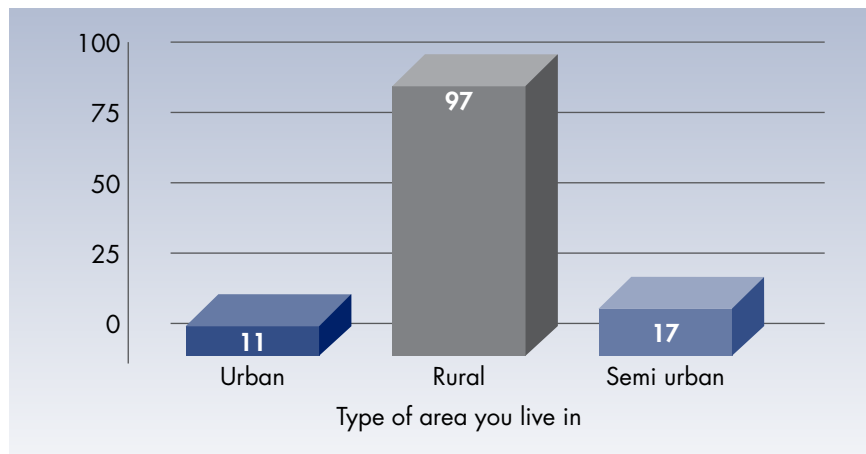
Figure 3 reflects that most of the students (77.6%) live in rural areas. A total of 13.6% of students live in semi-rural areas, and a small percentage of 8.8% live in urban areas. The bulk of students living in rural areas are impacted by the digital divide; the lack of internet access to basic digital tools and skills places them at a disadvantage. There must be a clear plan in place by the government to address this challenge, and students living in rural areas must be given priority. Failure to address this leads to disadvantages as the digital revolution accelerates.

Figure 4:
Level of Satisfaction with online learning

Satisfied
2.4%

Somehow Satisfied
39.7%
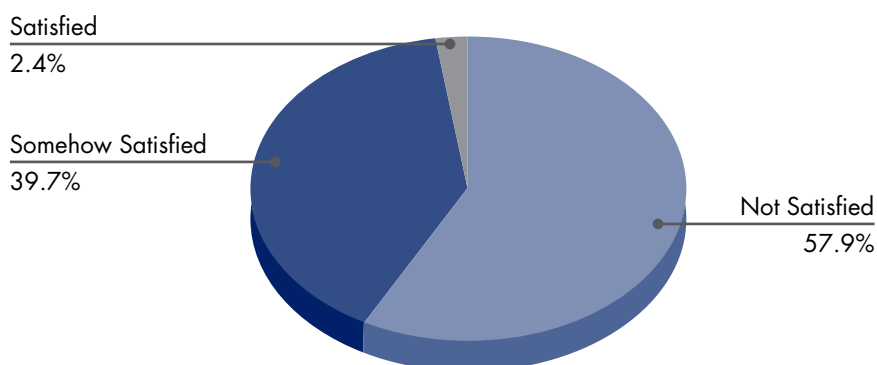
Not Satisfied
57.9%

Figure 4 illustrates the level of satisfaction with online learning by students. Most students (57.9%) were not satisfied by the shift to online learning amidst the COVID-19 pandemic. Only 2.4% of students were satisfied with online learning, and the remaining 39.7% were somehow satisfied. Unsatisfied students are from rural areas, and because they face challenges with internet connectivity, they were concerned about how they will be able to progress. COVID-19 took all of us by surprise and further exposed the disparities South Africans face. These challenges need to be addressed.

Figure 5:
Moodle online activities

61.9%

15.9%

13.5%

■ Most of the activities
■ Lectures only
■ Lectures and participation
■ Lectures, participation and assignments
■ Nothing from above
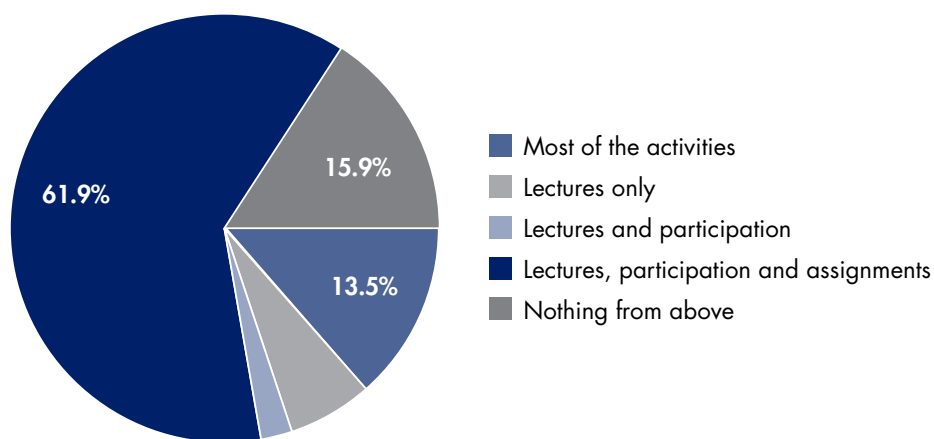
As can be seen in Figure 5. most students (62.4% - 78 students) pointed out that Moodle allows them to access lecture assignments, and they can participate on this platform. A total of 19 students (15.2%) were unable to use Moodle for anything, which is quite worrying as Moodle is the LMS that is currently used by the university. Sixteen students (12.8%) were able to complete most activities on Moodle, some (9 students -7.2%) were only able to access their recorded online lectures, and the remaining three students (2.4%) were able to access lectures and participate in class.

Figure 6:
Alternative online platforms used
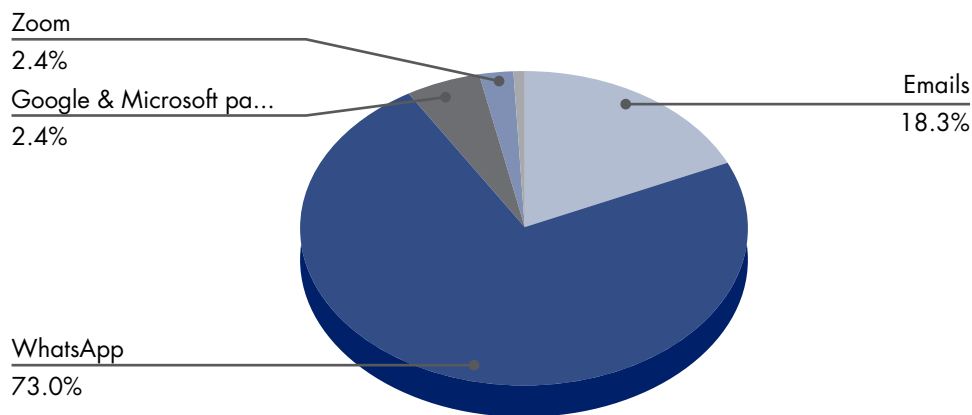
Figure 6 shows the alternative platforms students used when they could not use Moodle. WhatsApp (73%) is the predominant tool that most students use. Other alternative tools used were Zoom (2.4%), emails (18.3%), and Google and Microsoft platforms (5.6%). Moodle does work as expected for everyone. This could be due to the specification of their digital devices. More options should be made available for students.

Figure 7:
Challenges faced with online learning
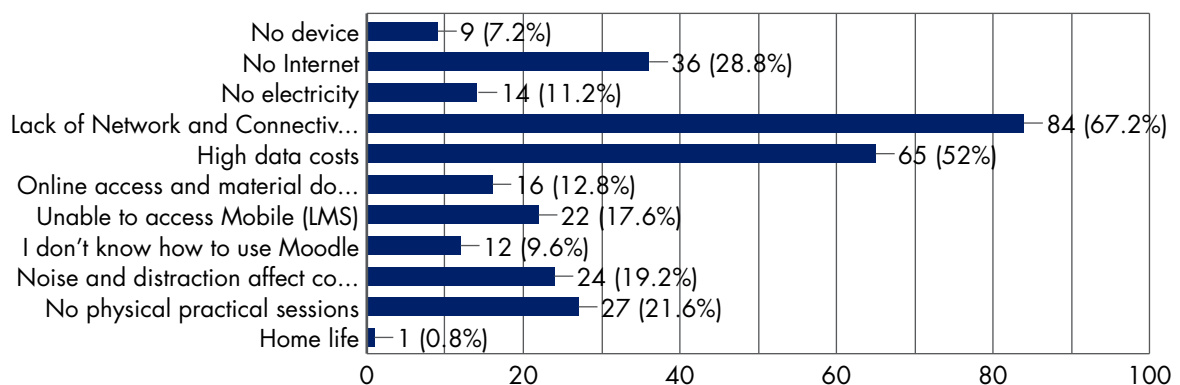
Figure 7 shows the challenges faced by students to engage in online learning. The main challenge was the lack of network and connectivity with the rural areas (67.2%), which hinders online learning. The high data cost (52%) is another obstacle preventing students from accessing their online content as many cannot afford data. Many students have no access to the internet (28.8%), illustrating the disparities faced by many students today. Some students do not have a device (7.2%) to use as a tool to continue with learning.

The students believed that internet data is expensive, and limitations on internet access and devices lead to difficulties for them to participate in online learning. Dlamini and Ndizinisa (2020) point out that issues of connectivity in rural and poverty-stricken communities remain unresolved. Hence, the main issues faced by students and lecturers in rural and online areas are connectivity and stable electricity; that situation meant that students began learning online without proper preparation, and their access to digital learning resources is minimal, affecting them from achieving their learning goals.

Figure 8:
Strategies to overcome barriers to online learning
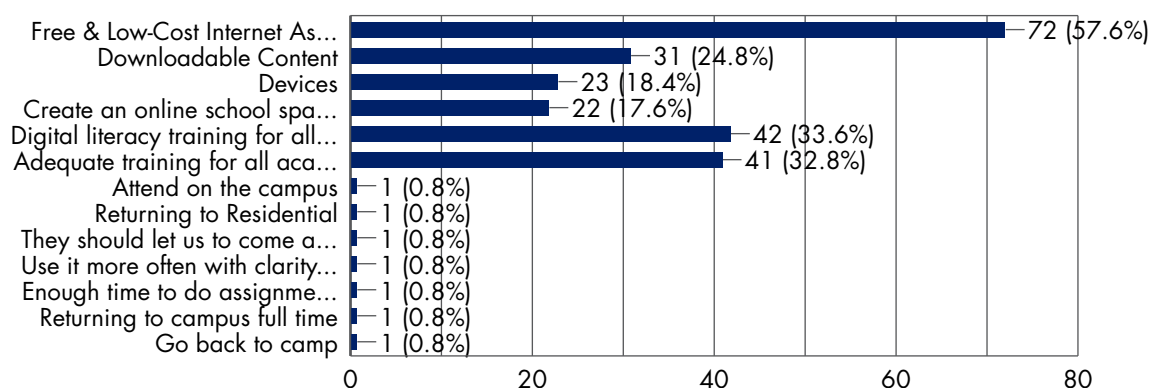
The majority of the students (57,65) feel that free or low-cost internet will assist in online learning. Digital literacy training for both students (33.6%) and academics (32.8%) was also pointed out by a vast number of students to make the transition to online learning. Devices (18.4%), downloadable content (24.8%) and creating an online space for students (17.6%) will make it easier for students in the online learning environment.

Joshi (2021) suggests that the first (access and lack of internet access) and second (internet capability and usage skills and lack of internet capability and usage skills) digital divides are quite noticeable. Higher public spending on IT and the strengthening of existing digital infrastructure can play an important role in this transition phase in South Africa. This is the time to forge partnerships with the private sector, with chambers of commerce and industry to expand national-, state- and district-level capacities to ensure the online provision of education. It is imperative to mobilise all major telecom service providers to boost Internet connectivity service for online education, especially for the underprivileged and under-resourced regions. Padayachee et al. (2018) recommend that a supportive environment for online assessment should address the following issues: A hands-on approach to using the LMS including aspects of the online assessment environment requiring refinement are feedback, assessment setup, and online assessment design, and the user-friendliness of the assessment system. This would benefit all the lecturers and students making use of the LMS. There is a need to guide, encourage and motivate academics as well as students in universities to make a transition to online teaching by engaging motivational speakers, industry experts, and webinars. Lecturers have to be given guidance and training on teaching methodologies through live streaming of online tutorials during these difficult times. The issues related to accessibility, equity (digital divide), and lack of communication among the stakeholders, namely, administrators, teachers, students, and parents, need to be resolved to ensure better learning outcomes. This will also necessitate proper and quality training for faculty to enable them to navigate online platforms, including accommodating the interests of persons with disabilities and building a healthy and resilient cyber ecosystem (Joshi, 2021). There is a growing call for skilled leaders who should implement online educational policies that will aid the smooth transition for all stakeholders that are aligned to the vision and mission of the university. Along with effective contingency plans, reliability and sufficient availability of Information Communication Technology infrastructure, learning tools, and digital learning resources in the form of Massive Open Courses, e-books, e-notes, and so on, are of paramount importance in such severe situations (Huang et al., 2020).

All students and staff need to be equipped with digital literacy tools and have access to the applications and online learning platforms. Dhawan (2020) emphasises that online courses should be made dynamic, stimulating, and interactive. Partlow and Gibbs (2003) explain that online programmes should be designed

so that they are creative, interactive, relevant, student-centred, and group-based to maximise learning and effective teaching strategies for giving online instructions.

Mpungose (2020) avers that within the South African framework, there is a grave need for increased investment in the advancement of resources, both in universities and at the community level, due to the digital divide. Liguori and Winkler (2020) note that tools and resources to address this digital divide gap are gradually evolving, with traditional textbook publishers offering more online learning resources, private companies developing more and better online experiential learning curriculums, and simulation providers continuing to offer improved options. Dlamini and Ndizinisa (2020) advocate that using technology to intensify teaching and curriculum coverage is a step in the right direction, but the situation must be socially just to ensure fair access and distribution of learning resources across communities, especially among historically disadvantaged groups. There must be structures that link pedagogy, technology, and context to avoid creating systemic inequalities that affect individual students' experiences. Online learning can help provide inclusive education even in times of crisis, and such systems need to be developed in educational institutions that ensure that no student is left behind based on education due to their location, social class, and ethnicity (Dhawan, 2020:19). Lecturers should provide more particular attention and heighten communication through social media to ensure the students easily adopt this new method of learning.

The current allocation of data by the university and zero-rated LMS (Moodle), as agreed with ICT service providers, restricts students and hinders them from accessing an array of e-resources. Ramli et al. (2020) concur that the university also plays an important role to ensure that all students can access the required resources needed during online learning, such as a subsidy on the internet data or the telecommunication companies can provide free data for the academician and students to engage in online learning. The Malaysian government implemented this to ease the difficulty faced by students and academics.

Mpungose (2020) emphasises that despite challenges experienced by students in transitioning from traditional to online learning, the prominence of the digital divide is the main hindrance to students realising effective online learning. There should be a specific focus on the customisation of the Moodle (LMS) to meet the local needs of disadvantaged students so that online learning can be achieved.

There is also a need to have a dedicated ICT support team to assist students with online challenges they may face. This information must be effectively communicated to students and academics, so they know whom to contact. The university should provide a toll-free call line and/or email addresses to provide support for their students and staff. There are several national and international bodies and organisations that have developed principles, guidelines, and benchmarks for quality assurance and the use of technologies to support e-learning. These policies should be aligned to the digital competencies of students and academics so that all are on board with online learning.

CONCLUSIONS

The transition to online learning requires skilled leadership that can tackle the digital divide and finds ways of mitigating these inequalities. Although online learning may have been viewed as a panacea at the start of the pandemic, it has adversely affected students and may have further amplified the digital divide. The study exposed that the major challenges encountered by learners in students in transitioning to online learning were technical issues such as lack of network connectivity and high data costs with the majority of students residing in rural areas, thus the inequalities of the education system have been further exacerbated. This calls for urgent intervention strategies by higher education institutions so that all students have equitable access to online learning with none left behind. This shift to an online learning system helps redefine the learning system, especially the tertiary education system in South Africa. Investment in technology infrastructure, high-quality digital educational content, basic IT skills for students and academics, and local capacity building by involving local bodies, the private sector, and the public is crucial.

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Quality management of programme reaccreditation at private higher education institutions in South Africa[1]

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ABSTRACT

Private higher education institutions (PHEIs) in South Africa must apply to the Higher Education Quality Committee, a standing committee of the Council on Higher Education (CHE), for the reaccreditation of existing accredited programmes. This article explores the internal quality management systems at PHEIs to manage the programme reaccreditation process. The conceptual framework for this study is the PHEI Open System Model which presumes the PHEI to be an open system. In an open system in this model, 'input' is filtered from the external to the internal environment and catalyses the conversion of resources ('throughput') into 'output', i.e., a reaccredited programme. The responses of a purposive sample of PHEIs were considered. This is a qualitative study whereby data was collected through semi-structured interviews which served to investigate how PHEIs manage the programme reaccreditation process and whether they present as open systems.

Keywords: private higher education, quality assurance, quality management, accreditation, reaccreditation, open system

INTRODUCTION

Internal quality assurance (IQA) is the responsibility of the higher education institution, whereas external quality assurance (EQA) is under the purview of the Council on Higher Education (CHE), an independent statutory body as declared by the Higher Education Act (Act 101 of 1997) that executes its mandate through its standing committee, the Higher Education Quality Committee (HEQC).

Private higher education institutions must be registered companies and abide by the regulations for registration of the Department of Higher Education and Training. They are subject to the requirements for *inter alia* programme accreditation, and the policy and criteria for registration of the qualification on the National Qualifications Framework (NQF) (SAQA, 2020; DHET, 2016; CHE, 2004, as amended; RSA, 1997).

The CHE must assure and ensure quality programmes in the system. According to the HEQC (CHE, 2021b, par.4),

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Accreditation is the recognition status given for a stipulated period of time by the HEQC to a programme after an evaluation indicates that it meets or exceeds a minimum threshold of educational quality.

'Reaccreditation' is the 'accreditation of an existing programme' and the 'criteria for the re-accreditation of existing programmes are identical to those for new programmes and comprise the same categories of programme input, process, output and impact, and review' (CHE, 2004, as amended).

This article focuses on the quality management of programme reaccreditation that is conducted for programmes offered by PHEIs. The main research question for the study is: How do PHEIs manage internal quality assurance to achieve programme reaccreditation? The study sought to determine the internal quality management systems in place at PHEIs.

LITERATURE REVIEW

Private higher education

Private higher education 'has become the most important aspect of global education' (Kajawo, 2020: 384; Barsoum, 2020) due to its growth and expansion (Kajawo, 2020; Levy, 2018; Shah et el., 2019). It plays a complementary role in the sector and adds a competitive element (Shah et al., 2019). With the expansion in the higher education sector, the private sector in most countries has been absorbing some of the demand. The number of PHEIs has increased over the past 50 years as the over-reliance on the public sector led to a greater need for a dual-sector system (Levy, 2018). Private higher education caters for those who prefer not to attend public institutions, or do not qualify for entry, and it meets the need for differentiated demand and is demand-driven (Altbach et el., 2009; Dittrich & Weck-Hannemann, 2010; Tamrat, 2017).

Even though considered to be the 'fastest-growing sector worldwide', it is characterised by 'very little strategic planning' (Altbach et al., 2009: 44-45). While public higher education institutions across the world were generally established under some form of government control, the private sector sprouted and mushroomed with increased measures having to be put in place by the government through regulatory frameworks to ensure legitimacy and quality (Kinser & Lane, 2017; CHE, February 2018).

Generally, PHEIs are tuition fee-dependent and operate in competitive markets (Buckner, 2017). PHEIs in South Africa are autonomous institutions that 'do not receive funding from the DHET, but for which the DHET has certain legislative functions' (DHET, 2021b: 20); and distinct in size, scope, academic offering, and duration of existence in the sector (CHE, February 2018). Some institutions are not-for-profit organisations whereas others are 'enterprise-driven' (CHE, February 2018).

The DHET (2021a) indicates that there are 93 registered and 40 provisionally registered PHEIs in SA, bringing the total of operational institutions to 133 at the time of this study. Section 21 of the *Regulations for the Registration of Private Higher Education Institutions* (DHET, 2016:9) indicate *inter alia* that, to maintain registration, the institution must 'concerning all of its higher education programmes, comply with the requirements of the Higher Education Quality Committee (HEQC)'. PHEIs have to submit accredited programmes for evaluation during the reaccreditation process, which coincides with the DHET's registration cycle (DHET, 2016; Stander & Herman, 2017:220). The reaccreditation outcome is communicated to the DHET, and the Registrar for private higher education institutions considers this in the amendment of registration.

Dittrich and Weck-Hannemann (2010) indicate that PHEIs are part of 'quality assurance life' and 'are here to stay' and that there should be recognition of the weaknesses and strengths in the private higher education sector. In SA, PHEIs are included in the EQA activities of the CHE.

Quality assurance in private higher education

Current developments in higher education (such as marketisation, globalisation, accountability demands, fraud and corruption, and dubious quality assurance practices) have served as an impetus for the establishment of national quality assurance bodies to regulate and promote quality (Garwe & Gwati, 2018). Stander and Herman (2017:220) posit that quality assurance (QA) of the private higher education sector is intended to safeguard the public against 'dubious or illegal HE operators'. Hoosen et el. (2017: 27) indicate that the increased number of PHEIs gave rise to concern about the 'declining quality of higher education', which precipitated the need for government regulation in the Southern African Development Community (SADC). Quality can no longer be assumed nor guaranteed (Kinser & Lane, 2017). By having a national set of QA guidelines and/or standards, stakeholders would be encouraged to have trust in the system, quality of the programmes, and degrees that are conferred (Hoosen et al., 2017).

Westerheijden, Stensaker and Rosa (2007) state that the main goals of QA should be accountability and quality enhancement. Accreditation in a quality assurance system is linked to accountability - internally within the institution and externally to the government or QA agency (Macheridis & Paulsson, 2021; Stensaker & Harvey, 2013). In SA, the Quality Council is responsible for ensuring the 'integrity and credibility of quality assurance' (RSA, 2009: 20) thus, for the CHE to perform its function as outlined in the HE Act (RSA, 1997), HEIs have to comply with the requirements of the HEQC.

The *Quality Assurance Framework for Higher Education Institutions in South Africa* (QAF) (CHE, 2021a: 32) stipulates that HEIs are responsible for IQA and should have 'well-established and fully functional' systems in place. HEIs are accountable inter alia for quality learning and teaching, the educational experience, graduate competence, quality and impact of research and innovation, community engagement, academic support, staff development and support services for the academic community (*ibid*).

According to Gilbert (2020: 48), accreditation is considered a 'coveted quality mark, which transcends national boundaries'. Reaccreditation can thus be considered a mark of continued compliance and sustained programme quality. QA (such as accreditation) affords legitimacy to a programme or institution which, in turn, signals recognition of its value or benefit to society (Kinser & Lane, 2017). The QAF (CHE, 2021a: 19-20) defines EQA as

> the means by which an external quality agency ensures that institutions have Internal Quality Assurance (IQA) systems in place to manage the quality of their activities and educational provision. It also ensures that the qualifications and programmes that they offer have been peer-reviewed to ensure that the provisioning meets the quality standards and criteria of the Council on Higher Education (CHE).

'Quality' is defined as 'fitness of purpose' of the HEI, 'fitness for purpose' in relation to its 'specified vision, mission and strategic and academic planning in relation to diversity and differentiation in the South African HE sector, 'value for money' and 'transformation' (CHE, 2021a: 29-30).

Intrinsic in the notions of 'accountability' and 'improvement' is accepting responsibility for QA and taking ownership of processes. QA is contextual and requires the input of all role-players for a quality culture to exist (Cardoso, Rosa & Stensaker, 2016). This notion is reinforced by Bendermacher et el. (2017) who argue that, within a quality culture, there is collective responsibility and involvement at the managerial and grassroots level. However, Boateng (2014) is of the opinion that student participation in IQA processes is limited, an observation which is supported by Moyo and Boti (2020). The development of a quality culture for sustainable IQA is essential and is characterised by a balanced top-down and bottom-up approach (Bendermacher et el., 2017). Harvey and Green (1993; 9) define a quality culture as

a devolution of responsibility for quality [within an organisational] system of interrelated nodes (a single person or small team). Each node has inputs and outputs. These are the quality interfaces …

For a quality culture to exist, quality assurance processes cannot function in silos. There would need to be purposeful, interrelated, interactive relationships (between people and processes) within an organisation or a system. Although intangible, a 'quality culture' can manifest in the form of a quality strategy and quality management system that identifies the 'quality work' (Elken & Stensaker, 2018) of individuals and teams, thus collective effort is needed to achieve a quality product.

Brookes and Becket (2007) posit that there is no universal consensus on how to best manage quality in higher education. This has led to the adoption of different quality management practices within countries and their higher education institutions (*ibid*). The CHE (2021a: 33) recognises the need for differentiation since HEIs in South Africa are at different levels of maturity in terms of their IQA management systems. The QAF (CHE, 2021a: 28-29) aims to entrench a QA system in the higher education sector that 'strengthens and enhances the quality of higher education provisioning' and intends to support HEIs in the establishment of 'robust quality cultures and appropriate structures'.

Krehbiel and Miller (2018: 3) postulate that a quality management system is a formalised system that 'documents the structure, responsibilities and procedures required for effective quality management'. Quality management is predicated on systems, structures, processes, and procedures being in place to 'check, control and assure quality' (Parsons, 2018). Stensaker (in Westerheijden et el., 2007: 99-118) points out that evaluation systems, management systems and information systems are combined in various ways in internal institutional arrangements. Quality management is therefore a 'nebulous concept' as it means different things to different people and thus differently or inconsistently applied (Barouch & Ponsignon, 2016: 945). This gives rise to the importance of standardised and sustainable QA frameworks to ensure comparability within systems.

CONCEPTUAL FRAMEWORK

The study adopted a conceptual framework, the PHEI Open System Model, which is based on a Systems Approach and partially derived from the Katz and Kahn Open System Model (Ramosaj & Berisha, 2014). The idea of an 'open system' is found in General System Theory – a worldview introduced by Ludwig von Bertalanffy (1968). General System Theory is based on the premise that there are systems everywhere, for instance in nature, science, business and organisations.

A system comprises interdependent parts that interact among themselves and with the environment (Von Bertalanffy, 1968). To gain a holistic picture of the system, it has to be viewed within the context of its internal and external milieu (Barouch & Ponsignon, 2016). It is assumed that within this system, there is an exchange of information, resources, matter, or energy, among others for it to be open, adaptive, flexible and responsive to the environment (Ramosaj & Berisha, 2014).

Zaki and Rashidi (2013) posit that HEIs need to adopt open systems thinking to enable them to cope with challenges and change. For example, the COVID-19 pandemic precipitated systems to be reviewed for adaptation to the 'new normal'.

Figure 1:
PHEI Open System Model
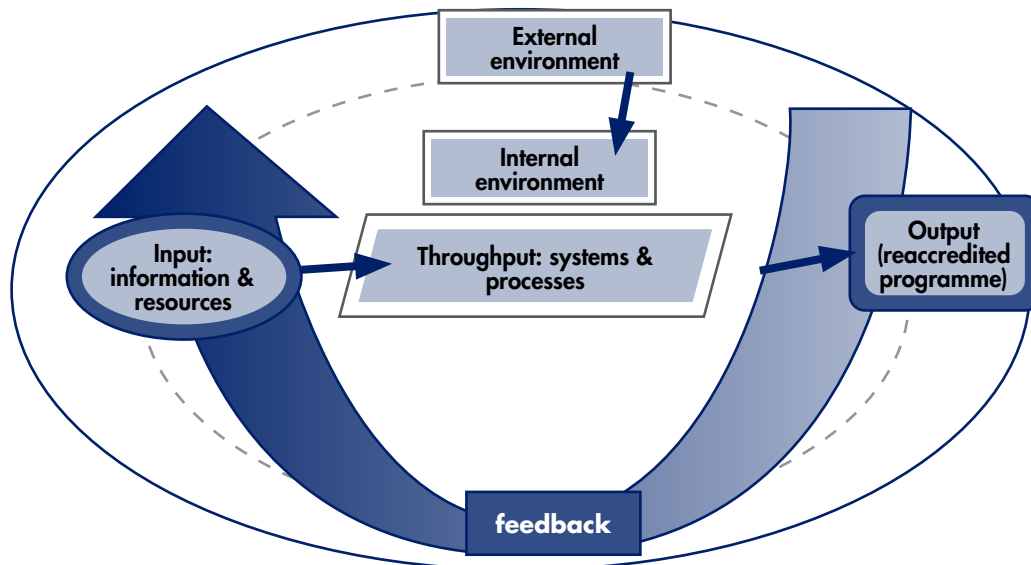
In the PHEI Open System Model (*Figure 1*), 'input' is the absorption of information and resources from the environment. The external environment is the legislative and policy (regulatory), socio-economic, political, regional, national (and regional and/or international) context within which the PHEI operates. It could include inputs received from industry, market surveys, the professional context and professional bodies. The internal environment is the governance, management, operations, internal interactions, and dynamics within the organisation, and presumes the availability of resources and staff capacity. It is assumed that internal and external environments intersect. The 'throughput' is the conversion (systems, processes, and procedures) of resources and feedback to produce the 'output' (product), i.e. the reaccredited programme.

This article considers whether the participant institutions display as open systems when managing the programme reaccreditation process.

RESEARCH METHODOLOGY

A qualitative approach was used. Data were collected at different institutions, involving participants in stratified levels of positions within the organisation, varying in race, gender, age, etc. Due to COVID-19 lockdown restrictions, interviews were conducted on a virtual platform, viz. Zoom.

A purposive sample of participants was done from PHEIs located in Gauteng; CHE, DHET and SAQA staff; and members of an association of private providers. There were 17 participants in total. This article focuses on the data collected from nine participants from seven PHEIs. Sampling was done using the DHET *Register of Private Higher Education Institutions* (5 October 2020). A formal invitation was extended to all participants via the appropriate channels. The research instrument was a set of interview questions. The individual semi-structured interview was recorded and transcribed, and member checking was done. Some documents were received for analysis which are confidential.

The Atlas.ti9 software was used for data organisation, coding and thematic grouping. Analysis was done according to the conceptual framework. The confirmability, dependability and reliability of the data were established through (i) reflexive practice; (ii) member checking; (iii) peer debriefing; and (iv) an audit trail. All data are stored securely.

The confidentiality and anonymity of participants are preserved. Data collection commenced once ethical clearance was received from the Ethics Committee of the University. Participants provided written consent and could exit at any point without reprisal. There was full disclosure on the scope and purpose of the research. The interview site and participant boundaries were respected (Creswell, 2014). There was adherence to guidelines for ethical research and protection of intellectual property (Singh & Stückelberger, 2017).

FINDINGS

Internal quality management

The study finds that there are different internal quality management systems in place across the institutions which confirms that quality management is a 'nebulous system' applied differently by each institution (Brookes & Becket, 2007; Barouch & Ponsignon, 2016). There are policies, structures, processes and procedures in place to 'check, control and assure quality' (Parsons, 2018). However, the institutions and their systems are continuously evolving, which is evidence of QA in itself (Brennan, 2018).

Evolving systems

The institutional systems develop in response to internal and/or external circumstances affecting the internal environment. There is restructuring, which is (i) commensurate with organisational growth (e.g. PHEI1, PHEI5 and PHEI7); (ii) in response to the requirements of the impending institutional audits by the CHE which are to be implemented from 2022 and will deliver an outcome on programme reaccreditation (e.g. PHEI5); (iii) the need for a more streamlined approach, e.g. PHEI3 (see discussion under 'Structures and roles') and PHEI6 (see discussion under 'A proactive approach'); or (iv) in response to feedback received through EQA (e.g. PHEI3 and PHEI6).

The institutions are also preparing for implementation of the QAF (CHE, 2021a) whereby functional internal quality management systems are expected to be in place. For example, PHEI1 indicates that it will be establishing a dedicated QA unit as a strategic move to get the institution ready for implementation of the QAF. PHEI1 acknowledges the need for improvement before it can self-manage quality successfully and posits that a supportive, collaborative approach from the CHE would assist in achieving quality enhancement, not only compliance.

PHEI3 strives to achieve quality enhancement of the programme. The curriculum design issues that were identified by the HEQC during the reaccreditation process prompted the appointment of a Dean to oversee programme design and align the qualifications with standard practice. The institution has 'invested heavily in senior academic management staff':

> There have been four senior appointments above me and many below me, so the structure itself has matured and all of these things happened because of feedback that we got from the CHE.

The institution has thus reviewed its systems and structures to be compliant.

At PHEI2, the Academic Director is a recently employed staff member who is solely responsible for liaison with the regulatory bodies and overseeing the accreditation and registration processes. The internal quality management systems are formalised systems with structures and embedded roles and responsibilities (Krehbiel & Miller, 2018).

Structures and roles

Since 2019, PHEI1 has established new faculties and employed a Dean for each and revised the existing leadership and management structures. The revised structure includes the Dean of Faculty and Head(s)

of Department, Subject Head and Faculty Board. The Academic Committee has been replaced by the Senate. The HOD is responsible for ensuring quality in the relevant department and the Programme Coordinator manages programme delivery and the quality assurance thereof. The Programme Coordinator and Subject Head roles are reviewed every three years to allow for revolving capacity building of staff. In the newly established Faculty, the HOD also fulfils the Programme Coordinator role until growth dictates new appointments.

The institution has a Centre for Teaching and Learning that supports the lecturers. QA through this unit ensures that assessment and student support are on par. Academic leadership in the programme is provided by the Programme Coordinator and Dean, at the outset, so that 'the quality mechanisms are developed into the programme'. The Registrar is responsible for IQA. The Registrar's responsibilities include quality assurance of policies, ensuring adherence to policy, and providing staff and student data relevant to the reaccreditation and registration processes. Responsibility and accountability are built into the value chain and quality is built into every step of the process. The process is seemingly more 'complex; with different layers, which is indicative of building a quality culture that filters through the institution and requires the input of all role-players (Cardoso, Rosa & Stensaker, 2016).

At PHEI2, the internal quality management structure is a 'short'/'narrow structure' because it is 'not a huge institution'. The General Manager on each site is responsible for staffing, operations, and client service. The Academic Manager per site is responsible for QA and manages all related matters. The operations team reports to the Academic Manager.

The Academic Director manages QA across the board. The Academic Committee forms part of the internal quality management structure, comprising the Academic Director and Academic Managers. The institution has a range of policies in place, including a 'policy on policies'. A programme is centrally managed from a base site and distributed nationally to all sites. The Subject Head provides academic leadership in the programme across sites of delivery. The internal quality management system shows stratification at the regional and national levels.

At PHEI3, the organisational leadership and management structure provides input to the quality management structure. The institution previously had several sub-committees. This led to duplication of work or function; therefore, the structure was streamlined into a Teaching and Learning Committee and Assessment Committee. These committees meet quarterly and report to the Senate, which is the decision-making body on all academic-related and academic QA matters.

The main governance structure at PHEI4 is the QA structure. To ensure quality, PHEI4 found that a purposeful and meaningful approach to the delivery of its programmes was needed – through a coherent and integrated organisational structure. The quality assurance structure is headed by the Council and Academic Board. The Academic Board is responsible for the overall academic function of the institution and manages, monitors, and controls all processes associated with good governance and the implementation of learning and teaching approaches. Several committees report to the Academic Board, including the Academic Quality Committee.

At PHEI5, the Executive Committee is the decision-making body. It comprises the heads of all the divisions, including the Head of Academics who is also the Head of Academic Quality Assurance. These are two demanding positions, to be separated upon recruiting a QA Manager (thus PHEI5 is evolving).

The institution will appoint programme managers to support the Deans. Currently, the Head of Academic Quality Assurance is responsible for programme accreditation and reaccreditation processes. There is a

comprehensive QA process concerning academic staff, which is based on gathering data from multiple sources to inform the curricula – 'things like content and being up to date with what's happening in the real world'.

The senior leadership and management staff at PHEI6 serve on the Executive Committee (EXCO), comprising the Chief Executive Officer, Registrar, Executive Dean, Director of Operations and Director of Quality Assurance. The CEO plays an active role in the QA structure. Each EXCO member is responsible for a specific department. There is one Faculty at present, with an Executive Dean as the leader. The Teaching and Learning Committee oversees the T&LC clusters. The institution has relevant policies and procedures to support operations and interdepartmental collaboration.

The QA unit is positioned above all the other units or functions:

> Everything is basically convened by your quality structures that are in place. PHE16

The Head Lecturer and faculty are responsible for the module content, content delivery, students at risk, etc. The Faculty Board and Academic Board assess whether objectives are met, intervention is required or improvement needs to be made. This signifies reflexive practice.

PHEI7's internal quality management structure includes three key positions: (i) the Head of Teaching and Learning who is the academic head per campus, responsible for the quality of learning and teaching on the site and accountable to; (ii) the Deputy Dean; and (iii) the Dean is responsible for IQA and managing EQA. Other key stakeholders per campus are Heads of Faculty, Academic Programme Developers, Programme Coordinators, Head of Work-Integrated Learning, and the Academic Manager.

The lecturers are involved in the quality management process. Three-monthly reports are prepared for the Academic Board, which reports to the Business Board. Improvement plans are drawn up if necessary. The institution participates in the relevant professional body's evaluation processes and incorporates the feedback into its review processes. Over the past year, the institution has established faculties per subject field which are managed by the Senate. With institutional growth, the structure became more complex, with accountability built in at each level.

PHEI1-7 have systems in place with the Senate, Council, EXCO or a Board at the apex. There is thus a high level of accountability for IQA. Having structures, and reviewing structures, are attempts to achieve compliance and improve programme quality.

A proactive approach

A few institutions have devised proactive processes that enable the efficient management of QA. At PHEI1, programme reaccreditation process is not treated as a standalone process. It is integrated with the accreditation process for new programmes and overall self-evaluation conducted by the institution each year. The reaccreditation templates provided by the CHE become the self-evaluation templates for new programmes. At the end of each year, the faculty need to follow the same steps as for programme reaccreditation: (i) form programme groups ('nodes'; Harvey & Green, 1993); (ii) provide input on the templates; and (iii) ensure that the evidence is in place and recorded in terms of the accreditation criteria for ease of reference. When these programmes enter their first reaccreditation cycle, the evidence is already available. This means that the initiation of external programme reaccreditation coincides with the internal conclusion of the process. The institution recently entered its new programme reaccreditation cycle but has been preparing for it since the first review about six years ago. PHEI1 strives to achieve compliance within the required timeframe and has processes in place to enable quality enhancement.

Similar to PHEI1, PHEI2 has introduced an efficient administrative system that links with the programme reaccreditation process. The evidence per criterion is compiled as ongoing practice. Preparation for the next reaccreditation cycle thus becomes routine. By the time the reaccreditation cycle is initiated, the portfolio of evidence is almost complete. It is not a mere tick-box exercise as the institution is 'constantly looking for improvement in our quality'. There are standard practices in place and attempts to achieve compliance and enhance programme quality.

Taking a proactive approach to administration is advantageous because it enables efficient management of the programme review process. PHEI6 is mindful that it could fall into the trap of 'too much administration' which could be a burden to staff and add to overheads. It has consequently invested in Bizmind to achieve efficiency in the system:

> It is a workflow process management system where you can create your own policies and your workflows and your processes that gives you the dashboards immediately and basically queries all the other systems that we have online immediately so that you really can see what is happening.

PHEI6 seeks innovative methods to inform internal practice which is why it has joined the University Innovation Industry Network. As elaborated:

> They query industry and university interaction and technology transfer. We embarked now on a pilot programme with them to basically create a framework to map your third mission engagement and communication, return of investment and so forth.

To further explore organisational efficiency and the value attached to the effort, the institution has started a research group around Decision Intelligence, which:

> … is basically taking a look at management structures within an institution … taking a look at how you measure your different engagement styles, how you measure your activities and return on investment of activities, towards research so that you get really a return on investment on what you are basically doing.

Institutions should seek innovative ways to improve efficiencies and prevent 'too much administration', particularly if IQA has to align with EQA that is viewed as 'complex' (Stander & Herman, 2017: 220).

Programme review
Programme review is an integral part of the programme reaccreditation process (CHE, 2004, as amended). At PHEI1, it includes inter alia looking at student performance, viability and currency of the programme, and marketability:

> Every time when there is a new cohort of students, the programme needs to be evaluated… an internal review to make sure that we're still on track …

Overall, there is a rigorous programme review process in place. The accreditation criteria are 'embedded' in all operations. Quality management is integrated from programme design to delivery and review and there are support systems in place. Evaluation panels, comprising external peers from public institutions and industry, are contracted to review programmes. The Faculty academic team coordinates these processes. Self-evaluation and site visits are done by relevant professional bodies for programmes that require their endorsement.

PHEI2 utilises the services of external peer reviewers from public institutions and the industry. Programmes undergo review at five-year intervals and policy regulated on the following basis:

> We even have got a policy on which programme, in which sequence. Once the sequence is complete, it starts in a new sequence based on where the biggest need is.

The institution employs peer, student and client review. The feedback is incorporated in attempts to effect quality enhancement.

At PHEI3, the programme reaccreditation process starts with the Academic Management Team that consists of the Registrar, Programme Managers, Programme Coordinators, Executive Dean of Academics, Programme Design Dean, and Executive Dean of Growth and Sustainability. Tasks are allocated to specific individuals, e.g., the Programme Design Dean would oversee curriculum revision and the Registrar a workgroup on policy. The size of the team depends on the number of programmes under evaluation. If there is a query around programme design, 'we would gather those individuals around and they would form working groups'. These workgroups are indicative of 'a devolution of responsibility' whereby 'small teams' are the "quality interfaces" within the 'system of interrelated nodes', where each node has its 'inputs and outputs' (Harvey & Green, 1993: 16). The institution draws experts from industry 'when we test programme review processes or when we need their input in regard to curriculum design, etc.'

Once the reaccreditation cycle is concluded, the institution reviews the process and develops improvement plans, if required. The institution adopts a 'lessons learned' approach: Each query by the CHE is addressed throughout the entire institution to improve internal quality management and enhance programme quality.

The current quality management system at PHEI4 was established about four years ago. In terms of programme review, there is an established system whereby the academics teaching the programmes can give feedback.

> Those minor reviews are taken in, and those are actually enacted every year, and then we'll go through a three years' big programme review update.

Any developments in the field are incorporated into the module content.

The institution has internal checks and balances in place. The role-players take QA seriously and the quality focus is embedded in every role.

> We've taken on the notion of quality, and not just quality assurance, but quality enhancement: How can we make things even better? How can we add value? How can we improve what we do? I now have a team of colleagues who are just as passionate about reading the documents from the CHE.

The top-down and bottom-up approach (Bendermacher et al., 2017) to quality management is indicative of a quality culture. It is about 'reading the documents' with understanding and the intention to take constructive feedback on board for quality enhancement. The institution seeks to mirror the EQA process:

> Whatever CHE does, we have our own internal, similar process.

The various quality committees convene to engage in the internal reaccreditation process. As at PHEI1, programme reaccreditation is an integrated process. The institution is refining some of its processes but the system is functional nonetheless. This is again indicative of an evolving system, as discussed above, where the pursuit is improvement of programme quality and improvement of process. This pursuit is also

exhibited by PHEI3 and PHEI6. The review process at PHEI6 is followed in all the areas of the organisation that support the programme.

At PHEI5, self-evaluation is done and there is reflexive practice with the intent to enhance quality. The Dean is responsible for quality assuring the programme design and review processes. However, the lack of a formal process for external peer academic and stakeholder review is regarded as a weakness in the internal quality management system. The national office monitors and provides feedback regularly. It is more of a top-down approach at present. It is anticipated that the new staff member to oversee QA will add value in this regard.

PHEI6 attempts to strengthen IQA and has established partnerships with international universities whereby a 'full audit' is done every five years by external peer reviewers for benchmarking with international accreditation standards. The audit is a week-long engagement with management, staff, students, and alumni.

> They take a look at evidence, going from curriculum to delivery, to assessment, maintenance of records and so on.

PHEI6 does not view QA as merely 'ticking boxes'. The review process is described as 'intense', with every assessment cycle moderated and feedback analysed in an attempt to close 'loopholes'.

Feedback

Student surveys on the course or lecturer are common. For example: at PHEI1, these are done at least twice a year. Students are advised of any improvements, thus closing the loop. Alumni are also surveyed. The institution tracks the employability of its graduates and canvases employer opinion on graduate adaptability and compatibility to the workplace. Peer reviews by academic and industry experts are ongoing throughout the year. Feedback is analysed and incorporated in improvement plans.

The condition for accreditation of a new programme is addressed across programmes and at institutional level:

> … if you have issues with accreditation, the next evaluator might find the same. It's just easier that you address it and then it's clear.

Taking a systems approach thus mitigates risk to enable continued compliance.

Processes have been reviewed and procedures refined. For example, external moderation at PHEI1 used to be a 'tick-off', but new forms for reporting on assessment and moderation require qualitative responses to ensure that role-players engage. PHEI4's programme review process is also qualitative and requires input and feedback from various stakeholders, viz. employers, practitioners, professionals or professional body.

PHEI5 does a graduate survey and tracer studies are done:

> We can track, for instance, this latest professional body review that we had for a Higher Certificate. From that Higher Certificate, over 60% of the students go on to further studies. It really means that Higher Certificate is serving its purpose extremely well, which is to give access to students into a very specialised field of study.

The institution has done a longer-term graduate study. There are multiple inputs from industry, students, and staff that provide insight into the programmes, specific subjects, and pass and throughput rates. Data

from the annual DHET report is also considered. There is 'a huge amount of data' which are 'possibly not analysed quickly enough'. The analysis and feedback processes are viewed as thorough and rigorous.

PHEI5 relies heavily on industry experts to teach on a part-time basis and, although involved in programme design and review, they might regard their role as not substantive or their input not considered. This is regarded as 'a bit of a quality assurance challenge in terms of closing the loop'.

At PHEI6, industry representatives provide feedback on the relevance and standard of a programme. The lecturers at PHEI7 provide feedback on the modules that they teach. Once per year, a climate survey gauges where support, input and development are required.

It is evident that feedback is obtained from a variety of stakeholders on an ongoing basis which is considered when attending to programme review. In terms of the PHEI Open System Model, feedback from the environment is channelled into an internal throughput process for programme review, development, and quality enhancement. However, there should be greater inclusion of the student in the QA process (cf. Boateng, 2014; Moyo & Boti, 2020). Besides student surveys, there is no actual quality role played by the student. Brookes and Becket (2007) posit there should be 'management for quality' instead of 'management of quality' whereby the 'quality of student learning is central to any quality management programme' (sic). If there is to be 'management for quality', students need to play an agentic role in the 'quality of student learning'.

An open system

The institutions display as open systems. There are indications that they can achieve robust quality management systems that leverage capable leadership and management structures; careful planning; relevant and current policies and guidelines; reflexive practice; keeping abreast of developments in subject fields, industry and the sector at large; systematic implementation of the process; utilisation of available resources and incorporating feedback; staff agency; staff engagement; skills and knowledge; interdependencies; approvals processes including top level; and a network of academic and industry peers.

Although at different levels of functionality (CHE, 2021a), the internal quality management systems are functional. Structures and roles are being reviewed in response to developments in the external environment. Dedicated positions have been, or will be, established within the structures to convert the feedback from IQA and EQA processes for throughput of a quality 'product', i.e., a reaccredited programme.

Information is absorbed and processed through the relevant structures. The quality management of a programme means the conversion of resources within a system through interaction between the constituent parts of the system. There is the realisation that 'quality work' (Elken & Stensaker, 2018) cannot be done in silos and that interdependencies need to be leveraged to allow synergy in the QA process. The institutions take stock of their internal capacity and design a strategy to supplement, complement, or build capacity for greater efficiency and responsiveness. The integral role of staff in supporting the initiatives is recognised.

CONCLUSION

As an open system, the institution absorbs input from the external environment (Ramosaj & Berisha, 2014) and processes this through its relevant structures. The quality management of a programme entails the conversion of human resources to: (i) critically engage and understand the accreditation criteria and how these can be interpreted for the institutional context to demonstrate adherence; (ii) evaluate the efficacy of the programme to determine how well it achieves its stated aims; and (iii) absorb the feedback from review processes for the maintenance, and enhancement, of programme quality.

There is evidence of strong leadership and management as the driving force behind the quality agenda, that 'embraces the systems thinking' (Krehbiel & Miller, 2018), which is to not only achieve 'compliance' quality, but substantive, actual quality that is visible in the programme(s). Programme reaccreditation is managed within an integrated, collaborative process which is resource-intensive and requires a strategy, systematic application, and focused throughput for the achievement of quality output.

The study is limited in scope and size and, therefore, the findings cannot be generalised. Quality management systems cannot summarily be transplanted onto other contexts.

RECOMMENDATIONS

A Systems Approach – specifically an open system – should be adopted. Quality management systems need to be evaluated in terms of the size, infrastructure, and resources of the institution as these have 'an impact on institutions' ability or inability to keep up with the demands of both HE and QA legislative frameworks' (Stander & Herman, 2017). Further study on quality management systems at higher education institutions, and impact studies on EQA, should be conducted.

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Re-framing postgraduate supervision as a teaching and learning practice: supervisors' perspectives from one university in Lesotho[1]

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ABSTRACT

Traditionally, little emphasis has been placed on defining postgraduate supervision as a teaching and learning practice. This lack of a clear conceptualisation is cited as a source of confusion and frustration among practitioners. Lately, there has been a growing acknowledgement that postgraduate supervision should continually be examined in teaching and learning terms. In an endeavour to reconceptualise and reframe postgraduate supervision, a qualitative approach was adopted. anchored within the constructivist paradigm as its overarching theoretical framework. Perceptions of 10 supervisors from one university in Lesotho were analysed. Specific attention was paid to the supervisors' definitions and practices to assess the extent to which they reflected their understanding of postgraduate research supervision as a teaching and learning practice. The findings revealed that while the selected supervisors perceived postgraduate supervision as a teaching practice, they continued to be frustrated and overwhelmed by the institutionalised vagueness that permeates this practice.

Keywords: research, postgraduate supervision, constructivism, reflective practice, teaching and learning

INTRODUCTION AND PROBLEM STATEMENT

Traditionally, definitions ascribed to postgraduate supervision of master's and doctoral students depicted the supervisor as a study leader, a foreperson, an overseer and a coach. Postgraduate supervision has also been defined as an engagement of a supervisor in assisting postgraduate students in identifying a line of inquiry, delineating the scope of the project within the line of inquiry, and providing guidance to lead to the successful completion of the project and the dissemination of results (Lategan, 2014). In addition, postgraduate supervision has been construed as the development of new scholars in a specific profession (Van Rensburg, Meyers & Roets, 2016). Furthermore, this concept has been typified as a relationship between an expert in a specific discipline and a student or a group of students, whom he or she guides towards completion of research work that meets specific academic and disciplinary requirements (Wood & Louw, 2018). From these definitions, it can be noted that reference to postgraduate research supervision as a teaching and learning activity is rather hidden.

Lately, many countries are confronted with a rapidly changing higher education context that is characterised by increased demands for the accelerated completion of postgraduate students (Kimani, 2014; Masuku, 2021; Noel, Wambua & Ssentamu, 2021). This demand threatens the quality control of postgraduate research in the sense that the focus on supervision is often about assisting students to complete their studies in the minimum time. Limited attention is paid to embracing postgraduate supervision as an opportunity to nurture deep learning in the emerging professionals (Wood & Louw, 2018). Universities in Lesotho are no exception to this state of affairs. As postulated by Motshoane and Mckenna (2021), many do not see postgraduate supervision in a teaching and learning light. Hence it can be noted that when research supervision is separated from the broader teaching and learning project, it has an adverse impact on the supervisory practice, and is likely to constrain intellectual development (Ngulube, 2021). Thus, a hidden teaching and learning characteristic of postgraduate supervision continually creates a wide rift between research and teaching.

According to Wilkinson (2011), the lack of a clear conceptualisation of postgraduate supervision may be one of the reasons why at most institutions there is often a vacuum when it comes to recognition of postgraduate research supervision as a teaching tool. This therefore necessitates the continual examination of the discourse on postgraduate supervision in teaching and learning terms (Nkoane, 2014). This view is backed by Maistry (2017), as well as Motshoane and McKenna (2021), who observe that a growing scholarship of postgraduate supervision calls for its reconceptualisation, shifting from the traditional apprenticeship model towards a constructivist teaching and learning model. The traditional apprenticeship model depicted a supervisee as a passive recipient of knowledge who lacked independent agency, whereas the constructivist model portrays the supervisory practice as a collaborative and an intellectually stimulating experience for the supervisees (Ali, Ullah & Sanauddin, 2019; Masuku 2021; Ngulube, 2021).

Postgraduate research supervision involves learning how to become a researcher, as well as learning about aspects of teaching and learning that transfer into practices; hence the need to redefine it as a teaching and learning site (Boughey, Van den Heuvel & Wels, 2017; Ngulube, 2021; Noel et al., 2021). We have observed, however, that in the Faculty of Education at one university in Lesotho where this research was conducted, the supervisory practice is not clearly defined in teaching and learning terms. Furthermore, the workload policy does not clearly quantify supervision in terms of credit hours that recognise the amount of teaching that goes into this practice. In the absence of clear postgraduate supervision and workload policies (Masuku, 2021), the frequency of supervisory meetings and activities remains the discretion of a supervisor. This leaves supervisory responsibility to a vague interpretation, which may be taken casually, thereby compromising quality. Furthermore, postgraduate supervision may end up in unforeseen overloading and frustration of the supervisors. Therefore, this study emanated from the recognition that there is a need to understand postgraduate research supervision as a teaching and learning site, since this has implications for practice (Ngulube, 2021).

RESEARCH AIM AND OBJECTIVES

This study sought to analyse the supervisors' perceptions and practices in respect of the extent to which they reflect postgraduate research supervision as a teaching and learning practice. Based on this aim, the study was guided by two objectives, namely:

- to explore the perceptions of postgraduate research supervisors on supervision as a form of teaching

- to establish how supervisors' practices reflect their understanding of postgraduate research supervision in teaching and learning terms.

THEORETICAL FRAMEWORK

This study is framed within the constructivist paradigm as the overarching theoretical perspective. The central principle of this theoretical perspective is that students play an active role in constructing their own perceptions and meaning about their experiences and practices (Bada, 2015). This theory debunks the assumption that knowledge is an autonomous phenomenon that exists without the knower. Rather, it recognises that knowledge construction is a product of reflection about, and synthesis of, the prevalent circumstance and practices. As such, constructivism grants the students ownership of what they learn (Bada, 2015; Jaiwal, 2019).

Within the context of postgraduate research supervision, constructivism perceives a student as a responsible partner in the creation of new knowledge, while the supervisor's role is to support, facilitate and become the co-explorer of this new knowledge (Sebele & Jacobs, 2018). One of the fundamental characteristics of constructivism is the process of scaffolding, whereby a teacher supports a student to achieve the intended learning outcomes (Bada, 2015). The supervisor has to create an environment that nurtures the attainment of meaningful learning for the supervisee, by deliberately exposing them to the activities that support the learning process. Against this background, constructivism is construed as a suitable theoretical framework for underpinning most educational practices because of its wide-ranging impact on teaching and learning (Bada, 2015). Although the discourse of teaching and learning is often associated with classroom practices, the contention in this study is that such a discourse is also relevant for postgraduate research supervision. Thus, it is argued that as part of higher education, postgraduate research supervision also requires student-centred approaches and more collaborative learning environments (Ali et al., 2019; Masuku, 2021).

LITERATURE REVIEW

The literature for this study has been reviewed in two areas, namely postgraduate supervision as a teaching and learning practice, and the role of reflective practice in postgraduate research supervision.

Postgraduate supervision as a teaching and learning practice

In line with the constructivist approach, teaching and learning involve the active collaboration of both a teacher and a student, producing knowledge together (Zeegers & Barron, 2012; Masuku, 2021). Just like any teaching and learning situation, the supervisory practice can be described in terms of the following key components: the supervisor signifies the educator; the supervisee is synonymous with the student; the research project denotes the subject matter; and the supervision guidelines and institutional procedures set a critical context that can nurture or thwart effective teaching and learning.

Postgraduate supervision involves developing a scholarly identity, based on an awareness of, and sensitivity to, the ontological dimension of doing research, alertness to the student's conceptual capacities, learning styles and modes of intellectual processing (Motshoane & Mckenna, 2021). A major feature of postgraduate supervision is the creation of an interactive learning space where the seasoned supervisors and postgraduate students are engaged in an ongoing mutual and dynamic learning process (Nkoane, 2014; Ngulube, 2021). Accordingly, in the higher education space, postgraduate supervision is a collective activity that embodies knowledge sharing.

As Wilkinson (2011) rightly observes, postgraduate supervision is an extremely complex and challenging teaching-learning process, which is often misunderstood and underrated. Motshoane and Mckenna (2021) concur that this involves a distinctive kind of teaching which is both problematic and challenging. As a site for teaching and learning, postgraduate supervision has to be guided by key principles, which include general teaching skills, a deep knowledge of a specific discipline, and deep reflectivity (Masuku,

2021). Another key element of supervisory practice is communication and, more specifically, feedback on submitted research work. Strategies for giving constructive feedback include pitching the criticism at the student's level of understanding and keeping it specific; grounding feedback in evidence from the written work; linking to strategies for improvement; and using appropriate language in a collaborative rather than a lecturing style (Van Rensburg et al., 2016; Masuku, 2021). In essence, effective supervisors need to be grounded the in key tenets espoused by excellent teaching.

The role of reflective practice

Frick, Bitzer & Albertyn (2014) point out that research supervision undeniably involves a greater degree of explicit teaching than supervisors and higher education institutions usually acknowledge. As such, supervisors need to engage in extensive reflection on current practices and approaches so that they may deepen this form of teaching and learning (Frick et al., 2014). This view is underscored by Koukpaki and Adams (2020), who highlight that reflective practice is well-embedded in teaching and learning contexts.

The notion of reflective practice in postgraduate supervision is used specifically to improve practice (Masuku, 2021). Accordingly, reflective practice allows practitioners to think about their craft and to assess how they fare against the best practices in the field. Engaging in reflective practice necessitates dialogue and residual learning through which a practitioner continues to reflect in a conversation with the self and with others (Koukpaki & Adams, 2020). Reflective practice increases confidence and willingness to the practitioners to become lifelong learners (Wood & Louw; 2018; Petrucka, 2019; Masuku, 2021). As such, the need for an ongoing reflective practice of supervisors cannot be over-emphasised.

METHODOLOGY

This study is guided by the constructivist paradigm and a qualitative research approach was adopted. A descriptive research design was followed to explore the supervisors' perceptions and practices regarding postgraduate supervision. The supervisors' perceptions were analysed for the extent to which they demonstrated their understanding of the nature of postgraduate research supervision as a teaching and learning site. This approach is underscored by Merriam (2014), who holds that descriptive designs seek to understand the meaning or definitions that the participants have constructed. By virtue of being invited to take part in this research project, the participants were compelled to think reflectively and redefine postgraduate supervision accordingly (Cohen, Manion & Morrison, 2011).

The study utilised an open-ended qualitative questionnaire, followed by semi-structured interviews to collect data. The intention was to ensure crystallization of the data collection methods and enhance the credibility of the findings. An open-ended questionnaire allowed the collection of rich detailed data (Cohen et al., 2011) about postgraduate supervision teaching and learning activities. The follow-up, semi-structured interviews were also advantageous, as they allowed probing and enhanced the depth of responses. Data were analysed thematically, and inductive codes were utilised (Merriam, 2014).

PARTICIPANTS' SELECTION

The participants were purposively selected (Merriam, 2014). The intention was to engage supervisors who were considered knowledgeable about the tenets of effective teaching and learning. Such tenets include the characteristics of good educators, student characteristics, subject matter, teaching strategies, assessment and constructive feedback, learning outcomes, and effective learning. The participants also ought to have a minimum experience of five years in supervising postgraduate research. Ultimately, 10 supervisors from the Faculty of Education at one university in Lesotho were selected based on this criterion. By virtue of their professional training, which is entailed in teacher education, supervisors in the Faculty of Education were considered to be experts in teaching and learning matters. Hence it was anticipated that

they would have the ability to translate the tenets of effective teaching and learning into their supervisory practices.

ETHICAL AND TRUSTWORTHY MEASURES

Confidentiality and anonymity were ensured throughout the study so that the dignity of the participants could not be compromised. The participants' identities were disguised by allocating each a pseudo-code. As such, the participants were labelled Supervisor-one (S-1) to Supervisor-ten (S-10), respectively (Cohen et al., 2011). Attention was also paid to trustworthiness issues by documenting the research decisions and processes of data collection and analysis to enable an audit trail of our reasoning and conclusions (Roulston & Shelton, 2015). All audio records and transcriptions were safely locked away with the intention to destroy them after five years. Data transcripts were shared with the participants in order for them to verify the raw data and to correct factual errors. This was meant to ensure respondents' validation or member checking as described by Birt et al. (2016). Furthermore, we were mindful to control our own bias that could result from our own involvement in postgraduate research supervision. Hence, we strived to be as objective as possible in the decisions and conclusions made (Roulston & Shelton, 2015). Sufficient direct quotes were included from the data with a view to accentuating the participants' voices, and enhance authenticity of the findings.

THE FINDINGS

As indicated, data were analysed thematically and inductive codes were utilised (Merriam, 2014). Due to the overlapping themes, this section integrates the findings from both the qualitative questionnaire and the semi-structured interviews. The findings were categorised into the following five themes: (1) the supervisors' role; (2) acknowledging postgraduate supervision as a form of teaching; (3) strategies for effective supervision; (4) the basis for adopting a particular supervision strategy; and (5) indicators for effective supervision.

Theme 1: The supervisors' role

The participants were requested to define postgraduate research supervision. The objective was to assess the extent to which they viewed the supervisory practice as a teaching and learning activity. Their views revealed the versatile role played by a supervisor. They described a supervisor as a guide, a source of support, a resource person, a critical reader, and most importantly as a teacher. Upon further analysis of this theme, the following sub-themes emerged:

Sub-theme 1: Guidance

The participants pointed out that they perceive postgraduate supervision to involve guidance and ensuring that the students uphold certain standards stipulated in the field. This is what one participant had to say:

> Postgraduate supervision involves guiding postgraduate students through questions and relevant tasks. It also involves planning, execution of the plan and write up. (S-1)

From the foregoing quote, the participant acknowledges that their role in postgraduate supervision as to guide the students in planning and writing up their research, as well as probing the students with relevant tasks and questions to enhance clarity on research issues. Another participant concurred,

> It entails guiding and ensuring that they do their research work with high standards as stipulated in the field. (S-6)

From the above responses, it can be noted that the participants viewed the supervisor's role at master's and doctoral levels as mainly to provide guidance to ensure that certain standards of research work are attained.

Sub-theme 2: Support

The participants also depicted a supervisor as a source of support for the supervisee. One participant stated,

> As a supervisor you find yourself having to provide psycho-social and emotional support for the supervisees. (S-3)

From what the participant said, it can be noted that the supervisor's role is not simply to provide academic support to the students. Rather, the role extends to caring for their psychosocial welfare as well. This was confirmed by another participant, who said,

> I regularly check on my students to see how they are doing socially, mentally and emotionally. I even share coping mechanisms which worked for me when I was a student. (S-6)

The above response illuminates the supervisory role as nurturing the supervisees' psychosocial wellbeing as well. This finding illustrates that supervisors have to be compassionate in supporting and scaffolding students learning.

Sub-theme 3: Providing resources

Resourcefulness is another characteristic associated with postgraduate research supervision. Here is what one participant divulged,

> When I come across a paper that is relevant to what they are doing, I give it to them. I also suggest materials for reading where necessary. (S-2)

The above response is an example of how resourceful and selfless a supervisor ought to be when it comes to sharing materials that might benefit the supervisee. In support of this position another supervisor added,

> I also share external examiners' comments with my students so that they know what to expect. This helps them to improve their reading and writing style. At times, I share with them my own work and other related material (S-9).

From the foregoing responses, it emerges that a supervisor not only provides expertise and academic support, but they also have to go out of their way to provide material resources too. The above sub-themes reveal that the participants have comprehensive perceptions of how versatile the supervisory role ought to be (Petrucka, 2019).

Theme 2: Acknowledging postgraduate supervision as a form of teaching

The findings also revealed that postgraduate supervision is fundamentally and unavoidably a form of teaching. Further analysis of this theme yielded two sub-themes, namely customised teaching and the teaching load.

Sub-theme 1: Customised teaching

The participants depicted postgraduate supervision as a customised form of teaching as seen in the following response:

> Postgraduate supervision is teaching that is individualised and customised to each individual students and it is based more on the constructivism or authentic learning. (S-1)

In the foregoing quote, postgraduate supervision is portrayed as a form of teaching that is usually custom-made to the students' needs. Furthermore, the participants explicitly align postgraduate supervision with constructivist or authentic learning (Bada, 2015; Ali et al., 2019). This serves as an acknowledgement that postgraduate supervision is indeed a form of teaching. Another participant reiterated,

> Postgraduate supervision is a form of teaching because in most cases a supervisor has to teach supervisees how to approach certain things and what it is that is expected of them in each chapter. Hence it is unavoidably teaching and re-teaching fundamentals of research. (S-10)

The above quote confirms that this supervisor is aware of the teaching responsibility that comes with postgraduate research supervision. The participants were unanimous that whether or not the students went through research methods course(s), the supervisor unavoidably continues to teach and re-teach the art of conducting research.

Sub-theme 2: The teaching load

The participants also highlighted the issue of workload involved in postgraduate research supervision. Below are participants' own words,

> Postgraduate supervision is a lot of work. Perhaps supervisors should be exempted from undergraduate teaching, depending on their supervision load. (S-6)

From the above response, the teaching load that comes with postgraduate supervision is emphasised. The participant even expressed how they wished to be exempted from undergraduate teaching so that they can manage the heavy supervision load. Another participant echoed,

> Postgraduate comes with a huge teaching load. The load is actually killing me. Having to read the literature three to four times before the student gets it right is just too much. There are times when I am tempted to change career or retire early. (S-10)

While the literature has indicated that research supervision undeniably involves a greater degree of explicit teaching than supervisors and higher education institutions usually acknowledge (Frick et al., 2014; Masuku, 2021), it turns out that the selected supervisors contrarily acknowledged that postgraduate research supervision is a form of teaching. However, they also alluded to the heavy workload that comes with this form of teaching. Thus, it has emerged that there are participants who are not only overwhelmed by this role, but they consider the heavy supervisory workload as one of their reasons they may want to leave the academia.

Theme 3: Strategies for effective supervision

The participants were also asked to share the strategies they employ to ensure the effectiveness of postgraduate research supervision. This was meant to assess how their strategies align with their understanding of postgraduate research supervision as a teaching and learning practice. The following sub-themes emerged:

Sub-theme 1: Providing leadership

Some supervisors indicated that they provide leadership to the students' research work as indicated below,

> I identify those who significantly require leadership from the supervisor, and I provide heavy guidance: from shaping focus of their studies, explaining how each stage of research should be conducted and working on their language, demonstrating how they should write and use language. (S-1)

From the above response, a participant alluded to leading the students and giving direction every step of the way, depending on their needs. Another participant gave a different perspective,

> I allow the student to explore and help them to achieve what they intended to find out. Those who demonstrate independence in carrying out their studies require little guidance. I allow them to initiate their own plans and we sit to discuss as to ensure that they are on the right direction. (S-9)

The above quote indicates that when a student shows proactiveness, they should be allowed to explore and take a lead in their study, thereby allowing the supervisor to lead from the back. From these responses, it can be noted that leading students from the back may be a suitable strategy to use specifically with those who exhibit independence. Regardless of whether the supervisor leads from the front or from the back, the bottom line is that they have to provide leadership for their supervisees (Masuku, 2021).

Sub-theme 2: Regular check-ups

The participants also mentioned that regular check-ups with the supervisees were crucial to ensure their success. This is what they said about this issue,

> Keeping contact with supervisees through regular check-up encourages them to hold on when they want to give up. (S-4)

This quotation confirms that keeping a regular contact with the supervisees is a necessity motivating students and ensuring effective supervision. Another participant concurred that,

> Regular communication and meetings keep the students motivated and help to clear any misconceptions. (S-8).

As indicated in the above quote, regular communication has a positive effect in keeping the students focused and motivated. The above findings indicate that the participants were aware of the need to maintain regular check-ups with their students.

Sub-theme 3: Regular constructive feedback

The participants highlighted the importance of giving feedback to their supervisees. Here is what the participants said,

> I engage in thorough reading and thoroughly marking the submitted work, I then provide relevant and constructive feedback that helps to structure that work. (S-2)

The foregoing response highlights the importance of relevant and constructive feedback in shaping the students' work. This is a clear indication of a supervisory practice that is aligned with constructivist tradition (Jaiwal, 2019). Another participant also emphasised the value of constructive feedback as follows,

> I ask my supervisees to submit their work and I provide feedback through track changes and comments. I am giving feedback that is highly provocative through which they discover for themselves what to improve. S-10)

As can be noted from the foregoing responses, assessment and constructive feedback are significant in enhancing effective learning in postgraduate research supervision.

Sub-theme 4: Probing

Probing was cited as one of the mechanisms used by the supervisors to ensure that supervisees attain depth in their research projects. One participant revealed,

I probe them by having a conversation with them which aims to promote higher order thinking by raising questions, at times by illustrating how to articulate arguments. (S-5)

From the foregoing quote it can be noted that probing the students helps them to think critically and deeply about their work so that they can improve. This view is aligned with the literature that recognises that knowledge construction is a product of reflection and synthesis about the prevalent circumstance and practices. As such, constructivism grants the students ownership of what they learn (Bada, 2015; Jaiwal, 2019; Ali et al., 2019). In support of a similar position, another participant stated,

I identify gaps, sweeping statements and loose arguments. Then I challenge my students to tighten their assertions and arguments. (S-9)

The above response also indicates how probing students can push them in the right direction, thereby improving their work. From the above sub-themes, effective supervision is associated with the provision of leadership, regular check-ups, constructive feedback and probing of the supervisees in order to assist them in attaining a deeper grasp of the issues at hand. These findings confirm what the literature said about providing leadership (Masuku, 2021) and grounding feedback in evidence from the written work linking to strategies for improvement (Van Rensburg et al., 2016).

Theme 4: The basis for adopting a particular supervision strategy

The participants were also requested to indicate what informed their supervisory strategies. This was meant to establish their understanding of the factors that shape their postgraduate research supervision as a teaching and learning practice. Further analysis revealed the following sub-themes:

Sub-theme 1: Aligning postgraduate supervision with constructivism

The participants revealed that their supervision practice is influenced by constructivism, which is a teaching and learning theory that underpins knowledge construction. In support of this position, one participant said,

Postgraduate supervision ought to be more of a constructivist practice if one of its purposes is to create creators of knowledge. (S-3)

Another participant reiterated,

Postgraduate supervision is a teaching and learning activity that has to be anchored in socio-cultural constructivist theory to ensure its effectiveness. (S-7)

The above findings confirm that effective teaching and learning require to be anchored within the constructivist tradition, as this theory advocates scaffolding and actively engaging students in knowledge production (Bada, 2015).

Sub-theme 2: Professional responsibility

The participants also indicated that they were mainly influenced by their professional responsibility to supervise their postgraduate research students the way they do. This is how the participants explained the matter,

My tacit objective is to produce an independent thinker who fully comprehends the key components of research, and who can master the subject matter in their respective field (S-2).

This quotation is a good example of a supervisory practice that is underpinned by constructivism (Masuku, 2021); thus, producing independent thinking is one of the key tenets of this theory. Another participant added,

I have a responsibility and am committed to promote my students' growth and ensuring quality throughput. S-6

The above response makes reference to students' growth. Such growth is likely to occur when students are supported and they are intellectually stimulated (Ali et al., 2019). These findings reveal that the participants are aware of what effective supervision entails, and they seek to strive to attain such effectiveness.

Theme 5: Indicators for effective supervision

Any effective teaching and learning practice needs to be defined in terms of indicators or learning outcomes. The participants outlined the following indicators, which demonstrate that effective learning has taken place.

Sub-theme 1: Reduced mistakes and increased confidence

The participants illustrated that they can tell by the decline in the number of mistakes made by the students that learning has taken place. The following are the responses from the participants:

I compare previous submissions with the latest one; I am able to see if the student is no longer repeating the same mistakes. (S-5)

The above quote highlights that effective supervision involves assessing the supervisee's growth by comparing their previous drafts with the current and observing that the number of their mistakes has decreased. Another participant concurred,

In due course, some students end up more conversant and confident. At times they become even more knowledgeable than the supervisor. Such students become more daring in their views and are able to back up their positions using academic reasoning. (S-9)

The above response is a typical indicator of effective learning. It is extremely gratifying for any teacher when their student demonstrates confidence and exceeds their expectations in terms of the accrued knowledge in their field of study.

Sub-theme 2: Students' ownership of the work

The participants also cited ownership of the work as another sign that a student has indeed learnt. Here is what one participant said,

When you guide a student, they need to get to a point where they are passionate and excited enough about their work to take the lead. (S-3)

As can be deduced from the above quote, when a student exhibits passion and excitement about their work, they start taking a lead. This is an indication that such a student has intellectually been stimulated (Ali et al., 2019). As expressed by another participant,

It is gratifying when the student begins to own up their research work. (S-8)

The above responses reveal how gratifying it is for supervisors when their efforts begin to pay off and are demonstrated in their students' competencies and ownership of their work. It needs to be highlighted that ownership of the work is one of the tenets espoused by constructivism (Bada, 2015; Jaiwal, 2019). Observing from the findings, the participants not only shared their understanding of postgraduate supervision as a teaching and learning practice; they also outlined the characteristics that back up their understanding. Thus, they highlighted strategies and mechanisms they employ to ensure effective learning (Masuku, 2021). They further revealed the type of learning outcomes they seek to achieve. Finally, they shared their gratifying moments which signal that deep learning has taken place.

DISCUSSION AND RECOMMENDATIONS

In an endeavour to re-frame postgraduate research supervision as a teaching and learning activity, the study was anchored within the constructivist paradigm, which is regarded as a comprehensive teaching and learning theory for anchoring educational practices (Ali et al., 2019). Empirical findings resonated with this position wherein constructivism was cited as a suitable theoretical perspective within which postgraduate research supervision should also be grounded. Some participants explicitly referred to constructivism in their own responses as follows,

Postgraduate supervision ought to be more of constructivist practices if one of its purposes is to create creators of knowledge. (S-3)

And

Postgraduate supervision is a teaching and learning activity that has to be anchored in socio-cultural constructivist theory to ensure its effectiveness. (S-7)

Constructivism also permeated themes that included students support, giving constructive feedback, developing critical thinkers and independent scholars, as well as the indicators of effective learning, which included students' exhibition of confidence and ownership of their work. Based on these findings, a contention made in this study is that in the process of re-framing postgraduate supervision as a teaching and learning practice, it is crucial to foreground constructivism as an underpinning theoretical perspective.

As indicated by the literature, a teaching and learning practice has distinctive tenets, which include: a meeting site for the educator and student(s); a subject matter; teaching strategies or methods; assessment and feedback; and learning outcomes (Wood & Louw, 2018; Motshoane & Mckenna, 2021). From the findings, it can be noted that postgraduate research supervision meets these criteria and more. Furthermore, the findings revealed teaching strategies and mechanisms which promote effective supervision and students' learning (Masuku, 2021). Against this background, support and relevant professional development for supervisors are recommended. These are crucial in terms of enhancing the quality of postgraduate supervision.

The teaching responsibility involved in postgraduate research supervision cannot be over-emphasised. The findings revealed that a supervisor also has a versatile role, which includes providing emotional support, providing material resources, providing guidance and leadership. As the literature stated, being decisive and interchanging between these roles undeniably requires of supervisors to be well-grounded in reflective practice and that they must continue to be lifelong learners (Petrucka, 2019). Based on this position it can be advocated that supervisors need to deepen their reflectivity and apply flexible leadership skills

depending on the nature of the individual student's needs (Masuku, 2021). This can only be achieved with the relevant professional development.

Assessment and constructive feedback are significant in any teaching and learning practice (Van Rensburg et al., 2016). Based on the findings of this study, it can be inferred that the participants acknowledge the importance of constructive feedback that is coupled with probing the supervisees to push them out of their comfort zones. In addition, any teaching and learning practice has to be outcome oriented (Wood & Louw, 2018). The findings endorse those outcomes such as decreased mistakes vis-a vis increased students' confidence being the principles of constructivism that are indicative that intellectual stimulation and deep learning have occurred (Masuku, 2021; Ngulube, 2021).

CONCLUDING REMARKS

This study emanated from the realisation of the vagueness in classifying postgraduate supervision as a teaching practice (Ngulube, 2021). Therefore, the aim was to analyse supervisors' perceptions and practices for the extent to which they reflect postgraduate research supervision as a teaching and learning practice. The intention was to contribute to the discourse of teaching and learning, as well as the scholarship of postgraduate research supervision. Thus, the tenets of the effective teaching and learning site were outlined and assessed for how they translate into effective postgraduate research supervision. These included the educator's role, motivation, subject matter, learning outcomes, effective teaching strategies, assessment, constructive feedback, indicators of effective learning. Against this backdrop, the study recommends that the university should cease under-rating postgraduate research supervision and give it due recognition as a teaching and learning activity (Maistry, 2017; Motshoane & McKenna, 2021). Hence, the pertinent policies should be revised and enacted accordingly. Furthermore, proper administration and logistical support should be provided just like with other teaching and learning activities. Moreover, appraisal mechanisms that appropriately credit supervisors must also be put in place.

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The intention-behaviour gap: Three case studies of the application of general pedagogical knowledge[1]

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ABSTRACT

Various studies have investigated the intention-behaviour gap in human behaviour, but research on this effect in the teaching and learning domain specifically are still sparse. This paper analyzes the enactment of intentions as it relates to the general pedagogical knowledge that teachers intend to apply in their classrooms. Based on a qualitative-reconstructive study within instrumental case studies, the study focused on the gap between teachers stated intended general pedagogical knowledge application and their intention-realization in the classroom. The findings indicated varying individual degrees of intention-behaviour gaps among the three cases, but no full intention-realization in any of the cases. Conversely, the findings also show that all the teachers realized some additional components of their general pedagogical knowledge which were not initially stated at the point of planning.

Keywords: intention-behaviour-gap, general pedagogical knowledge, teacher professionalism, cognitive pattern, teaching practice

INTRODUCTION

The gap between human intentions and human behaviour has been studied for many years (Fennis et al., 2011; Gollwitzer et al., 2009; Rhodes & de Bruijn, 2013; Sheeran & Webb, 2016; Sniehotta, Scholz & Schwarzer, 2005). Aligning with studies on motivation, self-efficacy, self-regulation and goal setting in Psychology, studies on the intention-behaviour gap in human beings can be found in nutrition studies on sustainable diets (Leonie, Angelika & Carola, 2018), environmental sustainability (Swaim et al., 2014), physical activity behaviours (Rhodes, Plotnikoff & Courneya, 2008), health sciences (Gucciardi, 2016), consumerism (Hassan, Shiu & Shaw, 2016) and in many more scientific fields. Consistently, across multiple studies, findings emerge that indicate significant gaps between intention and behaviour and the fact that changing intentions do not necessarily guarantee behaviour change (Fife-Schaw, Sheeran & Norman, 2007; Sheeran & Webb, 2016). In education, intention-behaviour gaps have been studied to assess student behaviour (Escobar Alvarez, Ángeles & Ciancio, 2021; Henderikx, Kreijns & Kalz, 2017; Mergelsberg et al., 2021; Olugbara et al., 2020). A Norwegian study by Almas and Krumsvik (2008) specifically

found, for example, that teaching practices remain the same when teachers do not feel comfortable with the proposed changes in technology-rich ICT classrooms. In terms of decreasing the intention-behaviour gap, we know that the quality of the respective intention and its likelihood of enactment is influenced by the nature of the focal goal, the basis of the intention, and also by the properties of intention (Sheeran & Webb, 2016). In teaching, this means that a range of variables need to be aligned in order to minimize the gap between what teachers intend to do and what actually transpires in classrooms around the world.

In comparison to other fields, studies on the intention-behaviour gap in teaching are sparse. General pedagogical knowledge (GPK) as a theoretical construct is the professional knowledge utilized by teachers for dealing with diverse pedagogical tasks and requirements in the classroom, e.g., knowledge about classroom management, teaching methods, classroom assessment, and student heterogeneity (Darling-Hammond, 2000; Voss, Kunter & Baumert, 2011). This study focuses on the intention-behavioural gap of teachers with regard to the implementation of their GPK. What are the stated intentions of teachers in terms of the application of GPK in their classroom, and how do those intentions relate to actual actions in their teaching? The significance of this particular form of knowledge attests to the positive effects of the quality of teaching on student performance (Guerriero, 2017). In its Sustainable Development Goal 4 (SDG4), the United Nations also calls for the development of pedagogical competencies specifically, so that the educational requirements to support SDG4 can be implemented (Leicht, Heiss & Byun, 2018). The current understanding of GPK is based on various studies such as COACTIV, TEDS-M or ITEl TKS (Guerriero, 2017; König & Blömeke, 2010; Voss et al., 2011) which conceptualize and assess GPK. In the context of competence orientation, Kunter et al., (2013) and Voss et al., (2015) drew up an expanded definition and formulated four different areas of GPK:

- Learning (motivation, emotional and psychology knowledge, heterogeneity, development psychology knowledge)
- The class as a complex social structure (management, communication, social conflicts)
- Methods for teaching and learning (evaluation and diagnostic)
- Design of learning environments (spatial, material, media design).

General pedagogical knowledge is thus a form of knowledge with multiple perspectives inherent to it (Voss et al., 2011; König et al., 2011). In the teaching profession it is important to not only have the knowledge, but also to be able to apply it in specific situations (Nolle, 2004). In order to apply the knowledge (e.g., pedagogical competencies), there needs to be a clear *intention* to apply it (Sheeran & Webb, 2016). Since everyday teaching makes the pedagogical action unpredictable, the actions of teachers can be described as complex and the relation between their intentions to apply GPK and the actual actions that take place, critical for successful teaching and learning (Helsper, 2004). Yet, there is still limited textured discussion in the international discourse on the ways in which teachers base their professional acting on explicit knowledge (that can be readily articulated) or implicit (knowledge that is difficult to express and is based on experiences) and declarative (knowing-that) or procedural knowledge (knowing-how) (König et al., 2021; Polanyi, 1985; Ryle, 1949; Nolle, 2004; Neuweg, 2004; Neuweg, 2022; Hackl, 2004; Van Dijk et al., 2020).

On occasion, this phenomenon is partially integrated in teacher education programmes, within the discussions of the theory-practice gap in teaching and learning (McGarr, O'Grady & Guilfoyle, 2017; Korthagen, 2007). This gap then refers to the discrepancy between teachers' knowledge and their actions (while teaching), with their focus primarily on the conversion of theoretical knowledge into practice (McGarr et al., 2017). Literature suggests various causes for the theory-practice gap. One reason may be insufficient knowledge about general school theories, as well as insufficient knowledge about the need

for the application of theory in practice (McGarr et al., 2017; Korthagen, 2010; Shaharabani & Yarden, 2019). In this context, Robinson (1998) argued that narrowing the theory/research practice gap is not just a matter of disseminating research more effectively and that there are further reasons for the gap.

Another cause may lie in the complexities of teaching (Hoban, 2005). Interactions in the classroom are influenced by many different factors like the students' responses, the curriculum, the institutional structures or the values of the teachers, and the requirement to react spontaneously in different teaching situations (Hoban, 2005; Schön, 1983). These variables can make it challenging to plan teaching and apply explicit theories.

The third cause of the gap relates to the personal learning process of the teachers and their cognitive strategies to apply theory in practice (Korthagen, 2010). It makes the specific gap between what a teacher intends to do and what they actually do explicit. It is not just about the gap what a teacher knows and what they practice, it is also about what a teacher decides to do on the basis of what they know (e.g., intention), and what then transpires in the classroom. The gap refers to the 'space' in the process that 'leads from intention to action' (Sniehotta, Scholz & Schwarzer, 2005: 144). Korthagen (2010) also argue that in order to deal with the gap, it is essential to provide both an elaborated view of the intended process of teacher learning and specific pedagogical approaches in teacher preparation programmes. It is also necessary to link theory and practice effectively during teacher preparation programmes and to support the acquisition of useful and sustainable theories. Other factors that make it difficult to deal with the theory-practice gap are the emotions, feelings and cognitive patterns of teachers (Korthagen, 2010). We know that 'intentions are more likely to be translated into action when respective behaviors are easier to perform' (Sheeran, Trafimow & Armitage, 2003: 393). This suggests that teacher preparation programmes should pay particular attention to scaffolding the levels of complexity of the pedagogical knowledge acquisition of its students.

More recent studies suggest that the intention-behaviour gap in the general population is large and that the original intentions of individuals get translated into action only about half of the time (Sheeran & Webb, 2016). In teaching, that would mean that a teacher only enacts original intentions and planned applications of pedagogical knowledge 50% of the time. The potential detrimental results for learning seem evident. We also know, fortunately, that the 'quality of the intention matters, and the nature of the focal goal, the basis of intention, and properties of intention each influence rates of intention realization' (Sheeran & Webb, 2016: 16). For teachers, intention realization therefore needs to tie in with clear goals and clear views on how to attain the goal.

In view of the rare number of studies that investigate the intention-behaviour gap in teachers' application of their GPK in the classroom, more research in this field seems necessary for the further development of teacher education and the improvement of classroom practice. Furthermore, the importance of high intention realization rates to ensure quality education also supports the need for deeper qualitative investigation.

THE CURRENT STUDY

The current study explored the levels of intention-realization in teachers' cognitive concepts of GPK and their actions in the classroom. The study adopted a qualitative reconstructive approach by using practice-oriented research. The research question was:

What are the levels of intention-realization between the planned conceptual patterns of GPK of teachers and their concrete actions in the classroom?

METHODOLOGY

Our study used a qualitative, reconstructive theory-building process to present everyday school practice and to reconstruct cognitive concepts of the GPK of Austrian teachers and their teaching actions. The reconstructive approach enables to explore the field of school and to generate new models of GPK (Lamnek, 2010). The approach involved 45-minute semi-structured interviews with 26 teachers, and ethnographic observations with nine teachers. In total, each teacher was observed for six days. The six days were divided into two segments of three consecutive days, with a pause of several months between the two segments, while the number of teachers was based on the principle of theoretical saturation (Lamnek, 2010; Strauss & Corbin, 1996). The data were collected from teachers from different types of schools in Austria, i.e., primary schools (n = 9), lower secondary schools (n = 9), upper secondary schools (n = 8). From these schools, teachers with different years of work experience (between one and 40 years of experience as teachers), as well as different gender groups and subject specializations (e.g., science, humanities and arts).

In the semi-structured interviews, teachers were asked about their understanding of GPK and how they explicitly deal with and apply GPK in the classroom. The data collected from the interviews were evaluated by using interpretative phenomenological analysis. The qualitative-reconstructive research method and the interpretative phenomenological analysis complement each other in that both seek hypothesis-generating procedures within the research process.

In order to examine the extent to which the teachers actually applied what they had intended in their practice, the themes that emerged from the interpretative phenomenological analysis of the interviews were utilized to generate the foundation for the next phase of the study. An individualized map was drawn to depict the conceptual understanding of each teacher of their GPK, after which the map was used to create a checklist of intentions that was used during the subsequent structured ethnographic observations.

The structured ethnographic observations in this study reconstructed the GPK of the teachers and also investigated the extent to which the teachers implemented the actions they articulated during the interviews. The interviews were thus used to reconstruct the intentions, assessments and descriptions of the teachers, and the observations expanded the investigation by allowing the recording of concrete pedagogical actions and the manifestation of intentions (Aeppli et al., 2016).

From the nine teachers who were observed, three case studies were selected through purposive sampling to represent teachers from each type of school – a primary school, a lower secondary school and an upper secondary school. The findings that are presented here as instrumental case studies show the initial individual intentions and cognitive patterns of GPK of the selected teachers and the level of subsequent intention realization for each teacher. The gaps between their intentions and behaviours are indicated in table format.

Ethics statement

All participants provided consent to participate in the study. All data pertaining to participants were anonymised and potential identifiers within texts removed.

THREE CASE STUDIES

The case studies are introduced with short descriptions of each of the three participants. The findings from each case study are then presented in tabular format. Based on the interview data, person-related, individualized presentations are made of the participants' intentions to apply their GPK so that it becomes evident in their teaching. From the observation data, these intentions are then mapped in tabular format to assess the level of intention-realization for each participant. Intention realization is indicated on three

levels: full, partial and none. In addition, some extracts from the interview data are quoted to complement these findings.

Case Study 1 – Primary school teacher

The first case study refers to Max, a male teacher teaching in primary school. He was 29 years old and had been teaching for five years. He completed his education at a teacher training college and was teaching all common subjects in a primary school. Max regularly attended advanced training courses and had completed Montessori training.

Max described pedagogical knowledge as multidimensional knowledge and characterized it as relating to five different areas: didactic knowledge; action knowledge; knowledge about the person; knowledge about learning; and knowledge about diversity. Max characterized his knowledge about himself as self-reflection and also stressed the need to show an active interest in children. Further cognitive categories for Max were knowledge about learning and knowledge about diversity. The characteristics mentioned and assigned to the category 'learning' were knowledge for motivation, social learning, dealing with mistakes, knowing the needs of the learners, dealing with learning difficulties and the promotion of independent learning. Max's knowledge about diversity was characterized by cooperation with external staff, the promotion of the strengths and weaknesses of individual pupils, and knowledge about potential. He presented a multidimensional understanding of pedagogical knowledge that referred mainly to didactic methods and modes of action that support learning and provide individual support.

Max named specific pedagogical actions that he intended to apply in class. He summarized them as 10 actions, as presented in Table 1. These intentions emanated from the interview. The table shows the extent to which the above-mentioned intentions (e.g., fields of action) were identified during the subsequent classroom observations. The level of intention realization was captured on three levels: Full, partial and none.

Table 1:
Intention realization of a teacher in a primary school

Teacher's intention and plans for acting in the classroom	Level of intention realization	Observed teacher behaviour
To take different learning levels into account.	*Full*	He allowed all students to choose tasks that are appropriate for their level.
To encourage individual work.	*Full*	He created space in which the students can learn individually.
To encourage students to work independently – if the students need support, they can get it from the teacher at any time.	*Full*	He created an atmosphere in which the students could work independently. If they had any questions, they could contact him at any time. He offered the students individual support.
To help the students feel comfortable and do well.	*Full*	Students liked to be in his class, they seemed to have fun, and they behaved respectfully.
To use different materials.	*Full*	He prepared a variety of learning materials for the same content, thus providing options for the students.
To make the students work and use their knowledge and skills.	*Full*	He documented the students' achievements, he selected goals and facilitated individual discussions.

Teacher's intention and plans for acting in the classroom	Level of intention realization	Observed teacher behaviour
To give the students individual time to learn (open time management).	*Full*	The students were allowed to organize their time for learning independently.
To provide a learning environment where an ethos of "nobody is perfect" reigns.	*Full*	Each student was accepted for who they are. He exemplified tolerance and an open attitude.
To help students learn from each other (e.g., older and younger students work together).	*Full*	Students of different ages were in the same class in this school. This enabled older students to help younger students and learn from each other.
To encourage independent work: If students have any questions, they have to ask their classmates first and then the teacher.	*None*	Students asked the teacher for support first. Students only asked each other for help when the teacher initiated the process and told them to do so.

Table 1 illustrates how nine of the pedagogical actions mentioned were explicitly observed in class over a six-day period. Only one area of GPK that was initially mentioned by Max could not be captured within the structured ethnographic observations. The only deviation that was observed related to the fact that students tended to call for help from him as a teacher first, rather than asking their peers. In this case study, the intention behaviour gap was small and there was a high level of congruence between the teacher's intentions, his cognitive patterns and planning, and his actions in the classroom. Max explicitly named his actions (i.e., intentions) and then realized almost all these intentions in the classroom.

In addition to the pedagogical forms of action that Max planned himself, additional pedagogical activities were also observed. The observations illustrate how other pedagogical forms of actions (other than those initially intended) were reconstructed in his classroom. In the interviews, Max named specific GPK about teaching concepts, education, cooperation, support/promotion, diversity, (pedagogical) interaction, classroom management and didactics. Even though it was not explicitly mentioned among his intentions, Max also applied further GPK in the areas of the person and didactics, such as knowledge about leadership, disorders, posture and emotions, dealing with challenges, and body language. Max showed a multidimensional understanding of pedagogical knowledge and a small intention-behaviour gap. The comparison demonstrated the comprehensiveness of his implicit knowledge, the high levels of his intention stability and high goal realization. It also showed the realization of pedagogical knowledge that did not even form part of his original intentions.

Case Study 2 – Lower secondary school teacher

The second case study refers to a teacher who was teaching in the lower secondary school. Paula was a 43-year-old female who had been teaching for 20 years. Her subjects were History and English. Paula completed her education at a teacher training college. She showed great interest in scientific literature and new knowledge in the field of learning and completed numerous further training courses on topics such as coping and relationships in the classroom.

Paula characterized GPK mainly in terms of social action between teachers and students:

Pedagogical knowledge, for me that is being able to lead a class. So I see myself as a social actor and my task and my position as a teacher is to act socially. I need knowledge and the ability to act in order to socially balance a class and to lead a class and to see that they develop into a good team among themselves. (Interview 9)

Paula's GPK was reconstructed graphically based on the interview. For Paula, teaching and learning knowledge was about social action. In this case study, learning knowledge primarily referred to knowledge about social actions or the development of a sense of community. Teaching involved the knowledge areas of social leadership, instruction for learning, social skills, the importance of one's own role as a teacher and related power dynamics. In addition to the specific areas of knowledge on the learning and teaching side, Paula named four general knowledge components that were fundamental to social action. These were the teaching of values and attitudes, the promotion of competence and intelligence, the creation of an atmosphere of well-being, and taking on responsibility.

> I try to teach democracy in class, to bring democracy into the classroom so that they have responsibility for their class and their learning. Also, for the class organization. And these are very often little things. I often send them shopping, then in order to learn well and to learn in a structured way we need materials, no matter whether it's paper or hole punches. And you always have to make sure that they are available. At some point, the children are ready to fetch and organize the things themselves. To give them jobs, no matter if he is the energy manager or the floor manager. So they basically organize their class themselves. (Interview 9)

According to Paula, knowledge was intricately linked to the GPK category of social action. She defined this as knowledge for communication and as basic knowledge. The knowledge about communication included knowledge structures about asymmetric, direct communication, as well as the planning of time resources for the realization of communication in class. Basic knowledge was based on knowledge from specialist literature and the competence to fall back on this.

According to Paula, specific basic knowledge referred to the knowledge of learning and formative performance assessment. She took the position that learning only took place through relationship, which can be achieved by adopting the attitude of a coach rather than a teacher.

Paula named specific actions that can be taken to show GPK in her teaching. She described six different forms, which are shown in Table 2. For the areas of pedagogical knowledge mentioned, the table shows the extent to which her intentions were realized in the classroom, as captured during the classroom observations.

Table 2:
Intention realization of a teacher in a lower secondary school

Teacher's intention and plans for acting in the classroom	Level of intention realization	Observed teacher behaviour
To act socially.	*Full*	During the observations, the teacher showed how she was acting socially in the class. Social interaction related to different areas: learning, group, individual person, awareness raising, imparting values and norms.
To lead a class and have an overview of the individual needs of the students.	*Full*	She led the class effectively. She knew how each child learns, what weaknesses and strengths they have, and applied individual attention and learning strategies.
To create a good atmosphere in which all students feel comfortable.	*None*	Various challenges like bullying, fights between students and the exclusion of some students were observed.

Teacher's intention and plans for acting in the classroom	Level of intention realization	Observed teacher behaviour
To be part of the group.	*Full*	She supported individual learning and moved confidently around in the room.
To help students reflect about their learning process.	*Partial*	The students seemed unable to reflect on their learning process.
To make students responsible for their own learning.	*Partial*	*Ev*en though the teacher gave the students much freedom in which they were independently responsible for their learning, observations indicate that some children did not manage to learn independently; but rather remained fixated on the teacher.

Paula named a total of six specific intentions. Three of the intentions that she stated in the interview could be observed as full intention-realizations in her classroom. Two more of the intentions became partially realized and visible during observation. One of the intentions she articulated could not be observed and identified. The results therefore illustrate varying degrees of intention-realization, with full intention-realization half of the time, partial intention-realization for approximately a third of the stated intentions and one stated intention not having been realized on any of the six days of observation. She described specific knowledge that she applied in class, which could not at all, or only partially be reconstructed by the observations.

Observations revealed a wealth of other GPK manifesting, even though it was not mentioned as original intentions for this participant too. Observations illustrate how Paula named specific GPK from the categories (pedagogical) interaction, classroom management and person. Further GPK could be reconstructed for all three criteria mentioned. Other areas of her GPK that Paula applied, but did not name, included knowledge about communication and didactics. The extent to which intentions and cognitive patterns corresponded to or deviated from her pedagogical actions in the classroom varied for this teacher. Person-related variations that were recorded during the examination include the following aspects:

This teacher had more GPK than she had verbalized whilst stating her intentions. Even though she clearly possessed a wide array of GPK and skills, they were not expressed comprehensively when she discussed her intentions. The fact that of the six actions she initially listed, two could be observed only partially and one category could not be observed at all, indicates that there might be a gap between her assumptions of knowledge applied and her actual actions in the classroom.

However, as with the teacher in Case Study 1, this teacher also extensively applied other GPK that she did not mention during her discussion of her explicit intentions. This illustrates prototypically that she possessed extensive implicit knowledge that was articulated in the classroom but not consciously acknowledged as teaching intentions.

Case Study 3 – Upper secondary school teacher

Case Study 3 involved a teacher who taught in an upper secondary (grammar) school. Anna was a 45-year-old female who had been teaching for 20 years. Her subjects were History and sports. She completed her education at a university, and in the course of her professional life she later completed numerous further education and training courses. Anna was very committed to teaching and actively participated in school life through school development projects.

Anna's understanding of GPK was divided into two types of knowledge – basic knowledge and experiential knowledge. Anna saw GPK as multidimensional understandings of teaching and learning and described basic knowledge and experience as the basis of pedagogical knowledge. These were standing in a clear relationship to each other:

> For me, pedagogical knowledge is divided into two parts. One is the knowledge about one thing. That is knowledge about expertise. A lot of individual knowledge about something, about pedagogical areas and pedagogical knowledge means for me the experience that flows into teaching. (Interview 13)

According to Anna, basic knowledge controlled, questioned and influenced experiential knowledge. She stated that basic knowledge referred to theoretical forms of pedagogical knowledge. For her, experiential knowledge was based on the GPK elements gained through experience.

On the basis of the forms of knowledge that she articulated, pedagogical fields of knowledge were developed on the learning and teaching side. The different areas related to knowledge about the role of a teacher, teaching and learning, as well as the knowledge areas of education, systems knowledge, relationships, diagnostics and support. It emphasized people-centeredness and focused mainly on needs and support measures.

> I think it's very important to like people. I have to or rather you have to see young people as somebody, yes these are people who are not ready, who are in development and who cannot be measured by what I should or should be able to do as an adult. They are in a development process. You have to tell yourself again and again that they cannot know that yet, but I help and support them. I try to accompany them with support measures. (Interview 13)

In addition to the focus on learning, Anna explicitly addressed the dependence on and the effect of the system and its influence on GPK:

> The whole organization 'school' what comes to us from the administration, the ministry, the political side. So, the factors are simply becoming increasingly noticeable. This all flows in, this has an effect on a teacher. You take them into the classroom in some way. If you look at it abstractly and keep a distance from it, it still has an effect on the profession and on educational knowledge. (Interview 13)

She argued that GPK depended not only on individual teachers, but rather acknowledged the influence of the structural conditions within which teaching takes place. She pertinently mentioned administration and educational policy processes.

During the interview, she also named specific actions that could be used to make GPK visible. Anna relied on eight different forms, which are shown in Table 3. For the forms of general pedagogical knowledge mentioned, the table shows the extent to which the characteristics could be noticed when Anna was observed in the classroom.

Table 3:
Intention realization of a teacher in an upper secondary school

Teacher's intention and plans for acting in the classroom	Level of intention realization	Observed teacher behaviour
To understand the individual students' learning processes.	*Full*	She often asked questions about what students thought or meant in order to understand them better.

Teacher's intention and plans for acting in the classroom	Level of intention realization	Observed teacher behaviour
To assess objectively and without pressure.	*Partial*	Objective assessment was confirmed. However, the teacher queried the performance of individual students verbally and in writing. As a result, students were er constant pressure.
To know the level of development and level of learning of the students.		
	Partial	She reviewed the work with the individual students to establish what content they have learned. However, the frontal teaching style that she adopted consistently did not always support individual learning and the development of all students.
To perceive each student as an individual.	*Partial*	She created space for individual questions and concerns in the classroom. However, personalized learning did not take place.
To use different teaching methods.	*Full*	She worked mainly with a textbook, but also used a variety of teaching methods (concentration exercises, group work, etc.).
To act spontaneously in the classroom.	*Full*	She reacted spontaneously to the opinions of students and was able to argue professionally.
To deal professionally with disruptions and address challenges directly.	*Full*	She consciously decided which disturbances to react to and which to ignore. She spoke directly, named a problem/challenge in front of the class and gave the students the chance to correct.
To place the focus on individuals. To address attitudes and needs openly in the class.	*Full*	She created personal limits and ensured that needs and dissatisfactions were addressed directly.

Five of the eight intentions that Anna described could be observed in her teaching, while three of them showed up partially. Even though these gaps illustrated differences between intentions, cognitive patterns and actions for this teacher, she realized more than half of her intentions. In addition, in the instances where her intentions were realized only partially, the gaps seemed to be very small.

As with the teachers in the first two case studies presented earlier, Anna was found to apply more GPK than she had explicitly stated. Anna initially named four areas of knowledge – (pedagogical) interaction, classroom management, person, didactics (e.g., intentions). The category Communication (language and body language) was not mentioned. In the category Didactics, the specific areas of knowledge about topics, learning interaction and learning psychology were not mentioned. In the category (Pedagogical) Interaction, multiple sub-constructs were not explicitly mentioned, but she did indicate cooperation to be a specific aspect of her GPK. For Anna, a significant number of GPK aspects manifested in her classroom practice, which she had not explicitly stated during her interview.

The intention-realization rate for this teacher shows that her intentions were realized more than half of the time. Only three of the eight explicitly mentioned intentions and actions could be observed only partially. Small deviations between her original intentions and the actions that followed later could be observed. As with the teachers in the other case studies, the reconstructions also illustrate the application of fields of

GPK that Anna had not explicitly named initially. Similar to the teachers in case studies 1 and 2, Anna exhibited extensive implicit knowledge.

DISCUSSION

The findings from this study show degrees of intention-behaviour gaps in all three teachers who participated in the study. However, the individual variation between intention and behaviour was quite high, with one teacher realizing almost all his original intentions in the class, another realizing most of her intentions, and a third teacher realizing just over half of her original intentions. Interestingly, during the classes observed, all the teachers also realized GPK that they had not explicitly stated as intentions during the interviews. This finding suggests that the implicit knowledge that teachers bring to the classroom, *and enact during teaching*, even though it is not explicitly planned, may be an important ingredient of supportive learning environments. Even though intention-behaviour gaps were noted, high degrees of adaptability on implicit knowledge utilization in all of the cases were also shown.

The aim of this article was to explore the intention-behaviour gap with regard to the GPK of teachers by conducting a qualitative-reconstructive study. Interviews and observations were used to allow a reconstruction of the cognitive patterns (their intentions) and subsequent pedagogical enacting of teachers (their actual behaviour). The classroom observations enabled insights into the teaching being enacted and provided differentiated insights into potential gaps between the intentions and behaviour of teachers (Helmke, 2009). Even though only three case studies have been presented in depth in this article, similar trends could be observed in all of the initial nine case studies. The teachers were familiar with the interviewer due to prolonged engagement and the nature of the study. However, for the interviews, the teachers had no access to the questions prior to the interview and could therefore not prepare for it. In addition, the ethnographic open approach of the observations presents an object-adequate impression of the school practice of each person studied, since it was conducted within a high-trust environment.

The first case study presented here indicated a high degree of agreement between Max the teacher's intention and his behaviour. An early study on this phenomenon (Ryle, 1949) identified the ability of some teachers to explicitly name the knowledge they will be using in practice. These teachers are able to state their knowledge fairly comprehensively, then apply this theoretical knowledge in practice. Very little difference then presents between their cognitive patterns (e.g., intentions) and pedagogical forms of action.

For other teachers, there are more differences between what they want to do, and what they then actually do in class (Fife-Schaw et al., 2007) as is evident in the second and third case studies presented here. These two teachers mentioned several domains of GPK which they intended to apply in practice, but not all of these areas of knowledge and intentions could eventually be observed in their teaching later. The findings also revealed that all of the participants in this study used *more* pedagogical knowledge in practice than they verbalized initially. There is, however, disagreement in the literature as to the extent to which implicit knowledge should be verbalized by teachers (Polanyi, 1985; Hackl, 2004). In this regard, the current study aligns with the views of Polanyi (1985) and Neuweg (2004/2022) in stating that implicit knowledge cannot be fully verbalized prior to teaching. Rather, such knowledge becomes visible through actions, underlying interactions and physical expressions during teaching (Mead, 1934; Waldenfels & Giuliani, 2000), and it is a critical aspect of supportive learning environments.

Why is this important? Should we even be paying attention to the fact that intention-behaviour gaps exist when teachers enact their GPK? Should the fact that teachers reflexively enact their GPK when it is needed in the class not be sufficient? This study posits that investment in seeking closer alliance between teacher intentions and teacher behaviour during teaching, may potentially improve quality education

(Shaharabani & Yarden, 2019). This argument is also entrenched in views on the professionalization of the teaching profession. Low levels of intention realization in other professions (engineering, medical sciences, law, etc.) are remedied with targeted interventions. In teaching, intention-behaviour gaps should at least be understood in all their complexity. Whilst the dynamic nature of teaching and learning will allow for some fluidity of intention realization, minimizing the intention-behaviour gap can be one way to support teachers and students to actualize successful education outcomes (Dittrich, 2020). Our study sought to provide a detailed and systematic explanation of the internal structures and different behaviour patterns of teachers (Brüsemeister, 2008), their pedagogical intentions and their broad behaviours. The teachers from primary, lower and upper secondary school in our study characterized their GPK by offering multiple perspectives at the individual level. The enactment of their intentions was unique to each teacher. The intention-behaviour gaps depicted here echo the difference between declarative and procedural knowledge (Ryle, 1949) and also between implicit and explicit knowledge (Polyani, 1985; Neuweg, 2022) as found in earlier studies, but they specifically highlight teachers' enactment (or lack of enactment) of their verbalized intentions. Explicit knowledge does not exist as an independent construct, but contains elements of implicit structures (Polanyi, 1985). This is seen in the GPK that was presented by teachers in this study, without having been stated as prior intentions. We know that explicit knowledge can be transformed into implicit knowledge (Neuweg, 2022) as part of the repertoire of teachers' professional knowledge, and thus for the professional actions of teachers (Polanyi, 1985). Our study showed the influence of individual cognitive patterns, self-efficacy, action control and the values of teachers, and what these contribute to a learning environment.

Since students often react to and resonate with a teacher's behaviour (Neuweg, 2022), it is important for goal-oriented and quality education that teachers seek to minimize the gap between their teaching intentions and behaviours. There is a critical need to minimize the theory-practice gap in teaching (Fife-Schaw et al, 2007; Sheeran & Webb, 2016). Some studies (Sniehotta et al., 2005) provide suggestions on how to deal with the intention-behaviour gap, for instance by focusing on action planning as well as improving perceived self-efficacy and action control in teachers. In this regard, cognitive concepts and mental health may play a crucial role in the continued professional development of teachers. Gucciardi (2016) pointed out that mental toughness can enable people to make the most out of good intentions. He also argued that enhancing an individual's perceptions of control over a specific behaviour can enhance the likelihood that they will form strong intentions to engage in the behaviour. He suggests that for people with low intentions, the experiential or affective aspects and instrumental outcomes of engaging in exercises should be emphasized.

According to Fife-Schaw, Sheeran and Norman (2007), changing intentions does not necessarily guarantee any behaviour change. Sheeran and Webb (2016) also add that intention stability is the best indicator of the likelihood that an intention will be realized. In teaching, this means that intention realization will be related directly to the way in which a teacher's teaching intentions remain stable over time – which may in turn contribute to the teacher's behaviour change and full intention realization. Papies (2017) mention two explicit interventions, which take the cognitive processes for behaviour change into account, and which can also be part of teacher education: cueing and training interventions. With *cueing interventions*, the teacher has to change the critical situation for changing cognitive patterns with the help of using positive, goal-related cues, changing social norms of students or teachers or the learning environment in school. With *training interventions*, the existing situated conceptualizations are modified, so that novel memory structures can get activated in a critical situation in order to guide behaviour. This can be utilized in conjunction high qualitative tasks and existing didactic concepts, support reflection and mindfulness-based training of students and teachers as well as have some intention implementation strategies such as 'If-then' plans for responding to varying classroom situations.

CONCLUSION

This study, which investigated intention-behaviour gaps in the GPK and skills of three in-service teachers, suggests that more prominence should be given to the remediation of intention-behaviour gaps of teachers. Awareness of such intention-behaviour gaps may potentially increase teacher efficacy and ultimately contribute to improved learning outcomes. Educator preparation programmes often place great emphasis on the knowledge and skills development of pre-service teachers (Voss et al., 2015). For reducing the gap, reflexive teachers, who have the capacity to reflect their knowledge as well their acting is required (Dittrich, 2020). The professional knowledge of teachers builds up and develops continuously over the course of a professional biography. For this, teachers have to be life-long learners (European Commission, 2013). It is not possible to make all implicit knowledge explicit, hence, a motivated, mental strong and collaborative teacher is the basis for reducing the intention-behaviour gap. As the findings from this study also revealed, all of the participants in this study used more pedagogical knowledge in practice than they verbalized initially, which suggest that implicit knowledge has an essential role for teachers enacting their GPK.

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Professional development for teachers of Grade 1 second language learners[1]

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ABSTRACT

There is a need for professional development (PD) among second language (L2) learners' teachers to bring L2 learners up to the same level as their home language (L1) peers globally and in South Africa. Speech-language therapists (SLTs) can provide PD for teachers on language and literacy development of L2 learners. Within the bioecological framework, a mixed method design was used to determine teachers' PD needs through a questionnaire and dyadic interviews. The bioecological framework illuminated the personal characteristics, context, and time factors that inform PD needs. The results indicate a positive impact on teachers and L2 learners when schools prioritise teacher support for L2 learners. Teachers want to be involved in the implementation of PD, but many would prefer support without a coaching element. The findings provide direction for PD programmes to assist teachers with L2 learners in their class.

Keywords: teacher needs, L2 learner, professional development, bioecological framework, speech-language therapist

INTRODUCTION

Preparing teachers to work effectively with second language learners (L2) is a pressing educational need (Feiman-Nemser, 2018) because L2 learners are increasing globally (Aunio et al., 2019). Acquiring the language of learning and teaching (LoLT) while trying to master academic content is demanding for many learners (Manten et al., 2020). However, acquisition of the LoLT is necessary for literacy attainment, which is integral to effective learning in all learning areas (Govender, 2018).

Speech-language therapists (SLTs) can assist teachers to facilitate progress in language and literacy, as these professionals are the specialists in communication and language development which forms the basis of literacy skills (Wium, Louw & Eloff, 2010). In the past SLTs would have only supported individual learners, but White Paper 6 on inclusive education (Department of Basic Education, 2010) requires a shift to supporting teachers through PD (Wium & Louw, 2015a).

The focus of this study was on teachers of Grade 1 L2 learners, since learners who do not develop age-appropriate literacy skills during the foundation phase are at high risk for school failure (Snow & Matthews, 2016). In Grade 4, South African L2 learners have poorer reading comprehension than their English L1 peers, despite having had access to English as LoLT throughout the foundation phase (McLeod Palane & Howie, 2019). These figures suggest that L2 learners require a different instructional approach to bring them up to the same language proficiency as their L1 peers (McLeod Palane & Howie, 2019). PD in South Africa should, therefore, equip Grade 1 teachers to teach L2 learners effectively. However, there is a gap in the literature regarding the PD needs, and the factors that influence the PD needs of Grade 1 teachers of L2 learners. It is also unclear what teachers prefer in terms of PD structure.

A mixed method interpretive research design within a phenomenological approach was used to determine the factors that influence Grade 1 teachers' need for PD focused on teaching L2 learners. The ideal structure for a PD programme, according to teachers, was also determined. The paper provides valuable information to schools, districts and outside agencies that provide PD to teachers on the factors that influence their need for PD. It also provides practical solutions on who to target in PD and how to implement PD programmes.

In this article a brief history of the South African educational context is followed by the theoretical framework in which the study was situated. A literature review on the relevant concepts is provided. Thereafter the methods are described, followed by the findings and conclusion.

BACKGROUND

The political and resultant educational history of South Africa is pertinent to the current classroom context. During Apartheid the South African Language in Education Policy (LiEP) stipulated that each ethnic group be taught in their own language as well as either English or Afrikaans (Graven, 2013). In effect, English and Afrikaans obtained a higher status than the other ethnic languages (Msila, 2011) due to low academic standards of African schools who received less government funding than schools for white learners (Graven, 2013).

After 1994, the South African government sought to give equal status to 11 indigenous languages (Mtsatse & Combrinck, 2018). The LiEP adopted in 1997 allows school governing bodies to determine the LoLT, but recommends the use of the L1 as LoLT until Grade 3 (Department of Education, 1997). Currently, African-language-speaking parents increasingly choose to send their children to schools whose L1 differs from the LoLT (Aunio et al., 2019), thus, teachers need training on how to teach L2 learners (Feiman-Nemser, 2018).

THEORETICAL FRAMEWORK

To ensure that teachers benefit optimally from PD, various influences that affect teachers should be considered. The current study was situated within the bioecological theory (Bronfenbrenner, 2005a) which asserts that human development occurs as a result of the interaction between the individual and his/her context (Rosa & Tudge, 2013). The concepts of 'person characteristics', 'context', and 'time' are particularly useful because teachers' perceived need for PD can be influenced by these. Person characteristics, context, and time influence proximal processes that enhance competency and diminish dysfunction (Bronfenbrenner & Morris, 2006).

For the purpose of this study, person characteristics refer to age, gender, training, skills, and PD needs. Person characteristics influence and are influenced by the context in which the individual is situated. The context consists of four systems. The microsystem, in the case of a teacher, refers to the teacher's immediate

context, like the classroom and the specific school where she/he works. The mesosystem comprises the interrelations between two or more microsystems. The exosystem refers to settings where the teacher is not an active participant, but in which events occur that affects the teacher, such as the L2 learners' home environments, training institutions, and the Department of Basic Education (DBE). Finally, the macrosystem refers to the shared belief system in which the teacher finds herself/himself.

The increased number of L2 learners in South African classrooms is, from the teachers' perspective, a result of beliefs within society. English is often chosen as LoLT because the shared belief in the macrosystem is that English will give their children social capital (Aunio et al., 2019). Moreover, these parents are aware that learners in English-medium schools generally perform better than learners who have been taught in an African language throughout the foundation phase (McLeod Palane & Howie, 2019).

The choice of English as LoLT is, however, not the only option. In some cases, African-language speaking learners go to Afrikaans-medium schools (Condy & Blease, 2014). In the Western Cape, Afrikaans is considered important for commerce, especially in smaller towns (Carstens, 2017). In some cases, Afrikaans-medium schools are perceived to provide better quality education and function better than other schools in a given area (Brink, 2016). Challenges arise from the increasing number of learners whose L1 differs from the LoLT. These challenges play themselves out within the teachers' microsystem – the classroom.

A significant challenge in the classroom is that L2 learners often only have basic communication skills in the LoLT (Manten et al., 2020). They struggle to acquire the language of the classroom (Mweli, 2018), which is disadvantageous since language skills acquisition is a strong predictor of literacy skills (Snow & Matthews, 2016). White Paper 6 on inclusive education stipulates that it is the responsibility of the individual teacher to ensure that the LoLT does not become a barrier to learning for L2 learners (Department of Basic Education, 2010). The changes in the classroom context over time, as described in the previous section, necessitates PD for Grade 1 teachers to assist L2 learners with language and literacy through inclusive education.

LITERATURE REVIEW

Bioecological framework

The bioecological framework was originally developed to explain human development, specifically referring to children and adolescents (Rosa and Tudge, 2013). The framework is often used to examine educational practices for learners with particular developmental needs, like visual and hearing impairments (McLinden et al., 2017). Internationally it has been used to understand the influences on L2 learners' development (Ramírez, López & Ferron, 2019; Murtagh & Seoighe, 2022). In South Africa the bioecological theory has also been used to describe the needs of L2 learners in the foundation phase (Kotzé, Van der Westhuizen & Barnard, 2017). Using this framework, the situation regarding inclusive education has been found to be dire on the micro-, meso- and macrosystems, because the education system is not changing fast enough (Smit, Preston & Hay, 2020).

To effect change, Kern (2022) argues that it is important to focus on adults when using the bioecological framework in examining educational practices, since teachers are responsible for implementing inclusive practices. Placing the teacher at the centre of the bioecological framework, factors that influence South African teachers' implementation of inclusive practices have been researched (Engelbrecht et al., 2015). South African teachers' lack of involvement in PD has also been researched, using this framework (Geldenhuys & Oosthuizen, 2015).

Second language learning and teaching

The bioecological framework has shown that teachers' training, experience and cultural comptency affect L2 learners' developmental outcomes (Ramírez et al., 2019). L2 learners fare better in skills that are not language specific, like phonological awareness and decoding skills (Paradis & Kirova, 2014). However, L2 learners often experience difficulties in language and reading (Melby-Lervåg & Lervåg, 2014). Teachers therefore need to ensure that they teach L2 learners effectively.

Various factors influence the effectiveness of L2 teaching and learning. L2 teaching is more effective when teachers provide sufficient exposure time to the LoLT inside and outside the classroom (Dubiner, 2019). Learners learn better when they are expected to provide output in the L2 too, therefore ample opportunities for interaction should be created (Dubiner, 2019). Extralinguistic factors like learner and parent attitude towards the LoLT also affect L2 learning (Dubiner, 2019). To ensure effective L2 teaching and learning, teachers therefore require PD on this subject.

Teachers' PD needs

Learning opportunities focusing on L2 learning and teaching are scarce (Feiman-Nemser, 2018). Teachers in South Africa have indicated that they need more training to adequately teach L2 learners alongside L1 learners (Mfuthwana & Dreyer, 2018). Another South African study has found that foundation phase teachers are unfamiliar with the implementation of curriculum differentiation for diverse learners, yet differentiation is essential for successful inclusive education (Bester & Conway, 2021).

In a South African survey pre-service teachers and qualified teachers perceived their training to be insufficient to teach learners from culturally and linguistically diverse backgrounds (Jez & Luneta, 2018). After PD, these teachers still indicated a need for additional training sessions on inclusive practices, language, literacy, and assessment (Jez & Luneta, 2018). South African teachers feel they can offer support to learners on a one-to-one basis but have difficulty adapting the classroom environment for inclusive education (Nel et al., 2016).

Researchers call for PD programmes that provide teachers with knowledge and skills to support L2 learners, instead of focusing on identification and referral to other education contexts (Nel et al., 2016). In the USA, teaching effective strategies to support L2 learners in class has been successful in changing teachers' attitudes toward and expectations of L2 learners (Feiman-Nemser, 2018).

Effective teacher training

A relatively large number of studies have shown that PD programmes for teachers that focus on fostering academic language proficiency have a positive impact on classroom practices (Kalinowski, Gronostaj & Vock, 2019). The Luneta (2012) literature review in South Africa identified prerequisites to the effective implementation of PD programmes. Content should be based on teachers' professional needs, and teachers should participate in the design and implementation of the programmes (Luneta, 2012). Furthermore, such a programme needs to address existing school needs, have long-term engagement, and make use of high-quality instructors (Bayar, 2014).

Teachers in South Africa who had undergone training were reportedly unsure if the new strategies were feasible in their classrooms (Jez & Luneta, 2018). PD programmes for teachers are more effective when they include not only a training component, but also practical coaching (Kalinowski et al., 2019). Pairing coaching with group trainings is associated with improved teaching practices and improved achievement of L2 learners (Kraft, Blazar & Hogan, 2018).

Speech-language therapy

South African teachers need support from specialists (Nel et al., 2016). SLTs have expertise in language and literacy assessment, diagnosis and intervention, making them integral to the educational team (McLean, Snow & Serry, 2021). SLTs can provide support with specific reference to language issues (Lindner & Schwab, 2020), sentence structure and comprehension (Powell, 2018), acquisition of vocabulary and phonological awareness (Wium & Louw, 2013). Their specialised knowledge of linguistics and language development also positions them to support all learners learning to read (Powell, 2018). Supporting L2 learners in a culturally sensitive way to promote both the mastery of L2 and the retention of L1 is also specifically within the SLTs scope of practice (Wium & Louw, 2015b). SLTs and teachers need to work together to meet learners' academic and communication needs (Olszewski, Diamond & Bingham, 2018). For adequate support, SLTs need to engage in data collection and analyses to identify regional needs (Wium & Louw, 2015b). Teacher support through PD can be used to develop interventions and train teachers (Wium & Louw, 2015b; Powell, 2018). SLTs are encouraged to utilise collaborative research designs to enhance the acquisition of language, literacy and communication skills (Wium & Louw, 2015b). By training teachers on phonological awareness, morphology, vocabulary, and comprehension, SLTs provide support to all learners (Powell, 2018).

MOTIVATION FOR STUDY

It is evident that there is a pressing need for South African Grade 1 teachers to be trained with regard to effective approaches and strategies when working with the increasing number of L2 learners. South African teachers have a need for support from specialists (Nel et al., 2016) and inclusive practices with specific reference to language issues can therefore be enhanced through collaboration with SLTs (Lindner & Schwab, 2020). Meeting the needs of teachers is essential to ensure that L2 learners achieve their academic potential and have the same opportunities in life as their L1 peers. We therefore investigated how SLTs can meet the PD needs of Grade 1 teachers who teach L2 learners alongside L1 learners in the Western Cape.

The study is part of a broader project focusing on support provided by SLTs for teachers who teach Grade 1 L2 learners alongside L1 learners. The present article aims to determine the PD needs of Grade 1 teachers. The specific research questions (RQ) were as follows:

RQ 1: What person characteristics influence Grade 1 teachers' need for PD focused on teaching L2 learners?

RQ 2: What factors in Grade 1 teachers' context influence their need for PD focused on teaching L2 learners?

RQ 3: What do teachers consider to be the ideal structure for a PD programme?

METHOD

In this section, the methods used in the study are described. Ethical considerations are mentioned, followed by the design of the study, participant selection and participant description. Procedures and materials are described, and finally, data analysis, validity and reliability are discussed, with some notes on the limitations of the method.

Ethical considerations

All procedures were reviewed and approved by the Ethics Committee of the Faculty of Humanities at the University of Pretoria (HUM040/1019).

Design

A mixed method interpretive research design within a phenomenological approach was used. Within the phenomenological approach the researcher attempts to understand participants' interpretations, perspectives and impressions of a specific situation (Brink, Van der Walt & Rensburg, 2012). Various types of questions related to the aim of the study were used to answer the research questions (Bengtsson, 2016). The interpretive design allows for a deep understanding of the needs of the participants through thematic analysis (Lan, 2018). The phenomenological approach emphasises lived experiences of participants and is in line with the bioecological framework.

The study was conducted in two phases. During Phase 1, Grade 1 teachers completed a questionnaire regarding their PD needs and perceptions concerning L2 learners. Phase 2 consisted of two dyadic interviews. In dyadic interviews two participants interact in response to open-ended questions (Morgan et al., 2013). The dyadic interviews provided qualitative data, which allowed for a more in-depth understanding of teachers' PD needs.

Participant selection

For Phase 1 schools in the Western Cape that accommodate L2 learners alongside L1 learners were approached and Grade 1 teachers were invited to participate in the study. Participants were recruited through purposive sampling and had to meet a clear set of inclusion criteria: an appropriate foundation phase teaching degree (Bachelor of Education degree or Postgraduate Certificate in Education), South African Council of Educators (SACE) registration, and experience in teaching L2 learners alongside L1 learners. Eligibility was determined through the basic information section of the questionnaire. All participants from Phase 1 were invited to participate in Phase 2. Four participants agreed to be participants in Phase 2 and were thus also purposively sampled.

Participant description

Fifty-six participants met the inclusion criteria for Phase 1. Participants taught at schools with varying socio-economic status (SES) as indicated by the schools' Quintile rankings (a Quintile 1 ranking indicates a school serving a poor community, and a Quintile 5 ranking or independent school serves a predominantly wealthy community (Van Dyk & White, 2019)). All of the schools followed the Curriculum and Assessment Policy Statement (CAPS). All participants were female, as is fairly typical for Grade 1 teachers in South Africa (Bhana & Moosa, 2016). Participant demographics are displayed in Table 1.

Table 1:
Participant demographics

	N	Percent of cases (%)
Age		
20-29	12	21,4
30-39	25	44,6
40-49	3	5,4
50-59	12	21,4
60+	4	7,1

	N	Percent of cases (%)
Home Language		
Afrikaans	51	83,9
English	5	8,9
Same as LoLT	52	92,9
Fully bilingual (English and Afrikaans)	56	100
Teaching qualification		
University	44	78,6
College	12	21,4
Post level		
1	27	49,1
Head of department or grade	27	49,1
Principal	1	1,8
No option selected	1	1,8
Quintile		
1	13	25,5
2	12	23,5
3	7	13,7
4	7	13,7
5 or independent school	12	23,5

The participants taught Grade 1 learners for a mean period of 9,18 ($SD = 8,778$) years, ranging from one to 31 years. The mean number of learners in a class was 32,55 ($SD = 7,422$), ranging from 16 to 46 learners. The mean number of L2 learners for the current year was 4,84 ($SD = 5,047$) ranging from zero to 32 learners. The participant who did not have an L2 learner at the time of completing the questionnaire indicated previous experience in teaching L2 learners.

Two dyadic interviews were conducted during Phase 2. All four of the participants also participated in Phase 1. The dyadic interview participants represented knowledgeable and experienced teachers. Their profiles are displayed in Table 2.

Table 2:
Dyadic interviews: Participant profiles

Code	Age group	Highest qualification	Years' experience teaching Grade 1 learners	School type	LoLT
AA	30-39	Honours Degree	5	Quintile 3	Afrikaans
AB	20-29	Honours Degree	5	Quintile 1	Afrikaans

Code	Age group	Highest qualification	Years' experience teaching Grade 1 learners	School type	LoLT
EA	30-39	Postgraduate Certificate in Education	5	Independent school	English
EB	60+	Bachelor's Degree	30	Independent school	English

Materials

During Phase 1 of this study, a self-administered questionnaire based on the surveys used by Jez (2018), Nomlomo, Stofile and Sivasubramaniam (2018), and O'Connor and Geiger (2009), was used. This allowed the researcher to obtain quantitative and qualitative information about the research questions from a large sample of people who have experience in teaching Grade 1 L2 learners. Participants could complete the questionnaire in Afrikaans or English.

A pilot study was conducted to trial the Afrikaans questionnaire and to improve the validity and reliability of the instrument. Redundant questions were deleted, and confusing questions were reworded. The final questionnaire was translated to English and shortened so that it could be completed in 20 minutes. The final questionnaire consisted of the following sections: background information, the needs of L2 learners, the needs of teachers, content of a teacher training programme and the structure of a teacher training programme. The questionnaire had closed-ended questions, five-level scaled response, checklists, and open-ended questions. Open-ended questions were included at the end of each section and at the end of the questionnaire to allow participants to qualify and clarify responses. Participants indicated on the questionnaire whether they were willing to participate in Phase 2.

During Phase 2 these pre-determined questions guided the dyadic interviews: (1) What are the strengths and weaknesses of the L2 learners in your class? (2) What type of support do the struggling L2 learners receive? (3) Why do you think many teachers do not feel equipped to teach L2 learners? (4) What support do you receive to teach L2 learners? (5) Which aspects of language, literacy and reading do teachers have difficulty with? (6) What does the ideal teacher training look like? The dyadic interviews were audio-recorded with a smartphone.

Data collection

For Phase 1, links to the online questionnaires were mailed to participating schools, which were then forwarded to participants for completion, as guided by Jez (2018). In Phase 2, participants reacted in response to open-ended research questions in dyadic interviews. The interviews were conducted after school and lasted one hour each. Two participants attended the interview via video conferencing, and two at the school premises where they worked. A secure, end-to-end encrypted platform (Zoom) was used for the videoconference.

Data analysis

The Statistical Package for the Social Sciences (SPSS) version 27 was used to analyse the data from Phase 1. Descriptive statistics were employed to analyse the data obtained from the closed-ended questions and scaled items on the questionnaires. Spearman correlation was used to determine the degree of association between two ordinal variables or an ordinal and a continuous variable (Field, 2018). Point-biserial correlation was used when one variable was binary and the other either ordinal or continuous (Field, 2018). The Phi coefficient was used to determine the strength of association between two binary variables (Field, 2018). Statistical significance was set at p-value less than or equal to 0,05.

During Phase 2 the data were analysed employing theoretical thematic analysis (Braun & Clarke, 2006). The bioecological framework guided the thematic analysis. First the data were transcribed and read multiple times, then initial codes were developed. Themes were identified and then reviewed and adjusted until they adequately represented the data. Lastly, themes were grouped to fit into the bioecological framework.

Validity, reliability and trustworthiness

An exploratory factor analysis (EFA) using Promax Rotation and Principal Component Analysis extraction was conducted using the Likert-type items. It should be noted that, although the sample size of the current study was not extremely large, De Winter, Dodou and Wieringa (2009) have pointed out that EFA can be conducted with small sample sizes. Promax rotation was applied as it allows for correlations between the constructs which were evident in this case from the component correlation matrix. The Kaiser-Meyer-Olkin (KMO = 0.711) and Bartlett's test of sphericity ($p < 0.001$) showed the data to be suitable for dimension reduction (Hutcheson & Sofroniou, 1999). Items with communalities less than 0.4 (Eaton et al., 2019) and loadings less than 0.6 (Guadagnoli & Velicer, 1988) were dropped. Four constructs were extracted using the criteria of eigenvalues being greater than 1, and the Cronbach's alpha values for each of the constructs were computed with a Cronbach's alpha value greater than 0.7 being acceptable (Field, 2018). Construct 1 (Relevance of PD programmes), Construct 2 (Expertise and resources for teaching L2 learners), Construct 3 (Available support for teaching L2 learners) and Construct 4 (PD needs on teaching L2 learners) had Cronbach's alpha values of 0.860, 0.711, 0.784 and 0.866, respectively. Accordingly, reliability and internal consistency of the instrument was established. Construct validity is established when there is convergent and discriminant validity (Garson, 2013). In the questionnaire all items loading on the same construct load highly (establishing convergent validity) and correlations between items of different constructs do not correlate as strongly as correlations of items on the same construct (establishing discriminant validity).

Trustworthiness of the data obtained from the dyadic interviews was established by asking the interviewees to comment on the findings (Nieuwenhuis, 2019). All interviewees agreed that the findings are an accurate representation of the dyadic interviews. Triangulation of the results were obtained by using two different forms of data collection, namely the questionnaire and the dyadic interviews (Maree, 2019). Responses from the questionnaire were compared to that of the dyadic interviews to ensure that the results accurately reflect teachers' PD needs.

Limitations

Data were collected during the Covid-19 pandemic, which resulted in limited access to teachers. As such, the initially planned focus groups were changed to dyadic interviews.

FINDINGS

In this section the research findings from the two phases of the study are discussed. To support research findings from Phase 1, direct quotations from the transcriptions of Phase 2 are included. An alphabetical classification has been used to refer to each teacher to ensure anonymity (see Table 2). CA and CB represent the teachers from dyadic interview A. Their L2 learners were African-language speaking learners from Sub-Saharan Africa. Participants CC and CD took part in dyadic interview B. Their L2 learners were either Afrikaans-speaking or learners who speak an African language at home.

In dyadic interview B the Afrikaans learners and the African-language speaking learners were not perceived to have similar needs. The teachers did not experience the Afrikaans learners as facing a barrier to learning due to language. From here on, where reference is made to L2 learners in dyadic interview B, these references will be to African-language speaking learners, unless stated otherwise. This is

because the L2 learners from dyadic interview A and the African-language speaking learners from dyadic interview B seem to be homogenous in terms of academic needs. The results are discussed under these subheadings: Person characteristics that influence the need for PD, the influence of context on PD needs, and preferred PD programme structure.

Person characteristics that influence the need for PD

All participants were female, therefore differences in PD needs due to gender differences could not be determined. Participant age had an influence on how confident teachers felt in teaching, with older participants being more confident than younger participants ($p < 0,001$). However, participant age did not have a statistically significant effect on PD needs.

Participants' training and skills played an important role in PD needs. In Phase 1 adequate undergraduate training was associated with the perception that L2 learners are academically on par with the rest of the class by the end of the year ($p < 0,001$). Although inclusive education is part of all undergraduate education programmes, not all undergraduates feel that what they learn prepares them to work with diverse learners in practice (Walton, 2017). Inadequate undergraduate training in our study was associated with the feeling that the LoLT creates a barrier to learning for L2 learners ($p = 0,029$). If they perceived the LoLT to be a barrier to learning they also felt that they are not giving enough attention to their L2 learners ($p = 0,004$). These participants indicated a need for training on multilingualism ($p = 0,035$) to better equip them to help L2 learners.

Participants' experience is the second person characteristic to influence PD needs. In Phase 2 participants felt that newly graduated teachers who had only done the undergraduate course were not equipped to teach L2 learners. The participants felt that inexperienced teachers or those who did not specifically qualify themselves further would benefit from specific PD focusing on teaching L2 learners, as one AB stated:

> Just your B. Ed degree is not going to give you the knowledge to help children with learner support. (AB)

Participants who either felt adequately prepared by their undergraduate training or had attended subsequent PD courses that equipped them to work with L2 learners were more likely to feel that they could provide enough academic support for their L2 learners ($p = 0,040$ and $p = 0,005$ respectively). Through either experience or training the participants in Phase 1 had a range of skills at their disposal. Table 3 displays strategies that are used most often in the classroom.

Table 3:
Strategies used to teach L2 learners

Strategy	N	Percent of cases (%)
Repeat instructions	47	83,9
Repeat new vocabulary	43	76,8
Use other children as translators	40	71,4
Simplify or rephrase instructions or explanations	39	69,6
Decrease rate of speech	37	66,1
Stories, songs and rhymes	37	66,1

Strategy	N	Percent of cases (%)
Emphasise keywords	34	60,7
Additional visual material	34	60,7
Expand on learner's utterances	34	50
Involve parents to assist at home	23	41,1
Gestures	23	41,1
Dramatise	21	37,5
Translate to L1	17	30,4
Repeat the learner's utterance	16	28,6

The strategies used in the classroom were further elucidated in Phase 2 when participants explained how they simplify or rephrase instructions or explanations and repeat instructions and vocabulary. EA stated that:

> …we adjust our teaching all the time to include them… (EA)

EA elaborated further:

> So we talk about it all the time, every single word. What does this mean? Especially with my reading - with my reading I do every single word we read. (EA)

These types of strategies are effective for teaching L2 learners (Lyster, Saito & Sato, 2013). Participants EA and EB felt that the techniques and strategies they use come naturally with their level of experience. Personally, they were therefore uncertain about the importance of PD focusing on teaching L2 learners but saw the need for it in others, as can be seen in this dialogue between EA and EB:

> …we receive a lot of training, but I don't think we've ever received training, specifically for L2 learners… (EA)

> But I think at our level it's so elementary…you know what I mean? (EB)

> I think it comes easily to us, but there's lots of teachers that doesn't… (EA)

> I just think that comes with experience. (EB)

The findings show individual differences regarding PD needs. The majority of participants (61,8%; n = 34) from Phase 1 have attended courses or workshops that have equipped them to work with L2 learners. However, the participants in Phase 2 had not received training specifically on teaching L2 learners. AB explained that:

> …the training is mainly focused on the curriculum… But the teachers…haven't received much support on how you support children that struggle. (AB)

It is unclear whether the training referred to in Phase 1 was specifically on the topic of L2 learners, or whether participants simply felt that what they learned could be applied to L2 learners. Even EA and EB

who feel that PD focused on teaching L2 learners would be 'so elementary', felt ill-equipped to determine whether L2 learners experienced a language barrier or had additional difficulties. EA noted that:

> …it's hard to know. Is there not a concentration (problem)? Is there not another problem? Is it just the language? (EA)

Other common PD needs expressed during Phase 1 are set out in Table 4. The majority of participants in Phase 1 (83,3%; n = 45) felt that they could do more to improve their L2 learners' language skills. Many participants (81,5%; n = 44) indicated the need to learn more about the facilitation of language in the classroom and 86,3% (n = 48) wanted ideas on how to improve L2 learners' language and literacy.

Table 4:
Areas identified for training

Area	N	Percent of cases (%)
How to equip L2 learners' parents to help their children	38	67,9
Reading	36	64,3
Specific strategies for teaching L2 learners	34	60,7
Assessment of L2 learners	28	50,0
Vocabulary expansion	26	46,4
Spelling	25	44,6
Phonological awareness	21	37,5
What research says about teaching L2 learners	21	37,5
How to complete the curriculum effectively	21	37,5
Following instructions	21	37,5
Differentiated learning	19	33,9
Multilingualism	18	32,1
Vocabulary for Mathematics	18	32,1
Language and culture	17	30,4

A minority of participants (33,3%; n = 18) from our study felt entirely comfortable differentiating the curriculum for their learners, while very few did not feel comfortable at all (7,4%; n = 4). Participants are therefore mostly not unfamiliar with curriculum differentiation, but most feel that it is an area in which they could improve. Successful differentiation of the curriculum was associated with the perception that the L2 learners in their class were academically on par by the end of the year (p = 0,003).

Participants in Phase 2 felt strongly that if they were able to speak the L2 learners' home language, it would benefit the learners greatly and help with their own confidence in teaching L2 learners. Dixon et al., (2012) found that learning L2 learners' home languages can assist teachers to help learners more efficiently. However, in a multilingual country like South Africa very few teachers are able to speak all of the learners' home languages, as AA explained:

I have very limited isiXhosa vocabulary. I can literally say, "sit", "stand", "come to me"… but that is not going to equip me to help that child progress because I don't have that vocabulary. That is my biggest problem. (AA)

The influence of context on PD needs

The influence of context on the teachers' professional development refers to the microsystems, mesosystems, exosystems and macrosystems that have an impact on the teacher. Each system influences and is influenced by every other system.

PD needs: Microsystem and Mesosystem

The majority of participants (60%, n = 33) say that their school provides specific support to L2 learners and referral protocols are in place for struggling L2 learners (65,5%; n = 36). The more affluent the school, the more participants felt the school found practical ways to help teachers accommodate L2 learners (p = 0,039) and had adequate referral protocols in place (p = 0,041).

In Phase 1, teachers reported that workshops hosted by the school increased their confidence (p = 0,021). Increased workshop attendance was associated with less need for training in teaching phonological awareness (p = 0,002) and differentiated learning (p = 0,008), which agrees with the findings of Dixon et al. (2014). Schools that found practical ways to accommodate L2 learners had teachers who perceived their L2 learners to be on par with their L1 peers by the end of the year (p = 0,006).

Schools that provide specific support to L2 learners were more likely to have teachers who felt competent in teaching L2 learners (p = 0,005), who felt that they had sufficient resources to teach L2 learners (p = 0,020), were comfortable in differentiating the curriculum (p = 0,002), were satisfied with the number of training sessions they received from the Department of Basic Education and were in general confident teachers (p = 0,017). They were also the participants who felt that they were able to develop their L2 learners' skills to the appropriate level by the end of Grade 1 (p = 0,002). Gu and Day (2013) found that support within the workplace increases resilience of teachers, which impacts positively on their willingness to continue teaching to the best of their ability.

Rather surprisingly, the more school-based workshops participants had attended, the more likely they were to feel that they could do more to improve L2 learners' language skills (p = 0,006). Dixon et al. (2014) found that PD hours predicted teachers' confidence in their ability to promote learning. If workshops only consist of a two-hour presentation after school, teachers do not have the necessary knowledge to implement strategies in class (Dixon et al., 2014). Increased training time has been recommended for PD for South African teachers (Jez & Luneta, 2018). In the current study it is likely that most school-based workshops were short, theory-based workshops that did not include a coaching element, as advocated for in the literature (Kalinowski et al., 2019).

Our results show that if a school supports teachers with L2 learners, proximal processes are created that increase teacher competence and reduce dysfunction (Bronfenbrenner, 2005b). For most participants the microsystems aided them in teaching L2 learners. If the school environment was supportive participants were generally more positive about other microsystems, namely learners in their class. Positive attitudes to L2 learners have been shown to improve L2 learners' academic outcomes (Ramírez et al., 2019).

PD needs: Exosystem

Teacher perceptions in foundation phase classes in South Africa are that high learner-teacher ratios cause teacher negativity, discipline problems, didactical neglect and a greater need for PD (West & Meier, 2020). This was reflected in Phase 2, when EB stated that

> …in the small classes…we can actually help those children with language more so, whereas in a big group those that have the potential are actually lost… (EB)

In Phase 1, however, class size did not result in a greater need for PD. In fact, participants with fewer L2 learners in their class had a greater need for training on language and literacy (p = 0,032), assessment of L2 learners (p = 0,030), phonological awareness (p = 0,006), spelling (p = 0,019), following instructions (p = 0,004) and vocabulary expansion (p = 0,049).

These findings show the resilience of teachers and do not agree with the perceived didactical neglect found by West and Meier (2020). Our findings are similar to that of Gu and Day (2013) who found that adverse circumstances can increase teachers' resilience if they have a strong sense of vocation and a disposition suited to working with pupils from disadvantaged backgrounds. Schools with a lower socioeconomic status, which in South Africa is strongly linked to class size (Köhler, 2020), have a more pronounced effect on learner outcomes than class size as such (Köhler, 2020; Wills & Hofmeyer, 2018).

Interestingly, support from the district resulted in a greater need for training on assessment of L2 learners (p = 0,026), use of themes in the class (p = 0,013) and how to complete the curriculum effectively (p = 0,009). PD provided by the district therefore needs to address the specific needs of teachers if it is to be efficient. Our findings on the exosystem therefore indicate that teachers are resilient enough to provide support to L2 learners, even in schools were the exosystem enforces large class sizes. Their PD needs are rather influenced by the relevance of the support and training provided by the broader school structures.

PD needs: Macrosystem

PD needs influenced by the macrosystem are more implicit in nature, since these needs originate from shared beliefs and the broader culture. At the time of the study, no known previous studies have compared the beliefs of Afrikaans and English Grade 1 teachers, who represent different cultures. There were no statistically significant differences between teachers at Afrikaans and English schools with regard to their perceptions of themselves, support that they have received for teaching L2 learners, or the need for PD.

Beliefs and the culture surrounding inclusive education in South Africa influence teachers' PD needs. Teachers in South Africa tend to be quick to refer, instead of addressing diverse needs within the class (Bester & Conway, 2021). In Phase 1, teachers indicated that they felt more confident if referral protocols for struggling L2 learners were in place (p = 0,012). This was also reflected in dyadic interview B. Their perceptions were in line with an individual deficit model of difference, where expert assessment and treatment are needed. EA indicated the following:

> Their issues are so vast and it's often beyond the teacher's scope of practice. (EA)

EB agreed:

> (They need) more specialised help than we can give. We can give so much and not more. (EB)

Such opinions concur with opinions often held by South African teachers, notably when schools have therapy support available (Andrews, Walton & Osman, 2019), as was the case at EA and EB's school. In contrast, the schools where dyadic interview A's participants worked did not have the same support.

The teachers who participated in dyadic interview A took full responsibility for the L2 learners. This is contrary to most findings concerning inclusive education in South Africa, but agrees with Andrews et al. (2019), who found a positive correlation between low SES and inclusive practices. A potential reason for

Quintile 1 to 3 schools being more open to supporting L2 learners in class is that training provided on supporting L2 learners is perceived to benefit all the learners in the class, since L1 and L2 learners often experience the same challenges. As AA stated aptly:

> My learners who are L2 learners have exactly the same problems as my children who are L1 learners. (AA)

In contrast, dyadic interview B's participants perceived their L1 and L2 learners to be on vastly different levels, which makes implementing class-wide strategies challenging. EA explained:

> …for our (learners) some are at a high level, and some are at a low level. It really is worlds apart. (EA)

Inclusive thinking in affluent schools therefore needs to be evaluated and challenged to align to international views that inclusive practices should enhance the learning outcomes of all learners (Malinen et al., 2013). Our findings indicate that the macrosystem plays in important role in teachers' perceived PD needs. Their beliefs about L2 learners and whether they are responsible for assisting them influence how willing they are to participate in PD on teaching L2 learners.

PD programme structure

Participants in Phase 1 want to be actively involved in the implementation of PD. Most participants (81,1%; *n* = 43) would like to be able to discuss specific cases and get appropriate advice. On the whole, participants (81,5%; *n* = 44) want to brainstorm together to find solutions to language and literacy problems, and 73,6% (*n* = 39) want feedback on how their skills have improved.

Despite wanting feedback on how their skills improved, many participants do not want to be observed and receive feedback on how they teach (68%; n = 36). Participant AB cast some light on teachers' unwillingness for an in-class presence:

> I think many teachers get very anxious when someone comes to their class. (AB)

This perceived intrusiveness of a coach and the anxiety that goes with it has been described elsewhere (Shernoff et al., 2017). Coaching in South African Grade 1 classes has been found to have a large and statistically significant impact on Grade 1 reading proficiency, more than double the impact of teacher training alone (Cilliers et al., 2020). This yields important questions with regard to if and how coaching should be implemented. Shernoff et al. (2017) suggested that longer term support can result in a trusting relationship between the teacher and the coach, resulting in the desired outcome. PD programmes should therefore involve teachers in the implementation of PD and the presenters of the programme should make an effort to win the trust of the teachers.

CONCLUSION

Grade 1 teachers in the Western Cape have taken on the task of teaching L2 learners alongside L1 learners. Our results clearly show the benefit when schools prioritise support for teachers and L2 learners, by involving SLT's, for example. Teachers are more motivated within their microsystem and exosystem, with improved L2 learner outcomes, teacher confidence, resilience, and positivity towards the school and the Department of Basic Education. The positive interaction between the different microsystems and exosystems has a positive impact both on the teacher and the L2 learners' academic outcomes.

The implicit needs that this study has pointed out are within the macrosystem, namely shared beliefs about inclusive education. Some teachers felt that L2 learners' needs were beyond their scope of practice, which

is not in line with White Paper 6 on inclusive education (Department of Basic Education, 2010). Research shows that teachers' attitudes toward and expectations of L2 learners can change as they learn more effective strategies to support their learning (Feiman-Nemser, 2018).

To our knowledge, our study is the first in South Africa to ascertain what teachers are willing to do in a PD programme. Although they want to be active participants in the training, they prefer not to be observed while teaching, thus limiting the coaching element. Our study adds the important finding of teacher anxiety to the literature on PD in South Africa. Teacher motivation during PD programmes is important (Geldenhuys & Oosthuizen, 2015), therefore the coaching element of PD will have to be approached with compassion, nurturing and mentoring.

Implications for PD

This study has shown that person characteristics and context, as conceptualised in the bioecological framework, influences Grade 1 teachers' need for PD focused on teaching L2 learners. The person characteristics of age, training and experience increase teachers' confidence in teaching L2 learners. The participants in our study had a lot of skills and strategies at their disposal, however, they still had a great need for more PD on various areas related to L2 learners. Schools, districts, and the Department of Basic Education should therefore prioritise PD focusing on teaching L2 learners.

In the microsystem, schools that provide support to teachers who teach L2 learners have a positive impact on teachers' confidence and perceived L2 learner outcomes. Increased support in the microsystem can therefore reduce the need for PD. PD provided on district level, unfortunately does not seem to reduce the need for PD, which questions the effectiveness of these PD programmes. PD provided by the exosystem, or any outside agencies should therefore be provided in collaboration with teachers, ensuring that teachers' specific PD needs are met.

PD may also be more successful if teachers are supported in the implementation of new strategies. The PD structure should therefore be designed in collaboration with teachers, teachers should be involved in the implementation thereof, and PD presenters should have long-term engagement with the teachers to enable coaching. Table 5 provides strategic and practical solutions for the provision of PD for teachers:

Table 5:
Solutions for the provision of PD, within the bioecological framework

	Factors influencing PD needs	Practical implication for PD provision
Person characteristic	Teacher's age, skills experience and perceived PD needs.	Determine context-specific needs of teachers prior to PD planning.
Microsystem	Level of support provided by individual school.	Focus PD on teachers with less school support. Equip schools to be more supportive of their teachers.
Exosystem	Relevance of training provided by the school district.	Ensure relevance by involving teachers in the planning and implementation of PD.
Macrosystem	Inclusive education culture	Equip teachers to take responsibility for all learners in their class. Address attitudes toward inclusive education in PD.

This study has succeeded in giving a voice to Grade 1 teachers, from schools with various socioeconomic statuses, who have L2 learners in their class. The findings show that teacher education at the undergraduate

level as well as continuous PD should include training on how to teach L2 learners, regardless of LoLT. Teachers realise that they need to use L2 learners' home languages to support them academically. PD programmes should therefore train teachers on practical ways to use the learners' L1 despite the teacher not necessarily being proficient in the L1. In addition, the study has shown that the needs of Grade 1 teachers with L2 learners in their class are of such a nature that they can be met by SLTs. Providing PD on communication skills, language, literacy, reading, writing, phonological awareness, learner assessment and inclusive education are within SLTs' scope of practice (Wium & Louw, 2015).

Limitations and future research recommendations

A limitation to the study was the small sample size. We would have preferred to have more participants for Phase 2 of the study in order to obtain a wider range of qualitative input. However, the dyadic interviews were effective in acquiring in-depth responses from participants. Future studies could have more dyadic interviews with a wider range of participants, to be able to compare the views of different participants from the same type of schools.

The teacher and learner outcomes of PD designed and implemented via collaboration between SLTs and teachers could be a significant topic for future research. Furthermore, it should be ascertained whether a teacher PD programme focusing on the needs of L2 learners does, in fact, also benefit L1 learners, given that inclusive education should benefit all.

This paper used the bioecological framework to organise and conceptualise teachers' needs and perceptions regarding PD for teaching L2 learners. The bioecological framework has shed light on the person characteristics, context, and time factors that inform Grade 1 teachers' PD needs and was successful in revealing expressed and implied PD needs of teachers. The findings provide direction for planned PD programmes to assist teachers with L2 learners in their class and show that SLTs can meet the PD needs of teachers. Importantly, this is a first step in allowing teachers to have input in the content and design of a PD programme. Such a PD programme should enable teachers to continue to provide high-quality instruction in the midst of a changing classroom environment.

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A study investigating ways to entice teachers who have left the teaching profession to return[1]

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ABSTRACT

Early departure from the profession may result in a shortage of qualified teachers and may negatively affect learner performance. The loss of teachers from the profession before retirement age is a challenge faced by developed and developing countries across the world. This study seeks to determine the conditions under which teachers who had left the profession might consider returning. A qualitative study framed within the Self-Efficacy Theory, was conducted. The participants consisted of 14 qualified teachers who had left the teaching profession within their first ten years of teaching. The research instrument used constituted in-depth interviews conducted in-person and online. A thematic data analysis was conducted and the themes and categories that emerged from the data were interpreted. The results indicated that teachers who had left the profession would return if their concerns regarding provision of a supportive environment, adequate remuneration, manageable workload, a more desirable curriculum and sufficient resources, were addressed. Findings are that teachers who return to the profession should be phased in with regards to their workload and the number of administrative duties. The value of this study lies in answering a paucity in recent research and literature on prerequisite conditions for teachers to return to the profession.

Keywords: self-efficacy, teacher attrition, return to teaching, supportive environment, adequate remuneration

INTRODUCTION

The loss of teachers from the profession before retirement age, is a challenge faced, in varying degrees and due to various reasons, by developed and developing countries across the world (Ngala & Nyakwara, 2017). This is substantiated by Craig (2017) who refers to Canada, Sweden, Ireland, and Finland as well as Ngala and Nyakwara (2017) who reported on attrition in Kenya. The early departure of teachers from the profession may result in a shortage of qualified teachers (Carver-Thomas & Darling-Hammond, 2019), often negatively affecting learner performance (Nguyen et al., 2019) and may be detrimental to the performance of schools (Shibiti, 2019).

There seem to be differing opinions on the shortage of qualified teachers in South Africa. According to a statement released by the South African Department of Basic Education- '…there are more teachers in the country than the system can accommodate' (*SA News*, Apr 2021). The statement was released after Minister of Basic Education, Angie Motshekga, responded to a parliamentary question by presenting a table that indicated a teacher shortage of approximately 24 000, which has since been clarified as the number of teacher vacancies in the country. The statement also indicated that sufficient numbers of students graduate annually to fill the vacancies. More recently however, during a presentation to the South African Parliament, the National Treasury and the South African Teachers Union warned of possible teacher shortages due to natural attrition and unsatisfactory compensation (*Business Tech*, 2021). Simkins (2015:4) states that an important result from his study on the ability of South Africa to produce sufficient qualified teachers for learner needs, is

> that pumping more new qualified educators in at the bottom of the system will not in itself suffice to improve the average level of qualification among employed teachers. Every effort needs to be made to retain qualified teachers as well.

It thus would seem that though there may be sufficient graduates entering the profession, effort needs to be made to retain teachers in the profession.

Although ample research has been conducted in recent years on the causes of teacher attrition (Ngala & Nyakwara, 2017; Den Brok, Wubbels & Van Tartwijk; 2017, Ramos & Hughes, 2020), there seems to be less research on how to entice teachers who have left the profession, to return. Given the recent effect of COVID-19) on the South African education system, specifically the death of approximately 1650 teachers between March 2020 and February 2021 (Ndaba, B, 2021), an important consideration to make concerns how to entice qualified teachers who have left the profession to return.

This study seeks to determine the conditions under which teachers who had left the profession might consider returning. The study is conducted through the lens of the self-efficacy theory and seeks to answer the following research questions:

1. Under which conditions will teachers who have left the profession return?
2. Is there a relationship between self-efficacy and the requirements to return to the profession?

LITERATURE REVIEW

The study is positioned within a theoretical framework of Alfred Bandura's Self-Efficacy Theory. The theory surmises that individuals' perceptions of their self-efficacy have an effect on what activities they engage in, how much effort they exert, as well as how long they will persevere when facing obstacles (Bandura & Adams, 1977). The decision to engage or avoid a challenge or task could be influenced by the notion of one's self-efficacy (Paradewari, 2017). When conducting the research through this lens the focus shifts to whether qualified teachers who have left the profession have sufficient belief in their ability to succeed in the profession in order to re-engage with the profession (Odanga, Raburu & Aloka, 2018).

Teachers' self-efficacy beliefs stem from four sources of information, namely, performance accomplishments, vicarious experiences, social persuasion, and physiological states (Bandura & Adams, 1977). Performance accomplishments are based on teachers' perceptions of their mastery of experiences and the degree to which they were successful as well as the way in which they relate past experiences to their expectations of the future. During this study the participants evaluated their own past performance accomplishments and determined what is needed in order to increase the likelihood of producing mastery experiences if they

would return to the profession. Vicarious experiences, being witness to others' success within the profession, increase self-efficacy. In teaching, this is the observation of other teachers 'modelling successful teaching practices' (Bautista, 2011:333). In this study vicarious experiences, and their effect on self-efficacy, are viewed in terms of the participants' requirements that involve, for instance, training or mentoring in order to return to the teaching profession. Social persuasion, in the form of teachers being persuaded that they 'possess the capabilities to cope successfully' in the profession, is implemented in schools when superiors or fellow teachers provide positive feedback and encouragement (Bautista, 2011:334).

As in vicarious experiences, mentoring, for instance, may play a role in social persuasion. The final way to increase self-efficacy is through physiological states during which teachers are able to determine 'their level of anxiety and vulnerability to stress (Bandura & Adams, 1977:287). Positive feelings, such as enthusiasm and confidence, may strengthen self-efficacy, while negative ones like anxiety and fatigue lower self-efficacy because they provide the individual with physiological evidence that they are 'not ready to perform the task' (Van Rooij, Fokkens-Bruinsma & Goedhart, 2019:271). The requirements provided by the participants to return to the profession relate to their self-efficacy beliefs. It is, however, important to determine why teachers leave in the first place.

Teachers leave the profession for a number of reasons. Common causes for global teacher attrition mentioned in the literature are job dissatisfaction, remuneration concerns, organisational challenges, a lack of resources, burnout, issues related to classroom discipline and social interactions (Den Brok et al., 2017; Zach et al., 2020). More specifically, some teachers in African countries suffer from burnout due to poor job conditions coupled with high job demands (Fouche, Rothmann & Van der Vyfer, 2017) which may lead to attrition. Qualified teachers in South Africa leave the profession for a number of reasons such as lack of support, burnout, workload, salary concerns, and curriculum issues (Palm, 2020). Although there is ample research on the causes of teacher attrition, there is less research on how to entice teachers who have left the profession to return. The literature, however, does indicate a number of reasons why teachers remain in the profession (Chiong, Menzies & Parameshwaran, 2017; Ismail & Miller, 2020).

Research (Chiong et al., 2017; See & Morris, 2021; Kelly et al., 2019) indicates that there are a variety of reasons why teachers remain in the profession. Altruistic motivation specifically making a difference to pupils' lives, as well as professional mastery, were the most common reasons why teachers remained in the profession (Chiong et al., 2017). More specifically, teachers who were interviewed by Chiong et al. (2017; 1083) provided statements that were interpreted and related to the 'perceptions that they felt skilled and capable at teaching as indications of perceived professional mastery'. The presence of a supportive collegial environment and the presence of supportive leadership are also reasons why teachers remain in the teaching profession. When individuals are supported for their accomplishments and mastery experiences, their efficacy beliefs increase and may improve the desire to remain in the profession (Eginli, 2021). Idealistic factors, such as a love for children and the opportunity to instil values in them, as well as a love for the teaching profession, have been provided as reasons why teachers remain in the profession (Zach et al., 2020).

RESEARCH METHODOLOGY

This was a qualitative study, with a phenomenological design, in that the focus was on gaining an understanding from the participants' reflections about their own experiences (Jackson, Drummond & Camara, 2007). The study seeks to determine if teachers who have left, will return, and whether or not their perceived self-efficacy level has an effect on their decision to return to the profession. The study was conducted in urban schools in Gauteng and the Western Province in South Africa. These provinces were selected due to the researcher's access to information-rich participants in these areas.

The inclusion criteria for this study were that the participants were qualified graduate teachers and that they left the teaching profession within their first 10 years of teaching. Potential participants were excluded when they had plans to return to the teaching profession. The participants were selected from teachers who taught at urban schools in Gauteng and the Western Cape using purposeful and snowball sampling. The participants who were identified using purposeful sampling often provided access to other information-rich participants, during snowball sampling, whom they had previously worked with or knew during their teaching careers.

Purposeful sampling, commonly used to identify information-rich participants related to the phenomenon of interest, was used and a number of participants who met the inclusion criteria were selected (Patton, 2002; Palinkas et al., 2015; Luciani et al., 2019), some of whom provided access to more participants. In total, 14 participants were involved in the study. The participants were predominantly located using social media, specifically Facebook and Instagram, after which the researcher gained informed consent from the participants. They were provided with pseudonyms in order to protect their anonymity (Allen & Wiles, 2016). The University of South Africa's Research Committee provided ethical clearance for the research. Given that the studied phenomenon was investigated from the participants' perspective, the information was gathered through in-depth semi-structured interviews.

The semi-structured interviews allowed the 'participants the chance to explore issues they felt were important' (Longhurst, 2010:104) in that they were afforded and encouraged to provide in-depth responses of their own understanding of their experience with the phenomenon (Jackson et al., 2007). The use of semi-structured interviews allowed the researcher and participants greater flexibility to respond to the themes that emerged during the interview (Jackson et al., 2007). The interviews took place in-person or online using WhatsApp Video or Skype, depending on where the participants were located, and each interview lasted approximately 40 minutes. Follow-up interviews were conducted with select participants to broaden understanding and to provide clarity. The interviews were guided by a number of questions, eliciting responses, upon which the participants were probed to provide deeper responses. The questions focused on determining the conditions under which the participants might consider returning to the teaching profession.

Prior to the participant interviews, the researcher conducted a pilot study to gain feedback on the clarity of the questions and to determine if the information gathered during the interview fit the scope of the study (Codo, 2008). During the pilot interview, the researcher interviewed a prospective participant and asked and adapted the interview questions by rephrasing a few of the open-ended questions to better suit the purpose of the study. The information gathered during the pilot study was not included in the study findings.

The interviews were recorded as the stance held by the researcher was that 'the data is naturally occurring conversation and a feature of social life, and the use of tape-recordings and transcripts is a practical strategy for apprehending it, and making it available for extended analysis' (Tessier, 2012:447). The researcher manually transcribed the interviews from the recordings, which allowed immersion in the data and assisted in the thematic data analysis. During the transcription, themes emerged after which categories for the data were formed.

FINDINGS AND INTERPRETATION

As there was no significant difference between the findings in the two provinces, the findings from both provinces are discussed together. The categories that emerged during data analysis were school environment, remuneration, workload, curriculum issues and resources as being conditions that need to be addressed before participants would consider returning to the teaching profession. The requirement that was mentioned most often related to the school environment.

School environment

More than half of the participants stated that aspects relating to the school environment would be a condition influencing whether or not they would return to the teaching profession. The participants specified factors related to the school environment such as a positive morale, a supportive environment and agreement between management and staff on discipline.

A number of participants elaborated further by stating that they would require mentorship and/or training to return to the profession. Statements such as the following were made:

> I would need someone who would support me by identifying what I need and then providing assistance.

> A mentor or someone to bounce ideas off would be a requirement.

> A mentor, a backup, even only for emotional support, would be enticing.

Training, and the provision thereof, was mentioned by a few participants as a condition for their return. The participants provided the following motivation

> As I have been out of the profession for a number of years, I would need Curriculum Assessment Policy Statements (CAPS) training.

> As I struggled with classroom discipline when I taught, if a school offered to provide me with additional training, I would definitely consider it.

The statements provided by the participants may relate to self-efficacy in that having the said requirements met could have the potential to increase their levels of self-efficacy. The presence of a supportive school environment, whether in the form of the provision of a mentor or training, unity amongst staff or positive morale, could increase self-efficacy. This may be during the provision of vicarious experiences or social persuasion. Mentoring, in this instance, is considered as a relationship between an experienced and inexperienced teacher where the less experienced teacher, is guided by the more experienced teacher (Palm, 2020) and relates to the provision of vicarious experiences during the process of mentoring. Studies have indicated that the school environment, specifically the role of school leadership and relationships amongst staff, influence teachers' self-efficacy (Wilson, Woolfson & Durkin, 2020). Similarly, in a study conducted by Odanga et al. (2017), teacher self-efficacy was increased when teachers were exposed to a facilitative style of leadership that supported and encouraged teachers. Training was also provided as a tool to increase self-efficacy by 'increasing content mastery with new pedagogical skills'. The training could provide knowledge as well as improve their beliefs in their own abilities or improve their attitude towards their profession (Shahmohammadi, 2013:183), which has an effect on their physiological and emotional states and in turn enhancing their self-efficacy (Van Rooijens, Fokkens-Bruinsma & Goedhart, 2019).

The second most mentioned requirement for the participants to return to the profession was remuneration.

Remuneration

There was only one participant who provided remuneration as her only requirement for returning to the profession. The remaining participants, who said that higher remuneration was a requirement, did so in conjunction with other requirements in order for them to return to the profession.

One participant mentioned that

...well-paid maternity leave will make me consider returning to the profession

whilst the remainder of the participants who mentioned remuneration stated that they would require an increase in salary in order to return. Higher remuneration may increase teachers' self-efficacy (Hameed, Maqbool et al., 2013; Odanga et al., 2017) by increasing their level of motivation (Abror et al., 2020), which positively correlates with a greater self-efficacy.

Following remuneration was reduced workload as a matter that would need to be addressed in order for the participants to return to the profession.

Workload

Nearly half of the participants mentioned the workload, in the form of fewer administrative duties, smaller classes and reduced co-curricular activities, as a requirement for returning to the profession. The requirements all related to a decreased workload. Statements such as the following were made:

Having more time to get through marking would encourage me to return to the profession.

The number of Saturdays and evenings I will be required to work will influence whether or not I will return to the profession.

If the school gave me the content and the classroom and reduced the administrative duties, I will return to the profession.

If I am required to return to the profession as a teacher only and not a coach and advertiser, I will consider returning.

The prospect of returning to the teaching profession, with a decreased workload as a condition for their return, could inadvertently increase self-efficacy. It is possible that the likelihood of successful teaching or the possibility of mastery experiences increases with a decreased workload. Congruently, studies seem to suggest that there is a negative correlation between the level of self-efficacy and the magnitude of the workload (Van Rooij et al., 2019).

Curriculum

'Curriculum' was the fourth most frequently mentioned requirement to return to the profession. The participants, who stated that curriculum was a requirement to return to the profession, mentioned that they would return to a school with a curriculum other than the current national curriculum, or return to teaching in a school in a foreign country. One of the participants elaborated by stating that she would

return to a more innovative school where they challenge the traditional ways of thinking

whilst another participant stated that she would return to the profession if she could teach at a school where she did not feel as if she is

part of a system that is unjust to the vast majority of the country.

Teaching a curriculum that the participants support or believe in may increase their physiological and emotional states by increasing the likelihood of their own enthusiasm about what they are teaching. Positive emotions have been related to an increased self-efficacy (Van Rooij et al., 2019).

The final requirement mentioned by the participants was the provision of resources.

Resources

A few participants stated that they would need to be provided with adequate resources, in the form of physical resources and training, in order to return to the profession. One of the participants specifically mentioned that she would need 'proper facilities, equipment and resources' in order to return to the profession, whilst another stated that she would need sufficient textbooks in order to assist her in 'teaching in an engaging way' by reducing the time spent on making notes for her learners. The availability of physical resources may increase self-efficacy by promoting the likelihood of mastery experiences, thereby increasing self-efficacy.

Training, as a resource and as mentioned previously, may increase self-efficacy by increasing the likelihood of mastery experiences. Odanga et al. (2017) also found that the provision of resources enhanced teachers' self-efficacy.

CONCLUSION

Attracting and encouraging former teachers to return to the teaching profession is an admittedly complex challenge faced by the South African education system. Apparent from this study, however, is that the possibility exists to entice teachers who have left the profession to return.

Considering that the results of this study indicated a number of requirements that would need to be met for the participants to return to the teaching profession, the following recommendations were made. It is, firstly, recommended that the South African Department of Basic Education should further investigate the possibility of a mentorship programme during which teachers who return to the profession are mentored by a more experienced teacher. Secondly, it is recommended that teachers who return to the profession are phased in with regards to their workload and the number of administrative duties. Remuneration incentives in the form of signing bonuses should also be considered and further investigated to entice teachers back to the profession.

Finally, this study highlights the relationship between self-efficacy and the requirements that former teachers have in order to return to the teaching profession. It necessitates further research into the effect of self-efficacy on challenges faced by South African teachers, both in rural and urban settings

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