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Tutors' Experiences of Using a Data-Free Mobile Instant Messenger for Electronic Tutoring: A Case Study in Accounting and Information Systems Courses

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Research Paper

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ABSTRACT

In South Africa, data-intensive synchronous tutoring platforms like Zoom can be exclusionary due to limited internet access at home. Challenges in electronic tutoring include device scarcity, high data costs, network issues and low digital skills. To mitigate data costs, a data-free mobile instant messenger was tested for tutoring, guided by the technological pedagogical content knowledge framework (TPACK). The study included first-year accounting and third-year information systems courses at a historically disadvantaged institution. Qualitative data from tutors revealed that technology-related knowledge was crucial for effective electronic tutoring. Tutors with strong technology and content knowledge utilised the data-free application effectively and employed pedagogical expertise to offer flexible, after-hours support. These tutors demonstrated technological pedagogical and content knowledge by using features like voice notes and images to explain concepts, even without access to data. Students with Apple devices were excluded initially. The findings can inform the development of more inclusive electronic tutoring interventions in South Africa.

Keywords

Electronic tutoring, student inclusivity, context, data-free mobile instant messenger, technological pedagogical content knowledge framework (TPACK)

INTRODUCTION

> Soon the digital divide will not be between the haves and the have-nots. It will be between the know-hows and the non-know-hows.
> — Howard Rheingold

In recent years, the field of education has seen a profound transformation, with technological integration playing a crucial part in instructional techniques. Higher education has also changed recently from predominantly face-to-face classroom lectures and tutoring to blended learning. Blended learning

combines face-to-face learning and electronic learning (e-learning) by using technology and the internet (Nurdiani, Rustaman, Setiawan, & Priyandoko, 2019). Blended learning highlights the need for synchronous learning that allows students to engage with lecturers or tutors in real-time. Electronic tutoring (e-tutoring), combining the use of an electronic learning platform, such as Moodle, with a web conference service, has been shown to enhance university success (Barana, Fisssore, Marchisio, & Rabellino, 2018). E-tutoring has the potential to improve learning outcomes by giving students additional support and encouraging engagement with the course materials (Carlana & La Ferrara, 2021). This is especially true for accounting and information systems, where challenging ideas and practical skills frequently need individualised instruction and support. However, using synchronous options, such as web conferencing services for e-tutoring, can be exclusionary due to the high cost of data in South Africa compared to the rest of Africa (Competition Commission SA, 2019).

South Africa suffers from a prevalent digital divide as only a small percentage of people (10.1%) have access to the internet at home (Statistics South Africa, 2018). Although recent statistics indicate 43.48 million active internet users and 25.8 million active social media users, these statistics do not indicate where the internet is accessed from (Statista, 2023). The Digital 2023 report highlights the fact that 28% of South Africans still lack any access to the internet (Ashiru, 2023). Institutions' learning management systems (LMS) were zero-rated during #feesmustfall protests and COVID-19 (Trotter, Huang, & Czerniewicz, 2022). Zero-rating is where internet service providers and mobile network operators provide free access to certain websites or services. This means that users can access those websites or services without using their data allowance or incurring additional charges (Walubengo & Takavarasha Jr, 2017). Zero-rating has the potential to contribute to universal access and service in Africa by providing free or low-cost access to selected online content and services. This would help bridge the digital divide and provide greater access to information and communication technologies for underserved populations (Arakpogun, Wanjiru, & Whalley, 2019). However, a key challenge of using zero-rating to address the affordability of and access to ICT in developing countries is sustainability. Zero-rated services might not be sustainable in the long run if they rely on subsidies or other forms of support that are not available in the future (Walubengo & Takavarasha Jr, 2017). The alternative to zero-rating is data-free. In this article, 'data-free' refers to no data charges being incurred for sending text messages when a subscriber identity module card from a supported mobile network is used (Petersen, 2020).

While an institution's LMS may provide some interaction through asynchronous discussion forums, most do not allow for real-time engagement (Rambe & Bere, 2013). Given the need for more inclusive e-tutoring options that complement institutional LMSs, the use of a mobile instant messenger (MIM) was investigated. MIM can complement an LMS (Pimmer et al., 2019) because there are increasing numbers of MIM users in South Africa, such as those using WhatsApp (Seyama, 2019).

The use of MIM in education has been growing, especially during the COVID-19 pandemic (Muhammad & Annamalai, 2021). The widespread use of mobile technology and instant messaging applications is a major factor that has made e-tutoring increasingly possible in today's educational environment (Annese, Amenduni, Candido, McLay, & Ligorio, 2022). Students with access to mobile devices can access a practical platform for communication and cooperation (Nogubha & Mhlana, 2022). However, even when a MIM requires a reduced amount of data, it may still exclude students who cannot afford any data. MIMs that do not require any data at all are particularly important since they solve the problems of data affordability and accessibility, especially in areas where students have low socioeconomic status (Petersen, 2020). Such MIMs make it possible for tutors and students to communicate, exchange materials, and communicate synchronously without incurring high data charges

(Petersen & Arendse, 2022). Therefore, the use of a data-free MIM named Moya (https://moya.app/), was tested (Petersen, 2020). The benefits of using a MIM, such as WhatsApp, or a data-free MIM, such as the Moya application, for e-tutoring are compared in Table 1.

Table 1

Comparison Between a MIM Using Data and a Data-Free MIM for e-Tutoring

WhatsApp	Moya	Comparison
Communication regarding coursework and course requirements can be facilitated through the use of unlimited text and voice messages (Sayan, 2016).	Students, tutors and lecturers can send an unlimited number of text messages and voice notes, data-free, if they use the following mobile operators in South Africa: Telkom, MTN, Vodacom and Cell C (Petersen, 2020).	Both MIMs allow for communication via text and voice messages. However, students do not require data to use the Moya MIM whereas WhatsApp would require a positive data balance.
Course announcements can be published by tutors and lecturers for items such as assessment due dates (Gasaymeh, 2017).	The Moya application allows lecturers to create a read-only site. The group can be used exclusively for distributing important course-related information. The functionality is similar to an admin-only group on WhatsApp (Petersen, 2020).	Sending course announcements in an admin-only group is allowed in both MIMs. WhatsApp would require students to have data to receive these announcements, whereas Moya would not.
Tutors and lecturers can share materials such as photos, pictures and presentations via attachments (Izyani & Mohamed Amin, 2016).	Sending attachments in the Moya application is not data-free. Students would need to be notified of the size of an attachment before downloading it (Petersen, 2020).	Both MIMs require data for sending attachments.
Tutors and lecturers can post additional website links to topics and resources for students requiring further assistance (Gasaymeh, 2017).	Sending website links is data-free, but students will incur data costs when accessing those resources (Petersen, 2020).	The use of external resources will require data on both Moya and WhatsApp.
Students can discuss coursework with peers and tutors (Tang & Hew, 2017).	Sending text messengers for discussion with group members and peers is data-free (Petersen, 2020).	Sending texts via Moya is data-free while it requires data on WhatsApp.
Students can form study groups (Udenze & Oshionebo, 2020) and organise meetings with peers for assignments and projects required by lecturers (Gasaymeh, 2017).	The creation of groups by lecturers, tutors and students is data-free (Petersen, 2020).	Using group chats on Moya is data-free but not on WhatsApp.

Note. MIM = mobile instant messaging.

When implementing blended learning for university students, “integration efforts should be creatively designed or structured for particular subject matter ideas in specific classroom contexts” (Koehler, Mishra, & Cain, 2013). The need to consider the context of our students has been highlighted.

Current literature indicates the use of WhatsApp can enhance active participation during e-tutoring by students at a rural South African university (Motaung & Dube, 2020). However, Motaung and Dube's (2020) findings indicate several challenges for e-tutoring that may have led to low levels of engagement;

these include no access to suitable devices, network connectivity issues, and inadequate digital skills and competencies. Unfortunately, there is little literature on the use of a data-free MIM for e-tutoring. To help address this, the use of a particular data-free MIM within the fields of accounting and information systems is examined in this study. While easing the data restrictions, this MIM provides tutors and students with a suitable platform for interaction and information sharing, thereby facilitating learning. The research question for this study is: *What are tutors' experiences of using the data-free mobile instant messenger for electronic tutoring?*

By examining the experiences and perceptions of tutors using this MIM, we aim to gain valuable insights into its efficacy and potential contributions to educational outcomes.

RESEARCH MODEL

To assess the experience of tutors when using the data-free MIM, a suitable theoretical model to underpin the study was identified. The Technological Pedagogical Content Knowledge Framework (TPACK) is based on Shulman's concept of pedagogical content knowledge (Koehler et al., 2013; Mishra & Koehler, 2006). The TPACK framework focuses on the various sets of knowledge required for effective pedagogy in a technology-enhanced learning environment. In this research, the pedagogy addressed is e-tutoring. The research will describe tutor experiences when using the data-free MIM to tutor electronically and the observed student learning when using this technology.

Based on Jiménez Sierra, Ortega Iglesias, Cabero-Almenara, & Palacios-Rodríguez (2023), the application of the TPACK framework in developing countries can assist by providing:

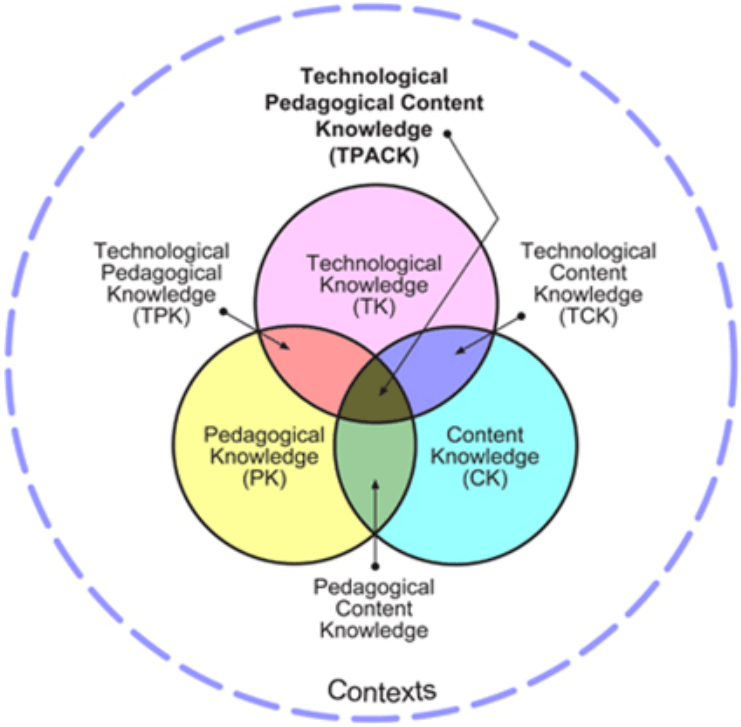
- Improved instruction and learning: Using the TPACK framework can assist lecturers in incorporating technology into their lesson plans to increase student engagement and interactivity.
- Access to high-quality education: By giving people in remote or underserved places technological access to high-quality educational materials via a data-free MIM, the TPACK framework can help assess if the education gap has been reduced.
- Professional development: TPACK-based professional development programmes can help lecturers in underdeveloped nations become more adept at using technology in the classroom.
- Resource optimisation: By maximising the use of scarce infrastructure and instructional resources, the TPACK framework can assist lecturers in understanding how to optimise resources.
- Customising instruction: The TPACK framework can be adjusted to regional circumstances, enabling culturally appropriate and situation-specific instructional content.

The framework has been used extensively in empirical studies as evidenced by 107 peer-reviewed journal articles (Willermark, 2018). Willermark (2018) suggests that using self-reporting and the TPACK framework identifies teacher activities. However, the "performance evaluations of teaching activities are rare" (Willermark, 2018:315). More recent systematic literature reviews indicate that most research using TPACK has been qualitative and conducted in America (Irwanto, 2021). TPACK has also been used to assess tutoring activities. A quantitative study in Pakistan, for example, determined that tutors need guidance in selecting an appropriate technology to use for tutoring (Ur Rahman, Hussain, Khalid, & Scholar, 2018). A study in Rwanda found that tutors have low levels of technological, pedagogical and content knowledge (Mporananayo & Ng'umbi, 2019). In addition, according to Ling Koh, Chai and Tay (2014), it is important to consider contextual factors, such as the availability of

technology, when implementing the TPACK framework. The TPACK framework is displayed in Figure 1, followed by construct descriptions.

Figure 1

TPACK Model



Note. Adapted from Mishra & Koehler, 2006.
TPACK = technological pedagogical content knowledge.

Contexts

It is commonly recognised that the COVID-19 epidemic affected the education sector negatively. As a result, many institutions adopted technology relatively quickly and some switched completely to distance learning to ensure academic continuity (van de Heyde & Siebrits, 2019). The use of e-learning in South Africa highlights key challenges, such as the development of e-learning content, the uptake and the use of the LMS, the need for technical support and training, infrastructure, and internet accessibility (Maphalala & Adigun, 2021). Other key obstacles to e-learning adoption in South African public schools within impoverished communities include a lack of interest by teachers, high internet access costs, a lack of devices, and perceived ineffectiveness (Antee, 2021). Based on the findings, it was suggested that the e-learning platforms of universities undergo regular upgrades and that staff have regular training related to newly introduced modifications. It was also suggested that academics receive timely technical help to maintain positive e-learning user experiences (Maphalala & Adigun, 2021).

As already noted, e-learning allows initial and continuous access to education even when in-person instruction is not possible (Chomunorwa & Mugobo, 2023). The use of educational technology, or

EdTech, is essential to teaching and learning in this context. While lecturers are encouraged to plan their learning activities before considering technology (Choi & Young, 2021), infrastructure needs to be in place. Therefore, the education departments in South Africa are busy implementing programmes to enable the use of technology in the classroom.

Despite the number of studies that have used the TPACK framework, it remains important to consider the context in which the technology will be implemented. In the South African context, the digital divide and significant inequalities need careful consideration (Statistics South Africa, 2019). There are disparities in the available resources at different South African higher education institutions due in part to the legacies of apartheid which have resulted in the persistent inequitable and inefficient allocation of resources in education (Department of Education, 1996). The #FeesMustFall movement highlighted these resource inequalities, while the COVID-19 pandemic once again emphasized the serious nature of the digital divide (Czerniewicz et al., 2020). Attempts to amend policies have not translated into improved access, equity or participation in higher education for the majority of previously disadvantaged black people in South Africa (Mzangwa, 2019).

The University of the Western Cape has a significant history of involvement in the struggle against apartheid and inequality (van de Heyde & Siebrits, 2019). It was historically a university for students of colour (University of the Western Cape, 2019) and the majority of current students are still from disadvantaged schooling and home backgrounds (University of the Western Cape, 2021). The university's primary goal is to assist the historically marginalised to participate fully in the South African knowledge economy by providing access to quality higher education (University of the Western Cape, 2019). For example, the university assisted students who did not have the resources necessary for learning online during COVID-19 by supplying data (Lawack, 2020). Through the Student Retention and Success Framework initiatives to improve tutoring, increased tutor training, tutor support and tutor evaluation have been implemented (University of the Western Cape, 2021). However, COVID-19 prevented these initiatives from being executed in the traditional face-to-face environment.

Technology Knowledge

Technology knowledge (TK) refers to the knowledge a lecturer or tutor has about technologies (Mishra & Koehler, 2006). For instance, does a lecturer or tutor use a pencil and book, or do they use the internet, hardware and software programmes? Do they have access to these technologies, and how well do they incorporate these technologies into lessons? With the rapid changes in available technologies, especially in education, it is imperative to update this knowledge regularly.

The University of the Western Cape aims to strengthen teaching and learning through the use of technology and digital platforms, such as their institutional LMS, iKamva (University of the Western Cape, 2021). Despite the increasing levels of TK among students, not all the historically marginalised students at the University of the Western Cape have adequate TK (Leonard, Mokwele, Siebrits, & Stoltenkamp, 2016). The university offers digital academic literacy training to all students (University of the Western Cape, 2021).

Using an LMS, lecturers can make content available for students online, and given the increasing number of MIM users in South Africa, the accessibility and usability of tools such as WhatsApp show promise. However, lecturers need to consider the accessibility, usability and perhaps even suitability of the technology options that they wish to implement. Literature indicates an interrelationship between accessibility and usability (Wood, 2015).

Content Knowledge

Content knowledge (CK) refers to the lecturers' knowledge of the subjects they are teaching (Koehler et al., 2013). Lecturers and tutors must know the concepts and theories they present in classrooms and tutorials, for example, accounting lecturers must be familiar with requirements from the South African Institute of Chartered Accountants (SAICA) as they are training future accountants. However, content knowledge in South Africa is a contentious issue, especially with calls to decolonise the curriculum (Gleason, 2018). Therefore, the University of the Western Cape aims to create "responsive, flexible and renewed curricula that will ensure students can engage confidently and authentically with local, continental and global contextual realities, and can navigate these spaces from a social justice and engagement perspective." (University of the Western Cape, 2021:30).

Pedagogical Knowledge

Pedagogical knowledge (PK) refers to "deep knowledge about the processes and practices or methods of teaching and learning" (Koehler et al., 2013:64). For instance, educators look at how students learn best, and should implement the best strategies to meet student learning and development needs. In simple terms, lecturers must understand how students acquire and retain knowledge (Mishra & Koehler, 2009). Lecturers must also prepare and guide tutors so that students learn the required course content.

According to the institutional operating plan of the University of the Western Cape, the goal is to cultivate graduates equipped with the expertise, capabilities and qualities essential for success in the professional realm, fostering a lifelong commitment to learning, and nurturing their social conscience, ethics and global care (University of the Western Cape, 2021). Lecturers need to deliver education, rooted in solid evidence and enriched by adaptable curricula and a wide array of teaching, learning and assessment methods.

Pedagogical Content Knowledge

Pedagogical content knowledge (PCK) concerns the "representation and formulation of concepts, pedagogical techniques, knowledge of what makes concepts difficult or easy to learn, knowledge of students' prior knowledge, and theories of epistemology" (Mishra & Koehler 2006). It requires that lecturers adopt the best teaching practices when teaching specific content (Koehler & Mishra, 2009), and know which methods to apply to assist students in learning content by building on their existing knowledge.

Lecturers are not only expected to understand the content they teach, but they also need to understand the ways that will make this content clear and easy for students to grasp. Lecturers can apply various techniques, such as class exercises and creative examples. Likewise, lecturers must guide tutors on how to effectively tutor online, e.g., how to assist students in completing the required tutorial exercises.

Technological Content Knowledge

Technology content knowledge (TCK) refers to knowledge of the methods needed to teach content when technology is used (Mishra & Koehler, 2006). While the use of technology can make learning content easier, an understanding of how digital technologies can do this is required and will enhance teaching specific content, and more particularly, create new understandings of the content taught (Koehler & Mishra, 2009). Blending digital tools, such as MIM, into teaching practices can transform the way students learn and interact with content, which ultimately changes their understanding of concepts and theories.

Online learning provides students with an opportunity to learn at a time and place that is convenient, without requiring their presence on campus. Therefore, it allows students to personalise their learning (Orfanou, Tselios, & Katsanos, 2015). But while a MIM allows students to access educational content, regardless of time and location, without data, the MIM may not be accessible to all students. The alternative, then, is to use a data-free MIM.

Technological Pedagogical Knowledge

Technological pedagogical knowledge (TPK) refers to how technology can enable different methods of teaching and learning (Mishra & Koehler, 2006). It is about using technology in a variety of ways. Currently, the University of the Western Cape is engaged in the process of reviewing the development of programmes that will be delivered exclusively online (University of the Western Cape, 2021).

Synchronous engagement may be particularly suitable for students who require immediate response and feedback, as synchronous engagement allows for real-time interaction and can be implemented by tools such as Google Meet and Zoom. However, the use of synchronous engagement comes at the expense of higher data costs and may result in students, especially those with data challenges, being excluded.

TPACK

TPACK refers to the "understanding that emerges from interactions among content, pedagogy, and technology knowledge" (Mishra & Koehler, 2006). In its simplest form, TPACK represents skilled teaching using technology. The TPACK framework is about understanding how different digital technologies can be utilised when teaching specific content. It also "allows teachers to address the challenges involved in integrating technology in teaching and learning" (Willermark, 2018) and reduces the challenges students face in acquiring knowledge. TPACK is used as a basis for effective teaching and learning with technology (Koehler & Mishra, 2009).

RESEARCH DESIGN AND METHODOLOGY

Based on recommendations by Zainal (2007), a case study was used in this research to test the effectiveness of a selected data-free MIM in two specific courses at a higher education institution. Table 2 highlights the peer e-tutoring typologies applied in each course.

Table 2

Peer e-Tutoring Typology Applied to this Research

Dimension	Information Systems course	Accounting course
Curriculum Content	Tutors utilised MIM to help students understand the content of the undergraduate information systems course. Tutors could also respond to questions about quizzes and other formative assessments.	The tutors utilised MIM to communicate with the students, to break down the tutorial questions into set-by-step instructions, and to send voice notes and videos to the students. The students used the MIM to consult with tutors. Students posted questions to tutors and engaged in peer-to-peer learning.
Setup of tutorial groups	With a class size of 173 students, two Moya groups for Android users and one group for iPhone users were created. Two lecturers, a teaching assistant and six tutors were active.	In this module, the class size was 490 students. Students were divided into groups with between 20-25 students and one tutor. There were 15 tutors, 2 lecturers and a teaching assistant.

Dimension	Information Systems course	Accounting course
Year of Study	Students were in their third year of study and tutors were at honours level.	Students were in their first year of study and tutors were in their third year.
Ability	Tutors had all completed the course the previous year and attained a course mark of at least 65%. It was anticipated that tutors with good course marks understood and could articulate the course material. Additionally, using Moya, students benefit from peer-to-peer learning (Barhoumi, 2015).	The tutors had completed financial accounting levels 1 and 2 as year modules and were either completing level 3 or had completed level 3 accounting. They had a good grasp of the concepts needed. The tutors were selected based on competency in the module and were expected to have achieved an average of 65% at level 2 in financial accounting.
Continuation of tutor roles	There was continuity as tutors in the first semester continued in the second semester.	New tutors were paired with senior tutors for succession planning. The group of tutors was diverse, representing the student body and ensuring that the students would communicate comfortably with tutors.
Location	Students can access tutoring from any location using Moya. However, as Statistics South Africa (2020) indicates, students in rural areas may have worse network connectivity than those in urban areas (Statistics South Africa, 2020).	Students and tutors were from all across South Africa, from urban city areas to deep rural villages.
Time allocation	Tutors were free to choose their consultation times, with some taking place during class times and others outside of scheduled class times. This gave students access to tutoring after hours and was useful for students who worked during the day. Despite designated consultation times, tutors reported that these were frequently exceeded. According to published research, using instant messengers may come with extra responsibilities such as interacting outside of predetermined hours (Poon, Giroux, Eloundou-Enyegue, Guimbretière, & Dell, 2019) and communication overload (Rosenberg & Asterhan, 2018).	Tutorials were allocated on a fixed day (Thursday). The topics of the week had already been discussed and hence students had foundational knowledge. The tutors were allocated 45-minute sessions throughout the day; a total of 26 sessions were held to accommodate all students. Additional consultation sessions were coordinated across the week, during traditional campus hours as well as after-hours considering the availability of students and their access to resources.
Student characteristics	Students were in their third year taking the Information Systems Strategy Formulation course. The students were diverse, spoke a variety of languages, and came from different provinces in South Africa. There were more full-time students than part-time students. According to South African research, married, older students who used MIMs find them to be disruptive to family life (Rambe & Bere, 2013). According to Indian research (Gon & Rawekar, 2017), 20% of the student sample did not find instant messaging convenient because it interfered with their personal and family time.	Students were in their first year at university and had usually completed Grade 12 the previous year. The students were from diverse social economic, religious and ethnic backgrounds and came from across the country. All students were registered for full-time studies. As the students were new to the university, they were particularly dependent on the lecturers and tutors for access to information and communication. The students needed a senior person to help them navigate through their first year at university.

Dimension	Information Systems course	Accounting course
Tutor characteristics	Tutors were the best-performing students in the Information Systems Strategy Formulation course. Students with tutoring experience were preferred. Literature indicates that tutoring also increases the academic achievement of the tutors (Raja, Low, & Lim, 2018). Tutors are allowed to gain work experience; payment can be applied to their student fee account.	The tutors were the top-performing students in Financial Accounting at the 2nd year level and were in their final year of studies. The tutors were senior students who had tutored before. The tutors were compensated monthly for all tasks performed.
Objectives	The objective of offering online tutoring was to provide students with increased access to information and assistance and to achieve improved pass rates.	The main aim was to ensure that students had access to learning resources including tutors. As Financial Accounting at level 1 can be very quantitative, a tutor needs to explain and simplify concepts and aid students in understanding and application.

Note: MIM – mobile instant messaging

Qualitative data was collected using an online survey. Purposive sampling was used to collect data from the 21 tutors who tutored a total of 663 students. The survey was only emailed to tutors in the information systems and accounting courses selected. Student numbers were checked to ensure that only tutors responded. Ten tutors responded (48% response rate) made up of 4 accounting tutors and all 6 information systems tutors. Based on recommendations by Malterud, Siersma and Guassora (2016), a reduced sample size can be used when the sample has extensive information regarding the subject. In this case, the sample size was acceptable as each tutor who responded was responsible for tutoring large groups of students using the data-free Moya MIM. The accounting tutor sample represents the data of tutors for 120 students. The information systems tutor sample represents the data of tutors for 173 students. In comparison, another reported case study of peer tutoring implementation at a university used a sample of only eight students and six tutors (Moumoulidou, Karadimitriou, & Pliogou, 2014). Interviews were not conducted for the current study due to social distancing restrictions during COVID-19 and the high cost of data for interview tools such as Zoom.

The online survey was designed with open-ended questions developed by the authors. A pilot survey was completed before sending the online survey to tutors and involved first sending it to a colleague and to a teaching assistant both of whom were familiar with using MIM. This was done to check whether the questions were understandable and clear, thereby reducing the potential ambiguity of responses. The choice of a colleague and a teaching assistant allowed for input from individuals who were familiar with the context and the use of the technology.

The online survey had the following questions:

TK1. How did your technology knowledge affect your ability to implement the intervention?
CK1. How did the course content influence your implementation and use of the intervention?
PK1. How did the intervention allow you to adjust your tutoring based on what students needed?
PK2. How did the intervention allow you to assess students in different ways?
TCK1. How did the intervention affect your tutoring of the course content online?
PCK1. How did the intervention influence your guidance of student thinking and learning?
TPACK1. Describe how you tutored lessons that appropriately combine course content, technologies and tutoring approaches.

The online survey allowed qualitative textual data to be saved in a spreadsheet which was then converted to PDF format and imported into Atlas.ti software. Thematic content analysis was used to analyse the data using the themes identified in the research model. The research followed the ethical and professional guidelines specified by the University of the Western Cape's research ethics policy. No responses were used unless consent was provided. All identifying information was removed to ensure anonymity.

FINDINGS

The findings commenced with the analysis of demographic information. Most of the tutors were female (80%). All tutors were under 25 years old and were full-time students. The majority spoke English (80%) with the remainder speaking Xhosa (20%). The Western Cape was the residence for most tutors (80%) but 20% lived in the Eastern Cape. Equal numbers of tutors connected to the students via prepaid cell phones (40%) and contract cell phones (40%), however, 20% used Wi-Fi.

Subsequent sections provide findings for each construct in the research model.

Technology Knowledge

Lecturers provided guidance and training for using the data-free MIM for e-tutoring based on findings from the literature, but tutors had less extensive TK for selecting technology (Ur Rahman et al., 2018). The use of a technology that is similar to the most popular social media application in South Africa, namely WhatsApp (Cowling, 2024), eased the acceptance and use of the Moya MIM.

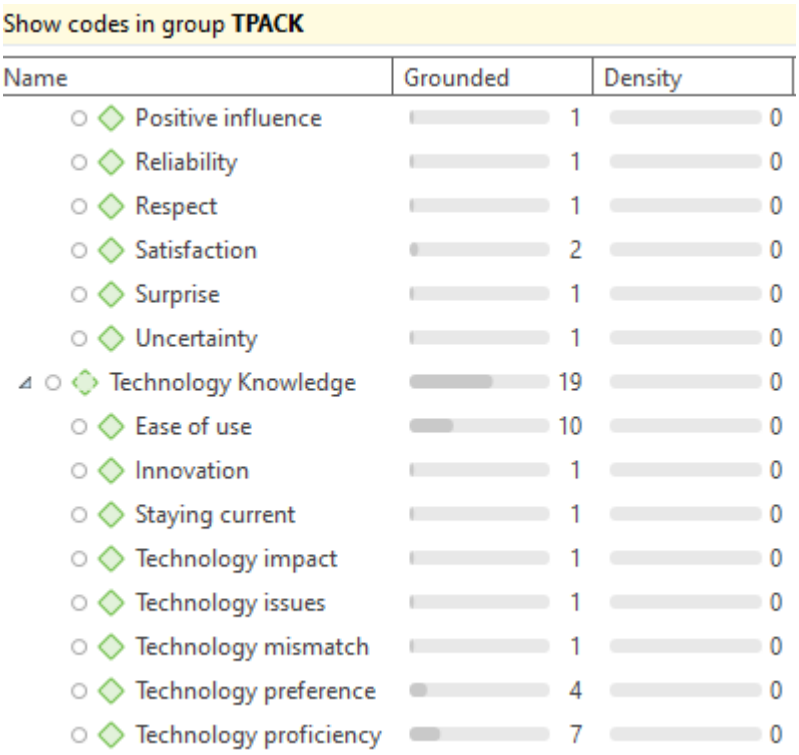
Most tutors indicated that they had the necessary knowledge (technology proficiency) to use a data-free MIM for e-tutoring as they used WhatsApp regularly. This finding is supported by the following quotes, as shown in Figure 2 extracted from Atlas.ti software. According and information systems tutor:

> My knowledge regarding technology affected the use of Moya positively because with the knowledge I have having to use the app for the first time was not a challenge from my end. In fact, the knowledge I have helped me to better understand the functionality of the app and learn as I was using it.

An accounting tutor stated that "as I have been using instant messaging apps for a long time, it was easy to come to grips [with] how this app works".

Figure 2

Technology Knowledge Codes Extracted from Atlas.ti



As per Figure 2, 'Ease of use' was the most frequently highlighted factor (ten quotations), substantiated by statements an information systems tutor such as: "because Moya is more or less the same as WhatsApp, I was able to use it instantly". An accounting tutor stated that "it was very easy to adapt and make use of the intervention".

Content Knowledge

Tutors indicated that having course content knowledge and that having content organised for students on the learning management system (iKamva) made it easy to conduct e-tutoring.

I only made use of Moya for the purpose of this course. iKamva provided all of the content. Moya allows easier and quicker interaction with students. (information systems tutor)

I had great knowledge of the course. So, it was not difficult to use the intervention [Moya] to tutor. (accounting tutor)

Pedagogical Knowledge

An accounting tutor indicated that it was easier for students to learn face-to-face rather than with Moya, "students learn better when they can see exactly what is being done when concepts are being explained".

Evidence indicates that accounting tutors needed time to adjust to using Moya for e-tutoring. According to one tutor, "not being able to conduct face-to-face tutorials was a challenge at first, but you begin to

get to grips with it". While another stated "I am more of a face-to-face kind of tutor, so adapting was challenging".

Information systems tutors appear to adapt easily to working remotely and could create boundaries between work and private time. One tutor stated "it allowed me to move remotely. Interactions depend on the engagement of students" and to quote another tutor, "it created boundaries and focused access to me. It prevented students from contacting outside of work hours".

Using the Moya MIM allowed students to have access to work at a convenient time. An accounting tutor stated, "students could go over the work afterwards as the messages are still there as opposed to face-to-face classes".

It also allowed for more flexibility and fun. An information systems tutor stated, "I made myself available outside of the prescribed tutoring times as well as consultation hours to be there for the students with whatever questions they might have". While an accounting tutor felt that "even during the time of the pandemic, it made me more flexible and a fun experience for students".

Pedagogical Content Knowledge

A tutor indicated that e-tutoring was easier when tutors had content knowledge. For an accounting tutor "relaying the tutorials in an understandable manner was made a lot easier with this knowledge [about coursework]".

A tutor noted that e-tutoring was challenging as it was difficult to assess whether students understood the content and whether changes were necessary. According to an information systems tutor:

> It was a bit tricky because at times students would comment/say they understand or they do not have any other questions only to find out when they are in the next tutorial/lecture slot, students would ask questions or query with their assignments.

Technological Pedagogical Knowledge

Tutors used a variety of features available on Moya to assist with e-tutoring. The tutors indicated that the use of voice notes and pictures were particularly useful in assisting students in learning concepts. According to an accounting tutor "the use of voice notes and pictures was needed to explain the content. As the course requires a lot of understanding, voice notes are very helpful while pictures help with the calculation in the work". An information systems tutor felt "Moya allowed for tutoring to take place through multi-media".

However, the use of pictures requires data.

Using WhatsApp for e-tutoring previously assisted tutors in using the Moya MIM. An accounting tutor cited previous experience as helpful "in 2019, I used to conduct consultations via WhatsApp. So, it was as if I have been doing this for a long time". An information systems tutor similarly stated "the way of tutoring was more or less the same as that of WhatsApp. What students learn is also dependent on the course material provided".

Technological Pedagogical and Content Knowledge

All tutors indicated that their expectations for using Moya MIM were met. The use of the Moya MIM for e-tutoring received mixed reviews, although most were positive. An accounting tutor felt "due to the different methods, I could use, voice notes, messages, videos and pictures, I was able to help each learner think about all the different things affected by the content". According to an information systems

tutor "I had to contextualize the content during a consult for a diverse audience and I did so by simply bridging knowledge gaps, whether it had been the tech we used or the content they did not understand.

Tutors indicated that using the Moya MIM was more inclusive compared to WhatsApp. An accounting tutor stated that "I could easily explain the course content and make sure that no student was left behind" and an Information systems tutor felt it was "easy to access students from anywhere".

Tutors used the Moya MIM to track participation. An accounting tutor stated "I was able to see who is online, who participates and who views the messages but does not participate.

However, it was also viewed negatively by some tutors.

An accounting tutor felt "tutoring accounting is quite difficult when it has to be done through a platform as the intervention [Moya]" and according to an information systems tutor "it felt very disconnecting, I would say".

One tutor indicated that there was a lack of participation from the students in his groups. An accounting tutor stated that "most of my students did not make use of the intervention but for those who did it assisted [them] greatly.

DISCUSSION

The TPACK framework offers a useful perspective for analysing and interpreting our findings. The junction of technological, pedagogical and content knowledge is highlighted by the TPACK framework. This research shows how the combination of subject-specific topic knowledge, pedagogical techniques and technology can improve student learning. It emphasises how tutors' educational practises in the area of accounting and information systems e-tutoring were improved by using the data-free MIM, Moya. The findings indicate that TK, CK, PK, PCK, TCK, TPK and TPACK were all important factors in the use of the data-free Moya for e-tutoring. For TK, ease of use has been identified in the literature as an important criterion for e-tutoring (Motaung & Dube, 2020). As Moya was easy to use, this assisted tutors in using it. Regular use and previous use of WhatsApp for consultation also aided in the use of Moya (Tang & Hew, 2017).

Overall, tutors' TK had a positive influence on their ability to implement and use Moya. Tutors who were adept at leveraging their existing technological competencies were able to create a seamless and effective e-tutoring environment. Findings indicated that tutors found this data-free MIM easy to use and quickly adapted to using it for e-tutoring purposes. Some tutors mentioned that their previous experience with apps like Google Meet made it even easier for them to interact with students on Moya. Accounting tutors had previously used WhatsApp to interact with students. This group of tutors noted that using Moya allowed them to use voice notes to explain concepts and that, although they still faced some challenges, they were able to help students who needed help with accounting. The tutors use a variety of media like posts, videos and audio to explain the content. Tutors also supported students after hours.

Tutors were able to modify their e-tutoring strategies to meet the needs of students as Moya allows tutors to tailor the e-tutoring based on student needs. Since Moya provided tutors with a variety of communication choices, such as voice notes, messages and questions, they could tailor their approach. For example, they could easily increase the frequency and type of interaction with students. The tutors also found Moya to be very useful for student assessment because they were able to gauge student understanding through the interactions that had occurred on the MIM. This finding supports the TPACK framework's PK component since it demonstrates how tutors can modify their tutoring to meet specific student needs.

Moya also enables collaboration, peer support and problem-solving among students. Hence, Moya helped students create new content knowledge as well as technological knowledge, while also developing skills such as collaboration and problem-solving. Having CK assisted the tutors when using Moya to explain content without being face-to-face. This finding agrees with a study of 24 primary school teachers in Singapore which found that CK helped when designing technology lessons (Ling Koh et al., 2014). Moya had a significant role in facilitating meaningful relationships between tutors and students and in evaluating students' learning. Tutors could more closely match the educational content to the individual needs of their students by using Moya to measure the comprehension levels of their students through their interactions.

An important aspect of this research was the provision of after-hours support by tutors. This is a testament to the dynamic nature of pedagogical strategies adopted, where tutors extended their availability to assist students outside of regular tutoring hours. PK was successfully used as tutors were flexible and provided support to students after hours. Tang and Hew (2017) refer to this as ‘temporal affordances”. PCK is topic-specific (Deng, Chai, So, Qian, & Chen, 2017); therefore, e-tutoring accounting for a first-year course is likely to differ from implementing e-tutorials with senior tutors with more technological experience and TCK, in post-graduate courses (Malik, Rohendi, & Widiaty, 2019).

TPK and TPACK were evident in the use by tutors of multimodal approaches, such as voice notes and pictures, to explain concepts to students at convenient times, even without data (Tang & Hew, 2017). Using multimodal approaches was also found to be advantageous by another study at a South African University of Technology (Bere & Rambe, 2013). Moya's ability to foster collaboration, peer support, and problem-solving among students fits at the intersection of. These elements are essential within the TPACK framework where the ability to collaborate and engage with peers to solve problems is considered a powerful educational strategy, especially in fields such as information systems and accounting.

The research also identified challenges, such as lack of internet access and device issues, that hindered student engagement in the e-tutoring process. These challenges highlight the importance of recognizing external factors and adapting teaching strategies accordingly, an essential aspect of the TPACK framework. The lack of active participation from students was highlighted as a concern by another study on e-tutoring in a rural South African university (Motaung & Dube, 2020). Addressing these challenges remains an essential consideration for the implementation of such technology-based interventions, particularly in contexts with varying levels of digital accessibility.

CONCLUSION

This research aimed to understand tutor experiences of using a data-free MIM in both a large accounting class and a somewhat smaller information systems class. The findings indicated that the TPACK framework could be used to explain tutor experiences. Hence, this case study provides valuable insights into tutors' experiences using data-free MIM for e-tutoring in information systems and accounting courses. This research aligns with the TPACK framework with a focus on integrating technological, pedagogical and content knowledge to enhance the educational experience. The results highlight the positive impact of technological competencies, flexible and adaptive tutoring approaches, assessment and interaction, student collaboration and problem-solving. The research also highlights the challenges posed by external factors.

This research highlights the potential of Moya and similar platforms to enrich the learning experience and promote effective and engaging teaching methods in higher education. The findings from this study

can assist in designing more inclusive student electronic tutoring interventions. However, the limitations of this qualitative research, particularly the small sample size, do not allow the study results to be generalised. The potential influence of biases on the credibility of the findings is acknowledged. To mitigate the risk of bias, tutors were assured of the confidentiality and anonymity of their responses, encouraging them to provide candid feedback without fear of judgment. The importance of honest and reflective responses was emphasized.

The next phase of this study will analyse student results in creating more inclusive e-pedagogies, especially in large classes at low-resourced higher education institutions in South Africa. Further research is required to support generalisability. The findings are meant to inspire further investigation into the use of data-free technologies in higher education to create more inclusive e-tutoring and online learning environments.

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REFERENCES

Annese, S., Amenduni, F., Candido, V., McLay, K. F., & Ligorio, M. B. (2022). Tutor's role in WhatsApp learning roups: A quali-quantitative methodological approach. *Frontiers in Psychology*, *12*, 1–14. https://doi.org/10.3389/fpsyg.2021.799456

Antee, A. (2021). Student perceptions and mobile technology adoption: implications for lower-income students shifting to digital. *Educational Technology Research and Development*, *69*(1), 191–194. https://doi.org/10.1007/S11423-020-09855-5

Arakpogun, E., Wanjiru, R., & Whalley, J. (2019). Zero-Rating and other initiatives by over-the-top players in Africa: Do they contribute to universal access and service? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3427161

Ashiru, G. (2023). Report highlights: 28% of South Africans lack internet access. *Tech in Africa*. https://www.techinafrica.com/a-study-says-that-28-of-south-africans-dont-have-access-to-the-internet/

Barana, A., Fisssore, C., Marchisio, M., & Rabellino, S. (2018). Online tutoring to enhance university success. *Proceedings of the European Distance and E-Learning Network 2018 Annual Conference*, 755–763.

Barhoumi, C. (2020). The effectiveness of Whatsapp mobile learning activities guided by activity theory on students' knowledge management. *Contemporary Educational Technology 6*(3). https://doi.org/10.30935/cedtech/6151

Bere, A., & Rambe, P. (2013). Extending technology acceptance model in mobile learning adoption: South African university of technology students' perspectives. *Proceedings of the International Conference on e-Learning, ICEL,* 52–60. https://www.researchgate.net/profile/Charity-Ndeya-Ndereya/publication/288051189_Academic_staff%27s_challenges_in_adopting_blended_learning_Reality_at_a_developing_university/links/5d763cb6299bf1cb80935ec4/Academic-staffs-challenges-in-adopting-blended-le

Carlana, M., & La Ferrara, E. (2021). Apart but connected: Online tutoring and student outcomes during the Covid-19 pandemic. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3777556

Choi, B., & Young, M. F. (2021). TPACK-L: Teachers' pedagogical design thinking for the wise integration of technology. https://doi.org/10.1080/1475939X.2021.1906312

Chomunorwa, S., & Mugobo, V. V. (2023). Challenges of e-learning adoption in South African public schools: Learners' perspectives. *Journal of Education and E-Learning Research*, *10*(1), 80–85. https://doi.org/10.20448/JEELR.V10I1.4423

Competition Commission SA. (2019). Data services market inquiry. *Competition Commision South Africa*, 1–316. Retrieved from https://www.compcom.co.za/wp-content/uploads/2019/12/DSMI-Non-Confidential-Report-002.pdf

Cowling, N. (2024). *Most used social media platforms in South Africa as of the 3rd quarter of 2023*.

https://www.statista.com/statistics/1189958/penetration-rate-of-social-media-in-south-africa/

Czerniewicz, L., Agherdien, N., Badenhorst, J., Belluigi, D., Chambers, T., Chili, M., … Wissing, G. (2020). A wake-up call: Equity, inequality and Covid-19 emergency remote teaching and learning. *Postdigital Science and Education*, *2*(3), 946–967. https://doi.org/10.1007/s42438-020-00187-4

Deng, F., Chai, C. S., So, H. J., Qian, Y., & Chen, L. (2017). Examining the validity of the technological pedagogical content knowledge (TPACK) framework for preservice chemistry teachers. *Australasian Journal of Educational Technology*, *33*(3), 1–14. https://doi.org/10.14742/ajet.3508

Department of Education. (1996). *Green Paper on Higher Education Transformation*. https://www.gov.za/documents/green-paper-higher-education-transformation

Gasaymeh, A.-M. M. (2017). University students' use of WhatsApp and their perceptions regarding its possible integration into their education. *Global Journal of Computer Science and Technology*, *17*(1), 1–9.

Gleason, N. W. (2018). *Higher Education in the Era of the Fourth Industrial Revolution*. Springer Singapore. https://doi.org/10.1007/978-981-13-0194-0

Gon, S., & Rawekar, A. (2017). Effectivity of e-Learning through Whatsapp as a teaching learning tool. *MVP Journal of Medical Sciences*, *4*(1), 19. https://doi.org/10.18311/mvpjms/0/v0/i0/8454

Irwanto, I. (2021). Research trends in technological pedagogical content knowledge (TPACK): A systematic literature review from 2010 to 2021. *European Journal of Educational Research*, *10*(4), 2045. https://doi.org/10.12973/eu-jer.10.4.2045

Izyani, M., & Mohamed Amin, E. (2016). Students' perception on the use of WhatsApp as a learning tool in ESL classroom. *Journal of Education and Social Sciences*, *4*, 96–104. http://jesoc.com/wp-content/uploads/2016/08/Edu-76.pdf

Jiménez Sierra, Á. A., Ortega Iglesias, J. M., Cabero-Almenara, J., & Palacios-Rodríguez, A. (2023). Development of the teacher's technological pedagogical content knowledge (TPACK) from the lesson study: A systematic review. *Frontiers in Education*, *8*, 1–11. https://doi.org/10.3389/FEDUC.2023.1078913/BIBTEX

Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)? *Contemporary Issues in Technology and Teacher Education*, *9*(1), 60–70. https://doi.org/10.1177/002205741319300303

Koehler, M. J., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge (TPACK)? *Journal of Education*, *193*(3), 13–19. https://doi.org/10.1177/002205741319300303

Lawack, V. (2020, April 29). Data allowance for students in need: #NoStudentLeftBehind.from https://www.uwc.ac.za/news-and-announcements/announcements/data-allowance-for-students-in-need-nostudentwillbeleftbehind

Leonard, L., Mokwele, T., Siebrits, A., & Stoltenkamp, J. (2016). "Digital natives" require basic digital literacy. *The IAFOR International Conference on Technology in the Classroom – Hawaii 2016 Official Conference Proceedings Abstract*, 19–35.

Ling Koh, J. H., Chai, C. S., & Tay, L. Y. (2014). TPACK-in-action: Unpacking the contextual influences of teachers' construction of technological pedagogical content knowledge (TPACK). *Computers and Education*, *78*, 20–29. https://doi.org/10.1016/j.compedu.2014.04.022

Malik, S., Rohendi, D., & Widiaty, I. (2019). Technological pedagogical content knowledge (TPACK) with information and communication technology (ICT) integration: A literature review. *Advances in Social Science, Education and Humanities Research 299*, 498–503. https://doi.org/10.2991/ictvet-18.2019.114

Malterud, K., Siersma, V. D., & Guassora, A. D. (2016). Sample size in qualitative interview studies: Guided by information power. *Qualitative Health Research*, *26*(13), 1753–1760. https://doi.org/10.1177/1049732315617444

Maphalala, M. C., & Adigun, O. T. (2021). Academics' experience of implementing e-learning in a South African higher education institution. *International Journal of Higher Education*, *10*(1), 1–13. https://doi.org/10.5430/ijhe.v10n1p1

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017–1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x

Motaung, L. B., & Dube, B. (2020). WhatsApp messenger as a mediating tool in times of Covid-19 for enhancing student engagement in e-tutorials at a rural South African university. *Journal of Educational and Social Research*, *10*(6), 214–224. https://doi.org/10.36941/jesr-2020-0121

Moumoulidou, M., Karadimitriou, K., & Pliogou, V. (2014). A case study of peer tutoring implementation at university: Investigating the students' difficulties that were faced with the method and the tutors' difficulties in applying it *.

International Journal of Psychology and Educational Studies, *2020*(4), 1–13. https://doi.org/10.17220/ijpes.2020.04.001

Mporananayo, N., & Ng'umbi, M. (2019). Assessment of the perception of TVET Tutors in Rwanda on their level of technological, pedagogical and content knowledge (TPACK): A case of integrated polytechnic regional colleges (IPRCs). *IOSR Journal Of Humanities And Social Science (IOSR-JHSS*, *24*(6), 29–38. https://doi.org/10.9790/0837-2406052938

Muhammad, R., & Annamalai, N. (2021). Using Facebook and WhatsApp to teach and learn english : A comparative systematic review. *E-JBL*, *4*(1), 16–41.

Mzangwa, T. S. (2019). The effects of higher education policy on transformation in post-apartheid South Africa. *Cogent Education*, *6*(1). https://doi.org/10.1080/2331186X.2019.1592737

Nogubha, M., & Mhlana, S. (2022). Effective use of e-tutoring system: Social WhatsApp messenger on social identity development. *Smart Innovation, Systems and Technologies 251*, 729–737. https://doi.org/10.1007/978-981-16-3945-6_72

Nurdiani, N., Rustaman, N. Y., Setiawan, W., & Priyandoko, D. (2019). The IM and LMS moodle as the TPACK components in improving embryology concepts mastery of prospective biology teachers. *AIP Conference Proceedings*,*2120*. American Institute of Physics Inc. https://doi.org/10.1063/1.5115712

Orfanou, K., Tselios, N., & Katsanos, C. (2015). Perceived usability evaluation of learning management systems: Empirical evaluation of the system usability scale. *International Review of Research in Open and Distance Learning*, *16*(2), 227–246. https://doi.org/10.19173/irrodl.v16i2.1955

Petersen, F. (2020). Towards student inclusivity during Covid-19: Testing the #datafree Moya messenger. *Alternation - Interdisciplinary Journal for the Study of the Arts and Humanities in Southern Africa*, *SP32*(1), 294–331. https://doi.org/10.29086/2519-5476/2020/sp32a12

Petersen, F., & Arendse, R. (2022). The data-free Moya messenger application : Online accounting tutoring in a large class. D. Remenyi (Ed.), *8th e-Learning Excellence Awards 2022 An Anthology of Case Histories* (113–123). Reading, United Kingdom: Academic Conferences International Limited. https://www.academic-bookshop.com/ourshop/prod_7877109-8th-eLearning-Excellence-Awards-2022-An-Anthology-of-Case-Histories.html

Pimmer, C., Brühlmann, F., Odetola, T. D., Olusola Oluwasola, D., Dipeolu, O., & Ajuwon, A. J. (2019). Facilitating professional mobile learning communities with instant messaging. *Computers & Education*, *128*, 102–112. https://doi.org/10.1016/j.compedu.2018.09.005

Poon, A., Giroux, S., Eloundou-Enyegue, P., Guimbretière, F., & Dell, N. (2019). Engaging high school students in Cameroon with exam practice quizzes via SMS and WhatsApp. *Conference on Human Factors in Computing Systems - Proceedings*. https://doi.org/10.1145/3290605.3300712

Raja, J. E., Low, K. O., & Lim, W. S. (2018). Peer tutoring in higher education–a pedagogical tool for student-centered teaching. *Conference on Association of Southeast Asian Institutions of Higher Learning, Japan*. https://www.researchgate.net/profile/Ko-Low-2/publication/327917393_Peer_tutoring_in_higher_education_-_a_pedagogical_tool_for_student-centered_teaching/links/5bae213345851574f7ec47e0/Peer-tutoring-in-higher-education-a-pedagogical-tool-for-student-center

Rambe, P., & Bere, A. (2013). Using mobile instant messaging to leverage learner participation and transform pedagogy at a South African university of technology. *British Journal of Educational Technology*, *44*(4), 544–561. https://doi.org/10.1111/bjet.12057

Rosenberg, H., & Asterhan, C. S. C. (2018). "WhatsApp, teacher?" - Student perspectives on teacher-student WhatsApp interactions in secondary schools. *Journal of Information Technology Education: Research*, *17*, 205-226. https://doi.org/10.28945/4081

Sayan, H. (2016). Affecting higher students learning activity by using Whatsapp. *European Journal of Research and Reflection in Educational Sciences*, *4*(3), 88–93. www.idpublications.org

Seyama, B. W. (2019, June 12). It's not surprising that WhatsApp is bigger than Facebook in South Africa - eNitiate. https://enitiate.solutions/whatsapp-bigger-is-than-facebook-in-south-africa/

Statista. (2023). *Digital population in South Africa as of January 2023*.https://www.statista.com/statistics/685134/south-africa-digital-population/

Statistics South Africa. (2018). *P0318 - General Household Survey (GHS), 2018*.

Statistics South Africa. (2020). Mid-year population estimate 2019. *Statistics South Africa*. https://www.statssa.gov.za/publications/P0302/P03022019.pdf

Tang, Y., & Hew, K. F. (2017). Is mobile instant messaging (MIM) useful in education? Examining its technological, pedagogical, and social affordances. *Educational Research Review*, *21*, 85–104. https://doi.org/10.1016/j.edurev.2017.05.001

Trotter, H., Huang, C. W., & Czerniewicz, L. (2022). Seeking equity, agility, and sustainability in the provision of emergency remote teaching during the Covid-19 pandemic: A center for teaching and learning takes an expanded role. *Higher Learning Research Communications*, *12*(0), 1–24. https://doi.org/10.18870/hlrc.v12i0.1280

Udenze, S., & Oshionebo, B. (2020). Investigating 'Whatsapp' for collaborative learning among undergraduates. *Üsküdar Üniversitesi İletişim Fakültesi Akademik Dergisi Etkileşim*, *5*, 24–50.

University of the Western Cape. (2019). UWC History. https://www.uwc.ac.za/about/mission-vision-and-history/history

University of the Western Cape. (2021). *Institutional operating plan 2021-2025*. https://international.uwc.ac.za/wp-content/uploads/2021/12/February_2021_v.2_UWC_IOP_2021_-_2025_Discussion_Document.pdf

Ur Rahman, F., Hussain, M. A., Khalid, S., & Scholar, P. (2018). Technological pedagogical content knowledge (TPACK) and preparedness of tutors in open and distance learning (ODL) for new teacher education programs. *Journal of Educational Research*, *21*(2). https://jer.iub.edu.pk/journals/JER-Vol-21.No-2/13.pdf

van de Heyde, V., & Siebrits, A. (2019). The ecosystem of e-learning model for higher education. *South African Journal of Science*, *115*(5–6), 1–6. https://doi.org/10.17159/sajs.2019/5808

Walubengo, J. N., & Takavarasha Jr, S. (2017). The challenges of using zero-rating (free basics) for addressing the affordability of ICT access in developing countries. *International Journal of ICT Research in Africa and the Middle East*, *6*(2), 47–61. https://doi.org/10.4018/ijictrame.2017070104

Willermark, S. (2018). Technological pedagogical and content knowledge: A review of empirical studies published from 2011 to 2016. *Journal of Educational Computing Research*, *56*(3), 315–343. https://doi.org/10.1177/0735633117713114

Wood, D. (2015). Problematizing the inclusion agenda in higher education: Towards a more inclusive technology enhanced learning mode. *First Monday*, *20*(9). https://doi.org/10.5210/fm.v20i9.6168

Zainal, Z. (2007). The case study as a research method. *Jurnal Kemanusiaan*, *9*. https://core.ac.uk/download/pdf/11784113.pdf