

School management team perception on integration of smartphones as m-learning tools

Sello Mokoena¹, Joseph Chikwendu Ezennia^{2*}

^{1,2}University of Zululand, South Africa; MokoenaS@unizulu.ac.za (S.M.) EzenniaJ@unizulu.ac.za (J.C.E.).

Abstract: The adoption and acceptance of mobile technologies as mobile learning (m-learning) tools in the education sector have brought benefits and opportunities in teaching and learning, especially in the 21st century. The study aims to determine the perceptions of the School Management Team members (SMT) on the use of smartphones as m-learning tools in selected secondary schools in King Cetshwayo District. The SMT members in secondary schools were targeted because they are key role players in schools in technology use and acceptance for teaching and learning purposes. The study employed a qualitative research approach to achieve the objective of this study. Ten principals were selected purposively from the selected secondary schools in King Cetshwayo District to conduct the research. Data were collected via interviews, and thematic analysis was employed. Four themes emerged: accessibility and availability, classroom integration, educational potential, and training and policies. The findings indicate that m-learning tools are essential for modern learning processes, as most SMT members recognize the potential of smartphone use to enhance student engagement and improve learning outcomes. The study recommends that adequate training should be made available to educators and that policies should be adopted and implemented for the effective integration of smartphones in secondary schools.

Keywords: *Integration, M-learning, School management team, Secondary schools, Smartphones.*

1. Introduction

In recent years, mobile learning has gained a lot of awareness as a growing section of the education and instructional technology field because of its accessibility to learning resources at any time and anywhere [1]. The smart device industry is one of the leading industries around the world, as most people are using mobile technologies for one thing or another in various fields of interest. In education, online teaching and learning, content knowledge, and other academic information can be accessed using smart devices, especially smartphones. Using mobile devices in teaching and learning is referred to as M-learning, which is defined as learning through mobile devices [2]. The opportunities offered by the most recent mobile technology (smartphones) present new opportunities and challenges to educational systems. Lediga and Ngoepe [3] state that it is gradually becoming more prevalent and diverse in different educational sectors, both in developed and developing countries, to use wireless, mobile, portable, and handheld devices. The use of wireless mobile technology in education provides various styles of learning that suit the different needs of 21st-century learners.

Mobile technology is associated with mobile devices that have web browsers, instant messenger systems, audio recorders, audio players, video recorders, and gaming systems, etc. [4, 5]. These mobile technologies can share electronic media content, such as photographs, videos, and data, wirelessly via radio waves, microwaves, infrared, GPS, and Bluetooth media-sharing protocols, including voice, text, video, and barcodes. They are mostly classified by the type of wireless communication technologies the device supports, the portability of the device, and personal usability [4]. These mobile technologies include cell phones, tablets, PDAs, smartphones, and notebooks, which use GSM, Bluetooth, and other

wireless communication protocols. According to Correa, et al. [6], there is a great deal of Internet viewing because many Internet users view content via smartphones or tablets. Memon, et al. [7] state that advancements in the mobile technology industry through smartphones and tablets have resulted in ubiquitous computing lifestyles that encompass social, professional, educational, and economic aspects and spaces. These advancements in mobile technologies provide opportunities and benefits for secondary schools by supporting advances in teaching and learning. The smartphone's easy connectivity to the Internet provides learners with more resources that enable them to expand their knowledge and share it with peers at the same time.

Technology is not only changing the way the world operates; it is changing the way we learn and the way we offer learning. Although some researchers, such as Coetzee, et al. [8] and Kadry and Ghazal [9], advocate for the exclusion of smartphones as learning tools for secondary school learners, claiming that they are a source of distraction that deprives learners of achieving their goals, other researchers, such as Yu and Conway [10] and Parent24 [11], opine that the use of smartphones within institutions of learning in the 21st century performs various important roles. For instance, it enhances learners' social abilities, connects them to the global world, and makes learning interesting and easy. Smartphones are regarded as one of the emerging technological devices (tools) that develop learners in the 21st century [12, 13]. The researcher believes that smartphones can be customised to be relevant to the cultural and social contexts of schools in both urban and rural settings. Noticeably, some secondary schools in urban contexts have already customised smartphones to be relevant m-learning tools in their schools.

This type of initiative is relevant to every secondary school, provided that SMT members, as initiators and developers of teaching and learning in schools, consider the use of smartphones as m-learning tools. High school learners must be equipped with skills and knowledge on how to use technology, as they are the next generation of the workforce that requires an absolute understanding of different technologies used for enterprises to be efficient and effective. It is of utmost importance that this current research assesses SMT members' perceptions of the use of smartphones as potential tools for enhancing teaching and learning in secondary schools in the King Cetshwayo District. Most teaching and learning institutions promote continuous engagement between teachers and learners for the betterment of teaching and learning. Therefore, smartphone integration as an m-learning tool in secondary schools can promote this engagement anytime and anywhere to enhance knowledge sharing and work efficiency.

2. Literature Review

2.1. Smartphones in Education Technology

There is a worldwide call for restructuring schools' practices in teaching and learning to support the use of ICT and digital technologies. School leadership is tasked with initiating the restructuring of schools to support the use of digital technology. The restructuring practice is aimed at embedding the necessary technological tools and skills required in education to support and enhance the teaching and learning processes. Accordingly, Christopoulos and Sprangers [14] opined that there is a necessity to carefully assess and examine the appropriate tools and platforms to be integrated into educational systems for m-learning to be successful in schools. Nonetheless, Bala [4] asserts that technology plays a significant role in creating and disseminating educational knowledge to teachers and learners in the 21st century. Equally, Can, et al. [15] revealed in their study that teachers remain the keystone of K-12 education in the 21st century, which is engulfed by many developments in the use of technology in schools. According to Bala [4], educational technology for social sciences is defined as the "organization of educational knowledge for the achievement of practical purposes as well as any tool or technique of doing or making by which capability is extended". The definition seems to suggest that smartphones can be used to improve the quality of teaching as well as learners' performance achievement.

Further, Oluwadara, et al. [16] posit that the future of education in the 21st century lies in connectivity using mobile technologies. Therefore, educators need to start preparing themselves for the

changing environments of the 21st century in terms of teaching and learning. Their readiness and preparedness would fast-track the acceptance and use of mobile technologies as useful tools for teaching and learning. Nevertheless, there have been many teaching and learning projects in Sub-Saharan Africa emphasising the integration of mobile technologies in instructional teaching, while less time has been spent on the training and development of teachers in integrating mobile technologies as instructional tools [16]. The authors further stated that approaches to m-learning training, uptake, and use do not incorporate the infrastructural deficiencies of many schools and societies into models for training and practice. Therefore, training educators is a critical component in the integration and use of smartphone technology as an m-learning tool to promote the ICT culture in teaching and learning.

2.2. Challenges of Smartphone Use in Secondary Education

The adoption and acceptance of mobile technologies such as smartphones pose many challenges to all education stakeholders, including principals, teachers, parents, and learners. Nevertheless, the most challenged among all are the teachers who are responsible for the delivery of educational lessons using these technologies. Most of these challenges have created some difficulties that militate against the ease and proper use of the technology. According to Hermanto and Srimulyani [17], teachers are facing various types of challenges ranging from financial and physical to mental challenges. Some of these challenges may include the cost of data bundles and physical and mental readiness to use mobile devices as m-learning tools in schools. The authors further assert that the critical challenge faced by some secondary schools is the adoption of mobile technology, which includes teachers' mastery of the technical and technological skills required to deliver online instruction/lessons using the school's Learning Management System (LMS) [17].

That notwithstanding, the availability of smartphones and tablets, and ownership by teachers and learners, alleviates the obstacle posed by the mobile devices required to practise m-learning in secondary schools. Further, Chisango and Marongwe [18] posit that other challenges experienced by the majority of secondary schools in using ICT in teaching and learning relate to the inadequacy of ICT infrastructure in schools to create digital academic information and knowledge. The ICT elements include access to the internet, data, and technological infrastructure that supports teaching and learning, even away from schools. The reason is presumably that most secondary schools in South Africa are in townships and rural areas, suggesting that the adequate security of these ICT infrastructures may not be guaranteed, especially against looting and theft of ICT infrastructure installations. However, the level of challenges faced by schools in m-learning adoption may be determined by the location of the schools and the socioeconomic factors of the surrounding communities.

2.3. Integration of Mobile Technologies in Secondary Education

Generally, smartphones play a vital role in businesses, health institutions, educational institutions, and many other sectors. However, the use of technologies and mobile devices such as smartphones as educational tools depends on the attitudes and perceptions of parents, teachers, learners, and the reflective attitudes of policymakers [19]. Notwithstanding this, smartphones play a vital role in pre-service teachers' teaching methods and strategies, as they are used to source information about their lessons. This argument supports the promotion of smartphone use in secondary schools as an m-tool for teaching and learning to assist in providing secondary school learners with a smooth transition to the higher education environment in South Africa and beyond. Moreover, most higher education institutions in South Africa make use of text messages to convey important information to students, for instance, vital due dates, examination dates, results, and other information about students' lives on campus. This makes students feel a sense of belonging to the academic community and supports better academic performance.

Irrespective of people's location, the development and use of smartphones in social and professional contexts have been integrated into people's lives, promoting the use of mobile technology in different

settings, whether rural or urban Maloney, et al. [20]. Kacetl and Klímová [21] assert that the latest emerging technologies through smartphone use easily promote reading and writing (texting) more than voice calling, which is the oldest function of the mobile phone. Moreover, since they promote reading and writing through social media, e-mails, instant messages, and SMS, smartphones can be part of secondary school learners' tools for developing reading and writing skills. However, studies conducted in Higher Education (HE) settings on smartphones' potential use as learning tools for students indicated that mobile technology devices such as smartphones, tablets, and PDAs are part of their learning toolkits [10, 22, 23]. Though it has been acknowledged that the use of smartphone technology in secondary schools enables learners and teachers to connect easily, create knowledge, and distribute it among each other at a faster pace [16], most schools still face challenges due to inadequate or unavailable technology infrastructure that supports the teaching and learning process. As most learners attend township schools, adequate technological infrastructure provision and development, as well as conducive environments for teaching and learning, are needed in these schools [18].

2.4. Perceptions of Educators on Smartphone Use as a Teaching and Learning Tool

In gaining and transferring 21st-century technological skills to learners, teachers need to be competent in the world of ICT. They require upgraded knowledge and skills to use mobile technologies successfully as m-learning tools in schools. According to Thannimalai and Raman [24], staff productivity will be significantly enhanced if they strive to develop their ICT skills in line with their duties. Similarly, Ebinu [25] highlights the importance of specialised training for staff to equip them with the skills and knowledge to perform their duties efficiently. Similarly, Thannimalai and Raman [24] and Raman, et al. [26] opine that principals play vital roles in ensuring technology integration in schools. This implies that SMT members and teachers in this changing environment of technology use need capacity-building programmes to adapt to the changing ways of teaching and learning in the 21st century. Evidently, principals and SMT members can be driving forces in the successful integration and use of technology by teachers and learners. Therefore, staff members' technological knowledge and skills are considered a valuable investment in schools' academic and knowledge growth [26].

In view of the above, SMT members are viewed as the originators and managers of change and development within the schools [27]. Further, empirical studies on smartphone use in education exist, with substantial literature in urban schools in developed countries [28]; however, empirical studies on smartphone use as an m-learning tool are rare in developing countries. It becomes imperative for educators in this 21st century to be prepared for teaching and learning for all learners in the classroom. This is because 21st-century youth are referred to as digital natives, as they believe in technology and make use of it for most part of their lives [28]. Invariably, learners have also shown their desire to use mobile devices for learning, as personal ownership of devices is growing every day [29]. This implies that educators in the 21st century need to embrace mobile technology use as a possible m-learning tool to support and promote teaching and learning. The growth in access to these devices is visible enough and can be found in all corners of schools' premises, from learners' pockets and hands to teachers' handbags and desks, with users either on social media or surfing the internet [30]. Mobile learning technologies enable teachers to create relevant, personalised, and differentiated learning experiences for their learners, with the possibility of interestingly increasing students' engagement [29].

3. Methodology

The study used a qualitative research approach. An explanatory sequential design was employed to achieve the aim of the study, which was to understand the perceptions of SMT members on the integration of smartphones as m-learning tools in secondary schools. Geographical parameters were strictly limited to educators and SMT members in King Cetshwayo District, which is one of the largest districts with a dispersed population in KwaZulu-Natal Province, South Africa. King Cetshwayo District is divided into clusters; hence, a cluster sampling technique, which is one of the probability sampling methods, was used. Table 1 represents the population from which the study sample was drawn. The

sample was drawn from five clusters: Kwadlangezwa, Esikhaleni, Empangeni, Richards Bay, and Eshowe.

Table 1.
Representation of the study population and sample size.

Clusters	Total population (N): number of secondary schools per cluster.	Sample size (n): number of selected secondary schools per cluster	Sample size (n) of principals in selected secondary schools
KwaDlangezwa	8	2	2
Esikhaleni	13	2	2
Empangeni	6	2	2
Richards Bay	7	2	2
Eshowe	10	2	2
Total	44	10	10

From the table above, each cluster was represented by two selected secondary schools, totaling ten schools, of which five were selected from rural areas and the other five from urban areas. Hence, the study data were collected from 10 selected secondary schools, and the sample comprised ten principals from the selected secondary schools. However, only eight principals were available for interviews. The collected data were analyzed using thematic analysis. The respondents' responses were transcribed and coded into four different themes that emerged: accessibility and availability, classroom integration, educational potential, training, and policies.

4. Discussion of the Study Findings

Smartphone use as a teaching and learning device simply entails having and dedicating more time to tasks and activities relating to schoolwork for both teachers and learners. M-learning practices have been adopted mostly by higher education institutions, with less focus on how secondary schools are faring in promoting teaching and learning in terms of m-learning adoption. That notwithstanding, the responses of the respondents (SMT) suggest that smartphones are the most preferred tools for m-learning among learners in secondary schools. The respondents were asked questions around the study themes presented in the previous section, the effectiveness of smartphones as useful m-learning tools in secondary schools, and the benefits derived from using them as m-learning tools. Conclusively, the responses of the respondents revealed that smartphone use as an m-learning tool in secondary schools is very effective. The responses are presented below.

4.1. Accessibility and Availability

M-learning is driven by its accessibility and availability because smartphones provide learners and educators with immediate and mobile access to learning resources, communication, and educational content anytime and anywhere. This accessibility significantly supports m-learning, particularly in resource-constrained environments such as King Cetshwayo District. To buttress this point, consider the response below.

“Because smartphones are readily available to teachers and learners, their use as an m-learning tool will benefit both, as access to information and communication can be quicker and always available.”

As so many people now own smartphones in urban and rural communities, respondents say that there is a need to infuse m-learning into teaching and learning for the betterment of both teachers and students.

“Smartphone ownership is vast in urban and rural communities. As secondary school leaders, it is our duty to find ways of effectively infusing smartphone technology use into our schools and to treat them as resourceful tools, not as gadgets that do not benefit learning.”

According to Nguyen and Chen [31], a notable advantage of m-learning is its ubiquity, which means that students do not need to bring so many gadgets to class; they only need their mobile devices. Some of the SMT members concur that;

“It is easily movable, and technological developments in smartphones have made it more of a personal computer. Perhaps, as the SMT, it is time we make up our minds and look into their use during school hours and in classes. For a start, allow learners in the classroom to use them to search for information related to the lesson of the day.”

“Instead of carrying many books, one smartphone can have all the required learning materials loaded, such as notes, textbooks, and rubrics for educators. It has become more of a computer than just a mobile phone.”

“Teaching and learning will be at the fingertips of teachers and learners if smartphones can be used as m-learning tools in secondary schools anytime and anywhere teaching and learning take place.”

“Smartphone technology is very powerful in the 21st century in terms of its size, capabilities, user-friendliness, and mobility. Secondary schools can benefit by providing more learning opportunities using mobile technologies.”

These findings are in line with Bukharaev and Altaher [32] findings, which reveal that m-learning has many educational benefits, such as facilitating the learning process from anywhere and at any time, which is also essential for meeting learners' learning needs. Moreover, through smartphones, educational experiences and materials can be provided to meet the needs of each learner and their circumstances. According to Eom [33], the integration of smartphones promotes self-directed learning and inquiry learning, as well as enhances the quality of the learning process. Additionally, the use of smartphones positively influences student-instructor and student-student dialogues.

4.2. Classroom Integration and Usage

Classroom integration and use of smartphones can be effectively done if guided by structured guidelines, digital monitoring, and ensuring alignment with the lesson goals. However, there are concerns about learners' distraction, but these can be addressed through goal-oriented use and monitoring. The guidelines should emphasise how, where, and for what smartphones should be used during teaching and learning in the classroom, with proper control and monitoring. For instance, smartphones can be used to search for information related to lesson topics. The respondents added their views on when they think smartphones should be integrated and effectively used as m-learning tools in the classroom.

“In the classroom, the educator allows learners to search for more relevant information related to the lesson topic.”

“When the school environment has been made suitable for mobile technologies to be part of the curriculum, learners, educators, communities, and officials have a clear purpose for using this technology in schools to benefit teaching and learning.”

“Possibly anywhere on the school premises and beyond, once there has been a proper guide to their use and learners' and educators' learning materials are made easily accessible on these devices.”

“Smartphones can be effectively used when learners have to access the internet to gather more information and understand the content of the lesson in the classroom, but must be monitored.”

Further, effective use must involve controlled internet access to educational and academic information related to classroom lesson content. According to Sharples, et al. [34], pedagogical frameworks should be used to guide mobile device use so that smartphones can be used in ways that enhance teaching and learning rather than distract.

“During teaching and learning, they have to be programmed for that purpose only so that learners do not use them for other purposes during classroom sessions.”

“They are going to be more effective if they are used in the classroom as a learning device, and they need to be always in good condition so that all learners can be at par with the educator and the content.”

“Schools have created an environment that uses a learning management system that allows learners and teachers to connect with each other and their learning materials anytime and anywhere using smartphones or tablets.”

“When school leaders have provided strategies for influencing educators and learners to see the benefits rather than the disadvantages of using smartphones as learning tools.”

Thomas and O'Bannon [35] assert that teachers' acceptance of mobile devices in classrooms increases when there are clear frameworks and devices are used for curriculum-aligned tasks. Furthermore, Kiger, et al. [36] assert that “mobile technology can positively impact learners' engagement and achievement when used in well-structured and goal-oriented activities in the classroom. M-learning should be integrated through carefully designed instructional strategies that address technological and pedagogical needs of learners [37].

4.3. Educational Potential

Educational potential refers to the set of resources made available to academics for the purpose of knowledge transfer and societal development, especially the use of smartphones in teaching and learning [38]. It points to the learning benefits and educational potential provided by smartphones, which include engagement enhancement, self-directed learning, all-time knowledge availability, and technological enrichment. Smartphones empower learners by allowing them to control their learning periods, igniting self-directed inquiries, attempting lesson-topic exercises and assessments, as well as accessing several multimedia contents that cover most of the subjects' lesson topics offered in secondary schools. The devices appeal to learners, and their quick familiarity with them is sufficient as an educational motivation tool. Below are some of the responses from the study respondents in terms of the educational potential of smartphones.

“Learners can self-assess and enrich themselves with information at any time using smartphones.”

“It is noticeable that learners find smartphones to be fun, enjoyable tools that can enhance m-learning.”

“Smartphones have technological strengths such as user-friendliness and handheld size that help schools enhance learning.”

“School leadership can influence positive mindsets towards the use of smartphones as potential educational learning tools.”

According to Faza and Lestari [39], self-regulated learning is described as a process whereby learners set their own academic goals, monitor their progress, and thereafter reflect on their performance and determine a positive way forward. These are all made possible and supported by mobile technologies and mobile devices, especially smartphones. Teaching and learning will have no boundaries because mobile technology, such as smartphones, is handheld, internet-enabled, and equipped with helpful user-friendly apps [40, 41]. Moreover, studies by Mao [41]; Stowers and Starkweather [42]; Norris, et al. [43] support the use of smartphones as potential tools for different educational contexts in the 21st century. Accordingly, Bala [4] and Evanoff [44] concur that mobile devices are becoming an integral part of schools' culture and, therefore, schools should adopt usage policies to embrace positive changes.

Furthermore, Alam and Mohanty [37] posit that smartphones do offer learners easy access to digital tools like apps, videos, and interactive simulations, which can encourage autonomous learning and ingenuity. Nonetheless, Bauer, et al. [45], in support of the above, assert that learners use mobile devices primarily for independent learning, research, and communication with peers and teachers, which contributes immensely to learners' deeper educational engagement. Again, Ibadova [46] concurs that mobile devices foster more learner-centred settings, which enable learners to learn in ways that suit their individual preferences and paces. Additionally, respondents' comments showed that smartphones can be effectively used in secondary schools and have the potential to enable learners to search for information relevant to their lesson topics. This is ultimately possible when the school environment is

technologically conducive and has its own Learning Management System that fully supports smartphone use.

4.4. Training and Policies

Insufficient training has been recognised as one of the barriers to the adoption of m-learning. Mabalane Junior [47] posits that integrating training programs for teachers on effective technology use can assist in bridging the gap between available m-learning opportunities and their practical implementation in the classroom. Indeed, the data responses indicated that training needs and policies are required to capacitate and guide the SMT members and teachers on smartphone use as m-learning tools in secondary schools. Below are some of their responses.

“The secondary education sector should provide training for the SMT and educators on using smartphones as m-learning tools and support this training with workshops and seminars to equip them with m-learning experiences and practices.”

It was reiterated that the Department of Basic Education (DBE) needs to provide proper guidance through workshops and various ICT training sessions because most educators see technology as intimidating. As noted by Osakwe, et al. [48], there is a substantial difference between teachers' perception of their competence in technology use and the amount of training needed before they can effectively use technology. The SMT members responded that;

“DBE must find ways to assist the SMT in how smartphones should be used and train them in the use and safekeeping of smartphones as learning tools, including policies, technical training, and procedures for the safe use of smartphones as m-learning tools in secondary schools.”

“DBE should provide all documentation, communication, and elementary training programmes for SMT and educators on the purpose of introducing smartphones as m-learning tools in secondary schools, so that schools are ready to adopt this technology.”

“Secondary schools' management teams and educators should be provided with the required training, skills, and resources to support and enhance m-learning. Unlike our learners, they are familiar with the use of smartphone technology in social life.”

Based on the views of the SMT members (respondents), it can be indicated that most educators have limited skills and capacity to use smartphones as m-learning tools in the selected secondary schools. Therefore, training needs and policy guidelines should be designed and prioritised by the DBE so that SMT members and educators can consider using smartphones as m-learning tools in secondary schools. According to Norris, et al. [43], one of the challenges of bringing technology use into schools is that either teachers are not provided with sufficient professional development or they are not provided with the essential technological tools. Inasmuch as there has been little support for smartphone use in teaching and learning processes, it is believed that this must be addressed through the professional development of SMT members and educators to realise the dream of fully using smartphones as m-learning tools in schools. Cochrane, et al. [49] posit that the role of leadership and institutional vision in supporting m-learning can never be over-emphasized. Hence, school leadership must provide an environment where technology use is planned, supported, and aligned with the school's learning goals.

5. Conclusion

Among all extant mobile technology devices, smartphones are the most widely owned and used by people of different age groups, especially youth. The aim of this study was to determine the perceptions of School Management Team members on the use of smartphones as m-learning tools in selected secondary schools in the King Cetshwayo District. The findings indicate that SMT members are positive about the view that smartphones provide learners and educators with anytime access to learning resources, enhanced student engagement, easy communication, and educational content from anywhere. Their accessibility significantly supports and enhances m-learning, particularly in resource-constrained environments. However, the availability of technological infrastructure, limited device

access, and insufficient training in effective mobile learning practices remain challenges, especially in township and rural secondary schools. These multifaceted challenges require policy attention to technological infrastructure, pedagogy, and school culture. When carefully executed, the use of smartphones may become a powerful tool for equitable, engaging, and individualised learning.

Smartphones as m-learning tools in secondary schools will benefit both teachers and learners during teaching and learning processes because of their influence on how things are done in the 21st century. Nonetheless, learners need technological skills in preparation for further academic study in higher education institutions, where mobile technology use for teaching and learning is a necessity. It is of great importance that secondary schools' educators start allowing and exposing learners to smartphones for their learning activities. The true strength of mobile learning lies in its ability to make education more accessible to diverse populations, especially in rural or under-resourced areas. UNESCO equally recognizes smartphones as powerful tools for educational equity, especially in regions where technology infrastructure is lacking, because they allow for continuous and on-demand learning. However, many teenagers are experts in the use of smartphones, while many educators are not; hence, the need for policy guidelines as well as training programmes on the implementation of smartphones as m-learning tools in secondary schools to transform educational outcomes.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Copyright:

© 2026 by the authors. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

References

- [1] T. Alam and M. Aljohani, "M-learning: Positioning the academics to the smart devices in the connected future," *JOIV: International Journal on Informatics Visualization*, vol. 4, no. 2, pp. 76-79, 2020. <https://dx.doi.org/10.30630/joiv.4.2.347>
- [2] G. Spencer-Smith and N. Roberts, "modified analytical framework for describing m-learning (as applied to early grade Mathematics)," *South African Journal of Childhood Education*, vol. 9, no. 1, pp. 1-11, 2019. <https://hdl.handle.net/10520/EJC-17338bf430>
- [3] M. S. Lediga and L. J. Ngoepe, "Exploring the effective use of mobile devices by previously disadvantaged English language student educators the constructivist way," *Per Linguam: A Journal of Language Learning= Per Linguam: Tydskrif vir Taalaanleer*, vol. 36, no. 2, pp. 104-125, 2020.
- [4] B. P. Bala, "Significant of smartphone: An educational technology tool for teaching and learning," *International Journal of Innovative Science and Research Technology*, vol. 5, no. 5, pp. 1634-1638, 2020.
- [5] M. S. Ahmed, "Technology acceptance of smartphones as mobile learning tools: A contextual comparative study of engineering and education colleges," Doctoral Dissertation, University of Canterbury]. University of Canterbury Research Repository, 2016.
- [6] T. Correa, I. Pavez, and J. Contreras, "Digital inclusion through mobile phones?: A comparison between mobile-only and computer users in internet access, skills and use," *Information, Communication & Society*, vol. 23, no. 7, pp. 1074-1091, 2020.
- [7] S. Memon, H. Shaikh, Q. Rind, and F. Dehraj, "Analysis of learning activities for children using smart phone applications in private schools," *Indian Journal of Science and Technology*, vol. 13, no. 34, pp. 3549-3554, 2020.
- [8] S. A. Coetzee, K. Leith, and A. Schmulian, "Accounting students access to social media related resources and the risk of tacit social exclusion," *Accounting Education*, vol. 28, no. 5, pp. 465-483, 2019. <https://doi.org/10.1080/09639284.2019.1641116>
- [9] S. Kadry and B. Ghazal, "Design and assessment of using smartphone application in the classroom to improve students' learning," *International Journal of Engineering Pedagogy*, vol. 9, no. 2, pp. 17-34, 2019.
- [10] F. Yu and A. Conway, "Mobile/smartphone use in higher education," in *Proceedings of the 2012 Southwest Decision Sciences Institute* (pp. 831-839). Conway, AR: Southwest Decision Sciences Institute, 2012.
- [11] Parent24, "Don't ban cell phones from schools," 2013. <https://x.com/Parent24>. [Accessed 25 May 2018]

- [12] P. Kaimara, S. M. Poulimenou, A. Oikonomou, I. Deliyannis, and A. Plerou, "Smartphones at schools? Yes, why not?," *European Journal of Engineering Research and Science*, vol. Special Issue: CIE 2018, pp. 1-6, 2019. <https://doi.org/10.24018/ejers.2019.0.CIE.1288>
- [13] D. Gachago, E. Ivala, J. Backhouse, J. P. Bosman, and V. Bozalek, "Towards a shared understanding of emerging technologies: Experiences in a collaborative research project in South Africa," *The African Journal of Information Systems*, vol. 5, no. 3, pp. 94-105, 2013.
- [14] A. Christopoulos and P. Sprangers, "Integration of educational technology during the Covid-19 pandemic: An analysis of teacher and student receptions," *Cogent Education*, vol. 8, no. 1, p. 1964690, 2021. <https://doi.org/10.1080/2331186X.2021.1964690>
- [15] T. Can, S. Kucuk, and I. Simsek, "Examining K-12 students' preferences and attitudes on mobile learning," *International Journal of Technology in Teaching and Learning*, vol. 15, no. 2, pp. 95-108, 2020.
- [16] A. Oluwadara, B. L. Kolapo, and I. C. Esobi, "Designing a framework for training teachers on mobile learning in Sub-Saharan Africa," *Journal of Education and Practice*, vol. 11, no. 32, pp. 57-66, 2020.
- [17] Y. B. Hermanto and V. A. Srimulyani, "The challenges of online learning during the covid-19 pandemic," *Jurnal Pendidikan Dan Pengajaran*, vol. 54, no. 1, pp. 46-57, 2021.
- [18] G. Chisango and N. Marongwe, "The digital divide at three disadvantaged secondary schools in Gauteng, South Africa," *Journal of Education (University of KwaZulu-Natal)*, no. 82, pp. 149-165, 2021.
- [19] R. Godwin-Jones, "Smartphones and language learning," *Language Learning & Technology*, vol. 21, no. 2, pp. 3-17, 2017.
- [20] C. A. Maloney, W. D. Abel, and H. J. McLeod, "Jamaican adolescents' receptiveness to digital mental health services: A cross-sectional survey from rural and urban communities," *Internet Interventions*, vol. 21, p. 100325, 2020. <https://doi.org/10.1016/j.invent.2020.100325>
- [21] J. Kaceti and B. Klímová, "Use of smartphone applications in english language learning—A challenge for foreign language education," *Education Sciences*, vol. 9, no. 3, p. 179, 2019. <https://doi.org/10.3390/educsci9030179>
- [22] A. Blilat and A. Ibriz, "Design and implementation of P2P based mobile app for collaborative learning in higher education," 2020.
- [23] B. Woodcock, A. Middleton, and A. Nortcliffe, "Considering the Smartphone learner: An investigation into student interest in the use of personal technology to enhance their learning," *Student Engagement and Experience Journal*, vol. 1, no. 1, pp. 1-15, 2012.
- [24] R. Thannimalai and A. Raman, "The influence of principals' technology leadership and professional development on teachers' Technology Integration in Secondary Schools," *Malaysian Journal of Learning and Instruction*, vol. 15, no. 1, pp. 201-226, 2018. <https://doi.org/10.32890/mjli2018.15.1.8>
- [25] A. A. Ebuonu, "Principals' decision-making and interpersonal management skills for effective administration of public secondary schools in Delta State, Nigeria," *Academic Research International*, vol. 10, no. 2, pp. 66-74, 2019.
- [26] A. Raman, Y. Don, and A. Kasim, "The relationship between principals' technology leadership and teachers' technology use in Malaysian secondary schools," *Asian Social Science*, vol. 10, no. 18, pp. 30-36, 2014. <http://doi.org/10.5539/ass.v10n18p30>
- [27] K. Klinck, N. Thutulwa, and A.-M. Pelser, "Creating a high-performing school management team: Bringing talent to the table for effective service delivery," *Frontiers in Education*, vol. 8, p. 1228181, 2023. <https://doi.org/10.3389/feduc.2023.1228181>
- [28] K. Moodley, W. Fraser, and M. Graham, "Factors enhancing mobile technology acceptance: A case study of 15 teachers in a Pretoria secondary school," *South African Journal of Education*, vol. 40, pp. s1-s16, 2020. <https://doi.org/10.15700/saje.v40ns2a1791>
- [29] K. Nikolopoulou, "Secondary education teachers' perceptions of mobile phone and tablet use in classrooms: Benefits, constraints and concerns," *Journal of Computers in Education*, vol. 7, pp. 257-275, 2020. <https://doi.org/10.1007/s40692-020-00156-7>
- [30] D. Mutambara and A. Bayaga, "Predicting rural stem teachers' acceptance of mobile learning in the fourth industrial revolution," *Journal of Construction Project Management and Innovation*, vol. 10, no. 2, pp. 14-29, 2020.
- [31] B. T. Nguyen and Y.-J. Chen, "A FRAME model-based investigation into the implementation of m-learning in classrooms from the perspectives of Vietnamese high school teachers and students in Southern Vietnam," *Vietnam Journal of Education*, vol. 8, no. 3, pp. 228-242, 2024. <https://doi.org/10.52296/vje.2024.403>
- [32] N. Bukharaev and A. W. Altaher, "Mobile learning education has become more accessible," *American Journal of Computer Science and Information Technology*, vol. 5, no. 2, pp. 1-5, 2017.
- [33] S. Eom, "The effects of the use of mobile devices on the E-learning process and perceived learning outcomes in university online education," *E-learning and Digital Media*, vol. 20, no. 1, pp. 80-101, 2023. <https://doi.org/10.1177/20427530221107775>
- [34] M. Sharples *et al.*, *Innovating pedagogy 2014: Exploring new forms of teaching, learning and assessment, to guide educators and policy makers*. Milton Keynes, United Kingdom: The Open University, 2014.
- [35] K. Thomas and B. O'Bannon, "Cell phones in the classroom: Preservice teachers' perceptions," *Journal of Digital Learning in Teacher Education*, vol. 30, no. 1, pp. 11-20, 2013. <https://doi.org/10.1080/21532974.2013.10784721>

- [36] D. Kiger, D. Herro, and D. Prunty, "Examining the influence of a mobile learning intervention on third grade math achievement," *Journal of Research on Technology in Education*, vol. 45, no. 1, pp. 61-82, 2012.
- [37] A. Alam and A. Mohanty, "Educational technology: Exploring the convergence of technology and pedagogy through mobility, interactivity, AI, and learning tools," *Cogent Engineering*, vol. 10, no. 2, p. 2283282, 2023. <https://doi.org/10.1080/23311916.2023.2283282>
- [38] R. Antczak-Jarząbska, A. Akberdiyeva, K. Kurowska-Wilczyńska, and J. Piwnik, "The role of educational potential in shaping the labor market: How universities can support graduates' employability," *Scientific Papers of Silesian University of Technology. Organization & Management/Zeszyty Naukowe Politechniki Śląskiej. Seria Organizacji i Zarządzanie*, no. 238, pp. 9-24, 2025.
- [39] A. Faza and I. A. Lestari, "Self-regulated learning in the digital age: A systematic review of strategies, technologies, benefits, and challenges," *International Review of Research in Open and Distributed Learning*, vol. 26, no. 2, pp. 23-58, 2025. <https://doi.org/10.19173/irrodl.v26i2.8119>
- [40] C. Reese Bomhold, "Educational use of smart phone technology: A survey of mobile phone application use by undergraduate university students," *Program*, vol. 47, no. 4, pp. 424-436, 2013. <https://doi.org/10.1108/PROG-01-2013-0003>
- [41] Y. Mao, "Efficient Communication for Mobile Devices in the New Era," 2020.
- [42] E. Stowers and W. Starkweather, "Smartphones: A potential discovery tool," *Information Technology and Libraries*, vol. 28, no. 4, pp. 187-188, 2009.
- [43] C. Norris, A. Hossain, and E. Soloway, "Using smartphones as essential tools for learning: A call to place schools on the right side of the 21st century," *Educational Technology*, vol. 51, no. 3, pp. 18-25, 2011.
- [44] J. Evanoff, "Okay, class, take out your phones," *The Idea of an Essay*, vol. 1, no. 1, p. 22, 2014.
- [45] S. Bauer, R. Seilhamer, B. Chen, and B. Bennett, "Students' mobile learning practices in higher education: A multi-year study. EDUCAUSE Review (Online)," 2015. <https://er.educause.edu/articles/2015/6/students-mobile-learning-practices-in-higher-education-a-multiyear-study>
- [46] A. Ibadova, "The role of mobile technology in language learning: A study on university students," *International Journal of Technology in Education and Science*, vol. 10, no. 2, pp. 295-310, 2026.
- [47] D. K. Mabalane Junior, "Analyzing teachers' perceptions of mobile learning in senior secondary schools: A FRAME model perspective in Sub-Saharan Africa," *Journal of Educational Technology Development and Exchange*, vol. 18, no. 2, pp. 127-150, 2025.
- [48] J. O. Osakwe, D. Nomusa, and N. Jere, "Teacher and learner perceptions on mobile learning technology: A case of Namibian high schools from the Hardap region," *Online Submission*, vol. 1, no. 1, pp. 13-41, 2017.
- [49] T. Cochrane, L. Antonczak, M. Guinibert, D. Mulrennan, V. Rive, and A. Withell, *A framework for designing transformative mobile learning. In Mobile learning in higher education in the Asia-Pacific region: Harnessing trends and challenging orthodoxies*. Singapore: Springer Singapore, 2017.