



Smartphone Integration as an M-Learning Tool for Educators at Secondary Schools in Kwazulu-Natal Province

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ABSTRACT

Smartphones have become an essential and integral part of our daily lives and have been recognized as the driving factor for teaching and learning in secondary schools because of the changes that technology has brought into the educational sphere and life at large. The objective of this study is to access the promotion of smartphone use as m-learning tools and the effect of its usage in secondary schools at KwaZulu-Natal Province, South Africa. The research method employed to achieve the objectives was quantitative research method with the use of questionnaires to collect empirical data from 135 educators from selected secondary schools at King Cetshwayo District in KwaZulu-Natal Province. The educators were chosen because they are the key role players in technology use and acceptance in secondary schools for teaching and learning purposes. The result shows that educators believe that smartphones should be promoted in secondary schools because of their effective use in enhancing teaching and learning but requires development of school policy guiding the use in school's context. The study recommends that the Department of Basic Education (DBE) should develop policies and strategies for school management teams (SMT) and educators that will promote the use of smartphones as m-learning tools in secondary schools.

Keywords: Smartphones, M-learning, Technology, Secondary schools, Educators

1. INTRODUCTION

COVID-19 pandemic brought real life disturbances in the world and uncertainty in the education sector in many countries including South Africa. The vagueness of the situation necessitated the use of mobile technologies and new strategies so that teaching and learning can be effectively delivered remotely. Moreover, the challenges of systematic Information Technology (IT) infrastructure development for schools inhibits effective teaching and learning. Hence, COVID-19 period validated the need for the use of smartphones as mobile- learning (m-learning) tools and educators reliance on smartphone technology thus becoming unavoidable. M-learning is defined as learning through mobile devices (Roberts and Spencer- Smith, 2019). Smartphones and tablets are leading the industry as the most used mobile technologies around the world. Mobile learning content, knowledge, and information can be accessed through the smartphone which basically requires wireless networks, mobile networks and mobile technologies to be at its best practice.

However, it should be noted that there are some urban secondary schools which have created ways of using the smartphone as an m-learning tool, while rural secondary schools are still struggling on how to utilize the smartphone to do the same. For urban secondary schools, the SMT and educators have the obligation to manage and control smartphone use for learning, because in most schools, educators and learners seem to have smartphones. Hence, it is the management obligation to manage smartphone use as m-learning tool. Therefore, this research explores how secondary schools SMT members and educators perceive the use of smartphones as m-learning tools in secondary schools. SMT members and educators are supported by the National ICT Policy on technology use in schools for the betterment of teaching and learning, irrespective of the context of the schools (Mwapwele, Marais, Dlamini, and Biljon 2020). Therefore, there is a possibility that secondary schools will benefit from using smartphones as m-learning tools than prohibiting them on school premises. The

integration of smartphones in learning for secondary schools will also assist in preparing secondary education in the implementation of the ICT policy which promotes life-long learning through technology use.

2. LITERATURE REVIEW

Smith, Stair, Blackburn and Easley (2018) state that smart phones can be considered as a component of Information Communication Technology (ICT), which can be adopted by educators as instructional tools. The initial reason for the inclusion of smartphones in teaching and learning by institutions is to promote learning and to ensure that the learning environment increases students' participation (Aljaloud, Gromik, Kwan and Billingsley, 2019). In addition to being a tool for communication, mobile phones are a vital part of everyone's social and professional lives. In both developed and developing countries, mobile phones are widely used even during learning processes (Roberts and Spencer-Smith, 2019). Technological advances have brought additional opportunities to mobile learning in the new era, making it possible and easy to enrich individual learners' learning experiences (Qureshi, Khan, Hassan Gillani and Raza, 2020). The opportunities offered by the most recent mobile technology (smartphone) present new opportunities and challenges to educational systems. Abubakari, Sumaila, and Abdulai (2021) confirm that with the 3G internet-capable mobile phones, there are over 60 000 apps (software applications), and these apps are promising to be part of educational development. Lediga and Ngoepe (2020) 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.

Wireless mobile technologies use in education provide various styles of learning that suit different needs of learners of the 21st century. Mobile technologies are mobile devices that have a web browser, instant messenger system, audio recorder, audio player, video recorder and gaming system etc. (Bulus, 2020). Their mobility feature allows the user to stay connected in performing a variety of tasks on the move, unlike computers (Memon et al., 2020). These mobile technologies can share electronic media content like photographs, videos, and data wirelessly via radio waves, microwaves, infrared, GPS, and Bluetooth media sharing protocols, such as 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 the personal usability (Bulus, 2020). These mobile technologies include cell phones, Tablets, PDAs, Smartphones, and Notebooks which use GSM, Bluetooth and other wireless communication protocols. According to Correa, Pavez, and Contreras (2020) there is so much movement of internet viewing because many internet users view via the smartphone or tablet. Memon et al. (2020) state that advancements in the mobile technologies industry through the smartphone and tablet have resulted in ubiquitous computing lifestyles that encompass social, professional, educational, and economic aspects and space. These advancements in mobile technologies have opportunities and benefits for secondary schools to be supported in advancing teaching and learning. The smartphone ease connection to the internet and provide learners with more resources that enable them to expand their knowledge and share with peers at the same time.

Smartphones are permanently connected to the internet type of device using an open access operating system which allows the learners to customize learning according to their own needs. This customization allows the users to do what they want to do with the device (Yu and Conway, 2012). The smartphone is also referred to as Work Extending Technologies (WET), meaning they allow the user to work and be productive away from offices or organizational premises (Thulin, Vilhelmson and Johansson, 2019). Therefore, smartphones' use as electronic-learning (e-learning) tools by secondary schools may allow learners to learn even beyond classroom walls extending their learning hours. The research focuses on the evolution of smartphones as the potential tool to enhance and enable e-learning in secondary schools, where technological resources (i.e. computers and laptops) are minimal. Moreover, many research studies around the globe (Bulus, 2020; Chisango and Marongwe, 2021) view the smartphone as the device that is going to bridge the technology divide between developed and developing countries through its use for social and professional context, and its dominance in the market of technological devices. Further, Kaceti and Klimova (2019) 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 system. Since it promotes reading and writing through social media, e-mails, instant messages, and SMS, the smartphone can be part of secondary school learners' tool to develop their reading and writing skills. Research studies conducted in Higher Education (HE) settings on smartphone potential use of a learning tool for students, indicated that mobile technologies devices such as smartphones, tablets, and PDAs are part of their learning tool kit (Blilat and Ibriz, 2020). Therefore, conducting this type of research on promoting smartphones use in secondary schools as m-learning tool can assist in providing secondary school learners with a smooth transition to HE environment in South Africa and abroad. Moreover, most universities send students text that reminds them of due dates, examination dates and results, information that is important to the students' lives at the university level. It makes them feel like they are part of the university family and synergy to do better academically. Irrespective of people's location, smartphone developments and use in a social and professional context has been integrated into people's lives

promoting mobile technology use in different settings whether rural or urban (Maloney, Abel and McLeod, 2020).

In South Africa there are schools that have adopted smartphones as m-learning tools meaning they are using technologically aligned approaches to teaching and learning (Mutambara and Bayaga, 2020). However, current m-learning approaches are at the initial stages of practice and adoption especially in Gauteng and Western Cape Provinces. The use of mobile technologies was initially thought of as belonging to people of a certain class and predominantly in urban areas. Thenceforward, it is no longer the case because of the availability of smartphones and their prices are affordable. A study by Mao (2020) shows that students are more engaged when using the SMS mobile service than other users of basic mobile phones. These services include services such as Multimedia Messages Service (MMS), accessing the web with HTML Browser, e-mails, JAVA, and WAP, used to view the internet on mobile phones. Young people need easy access to the latest technologies and services provided by smartphones, because many of m-learning activities and services can be provided through smartphone use. In as much as a smartphone is a dynamic tool in many industries; it can also be suitable as a learning tool. It also has features that allow learning to happen on the move, or anytime and anywhere, thus transforming and bringing many opportunities in the education sector. Furthermore, research by Ahmad, Javed and Naveed (2020), revealed that respondents in their study uses smartphones over laptops and other movable wireless technologies for m-learning. The estimation of smartphones penetration in the African continent is 929,9 million by 2021 (Boateng, Annor and Kumbol, 2021). In the South African market there was 72,9% increase on smartphone subscription from 2016-2017 (Oksiutyez and Lubinga, 2021). The statistics paint a good picture of people who have access to mobile phones which can be used for education as well. Smartphones are rising in popularity and rapidly in various fields in life such as education (Memon, Shaikth, Rind and Dehraj, 2020). Young adults are viewed as one of the population groups that have great access to mobile networks (Johnson, 2020). The smartphone technology is considered to be the best tool that enhances the performance of students (Ahmed, Salman, Malik, Streimikiene, Soomro and Pahi, 2020).

Integration of Mobile Technologies in Secondary Education

Smartphones play vital roles in business, health institutions, educational institutions and in many other sectors especially during the COVID-19 era. There is much to learn about the use of smartphones as learning tools for secondary schools, even beyond the pandemic. Therefore, whether in urban or rural areas, our educators need to be prepared and be ready to benefit from the use of smartphones as m-learning tools in schools. In using technologies and mobile devices such as the smartphone as an educational tool depends on the attitudes and perceptions of parents, teachers, students and the attitudes reflected by the policymakers (Godwin-Jones, 2017). The author further highlights that smartphones play a vital role on pre-service teachers' teaching methods and strategies, as they are used to obtain information about their lessons. Therefore, conducting this type of research on promoting smartphones use in secondary schools as teaching and learning tool can assist in providing secondary school learners with a smooth transition to HE environment in South Africa and abroad. However, irrespective of peoples' location, the smartphone developments and use in a social and professional context has been integrated into people's lives promoting mobile technology use in different settings whether rural or urban (Maloney, Abel and McLeod, 2020). Kacatl and Klimova (2019) 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. Since it promotes reading and writing through social media, e-mails, instant messages, and SMS, the smartphone can be part of secondary school learners' tool to develop their reading and writing skills. Most secondary schools in South Africa are in township and some in rural areas (Chisango and Marongwe, 2021). They face challenges such as the unavailability of required resources such as computers and laptops to support teaching and learning process. The use of smartphone technology in secondary schools will enable learners and teachers to connect, create knowledge and distribute it among each other at a faster pace (Oluwadara, Kolapo and Esobi, 2020).

Technological developments are crucial as majority of learners attend schools in townships. Smartphones act as the right tool to facilitate and foster m-learning in educational institutions with smart teaching and learning anytime anywhere. It is seen as an innovative tool ready to be fully understood by secondary schools' educators as a useful education technology device for long life learning (Bulus, 2020). The acceptance of smartphones as teaching and learning tools in rural and urban secondary schools require technological infrastructure and a conducive environment for teaching and learning (Chisango and Marongwe, 2021). However, as much as smartphone technology has come to stay, its advent in the school setting is still posing challenge to many educators (Bulus, 2020). The smartphone is one of the best education technology tool teachers can use to produce lessons content learning materials at their convenience and disseminate to learners (Bulus, 2020). Nonetheless, there are factors that encourage the use of technology in schools which need to be understood to infuse more technological hardware and software applications to promote technology use in schools. Most youth are fascinated by using smartphones in social practice which leads to them being more focused on it than focusing on schoolwork. This implies that the adoption, use, of smartphone technology could promote m-

learning. Further, Chatterjee, et al. (2020) found that technology use in schools has some advantages, such that the teaching of lessons becomes interesting, and learners become motivated to enjoy their lessons. Hence, educators' use of technology motivates and makes learners learning more interesting, however, it starts with the educators' willingness to use the technology. In view of the above, these authors (Kafyulilo, Fisser and Voogt, 2016; Chatterjee, et al., 2020 and Chisango and Marongwe, 2021) posit that the challenges that hamper technology use in schools include, ease of use, lack of technological tools, inadequate ICT, effectiveness of the technology in use to support teaching and learning, lack of support and motivation from the school management team and educators who never used technology in teaching.

3. METHODOLOGY

The study used a quantitative research approach. Explanatory sequential design was employed, and the geographical parameters were strictly limited to educators at King Cetshwayo District which is one of the largest with dispersed population in KZN. King Cetshwayo District is divided into clusters; hence, cluster sampling technique was used. In compliance with ethical standards in research, ethical clearance was first sought and received. Thereafter, permission to conduct research was received from all participating schools. The study participants were informed that they were at liberty to pull out of the study at any time they felt uncomfortable. Questionnaires were then distributed to 140 educators which were selected from the population made up of 5 clusters which were Kwadlangezwa, Esikhaleni, Empangeni, Richards Bay and Eshowe. One hundred and thirty-five (135) questionnaires were completed and returned representing a response rate of 96%, which is acceptable and reliable for data analysis. The data collected were analyzed using Statistical Package for the Social Sciences (SPSS).

Findings and Discussion

Table 1 below represents the biographical profile of the respondents. From the table below, it can be deduced that out of the 135 respondents, 60% of them were females and 40% were male respondents which indicates that majority of the respondents were female.

Table 1: Biographical profile of the study respondents

Variables		Frequency	Percent	Cumulative Percent
Gender	Male	54	40.0	40.0
	Female	81	60.0	100.0
Age	Below 29 years	25	18.5	18.5
	30-39 years	42	31.1	49.6
	40-49 years	40	29.6	79.3
	Over 50 years	28	20.7	100.0
Position	Principal	19	14.1	14.1
	Head of Department Educator	38	28.1	42.2
		78	57.8	100.0
Job Experience	Below 5 years	26	34.1	34.1
	6-10 years	17	12.6	46.7
	11-15 years	17	12.6	59.3
	16-20 years	24	17.8	77.0
	Over 20 years	31	23.0	100.0
Mobile Devices	Smart Phone Tablet	95	70.4	70.4
	Both	2	1.5	71.9
	None	36	26.7	98.5
		2	1.5	100.0
Use of mobile devices for teaching	Smart Phone Tablet	86	63.7	63.7
	Both	5	3.7	67.3
	None	26	19.3	86.7
		18	13.3	100.0
Awareness of online resources available	FUNducation SABC Education	2	1.5	1.5
	Thutong National Portal	77	57.0	58.5
	Teacherpedia	5	3.7	62.2
	Maths Excellence	37	27.4	89.6
	Maths Online	4	3.0	92.6
		10	7.4	100.0

The respondents were divided into four age groups: below 29years, 30-39years, 40-49years, and those of over 50years. From these age groups above, the 30 to 39years group represents most respondents with 31.1%. With

regards to the positions of the respondents, principals comprised 14.1% of the positions, HoDs were 28.1%, and the educators were in the majority with 57.8% of the total numbers. The highest number of teaching experiences were those that fall in the bracket of 5 years and less, whose percentage representation is 34.1%. Those with job experience of 20 years and above have 23% representation, 16 to 20 years have 17.8% representation, while the respondents with job experience of 6 to 10 years and 11 to 15 years were represented with 12.6% respectively.

Further, “to determine the ownership of mobile devices from the respondents, for willingness and readiness to use as m-learning tools in secondary schools”, the findings revealed; that 70.4% of the respondents owned a smartphone, and 26.7% owned both smartphone and a tablet. Equally, the result showed that 1.5% of the respondents did not own any mobile device, while 2% of the respondents only owned a tablet. Furthermore, “to indicate the willingness and readiness of the respondents to support the use of mobile devices as m-learning tools”, the results revealed; that 63.7% of the respondents support the use of smartphone as a teaching mobile device for m-learning. 19.3% of the respondents supported the use of both smartphones and tablets, while 3.7% of the respondents indicated the use of a tablet for m-learning. Nonetheless, 13.3% of the respondents did not indicate any device as an m-learning mobile device for teaching.

Moreover, “to determine respondents’ awareness of the available online learning resources”, the findings revealed; most of the respondents with 57% representation indicated that SABC Education is the common online learning resource they were aware of. SABC Education is an initiative by DBE in promoting online learning. Respondents with 27.4% representation indicated that Teacherpedia is the online learning resource they were aware of, 7.4% indicated Math online learning resource, while 3.7% of the respondents were aware of the Thutong National Education Portal. Nevertheless, 3% of the respondents indicated that they were aware of Maths Excellence online learning resource, and 1.5% of the respondents indicated that they were aware of FUNducation online learning resource.

Descriptive Statistics

To access the promotion of smartphone-use as m-learning tool in secondary school’s education, seven questions were designed using a 5-point Likert scale ranging from Strongly Agree to Strongly Disagree. These questions were aimed at assessing the respondents’ views, experiences and perceptions in determining the effectiveness of smartphone usage as an m- learning tool in secondary schools.

Table 2: Promotion of smartphone

Promotion of smartphone use as m-learning tools in secondary schools	SA	A	N	D	SD
1. Smartphones are useful tools for m-learning in secondary schools.	47.4	46.7	3.7	1.5	0.7
2. Smartphone access should be promoted in secondary schools to enhance m-learning.	42.2	52.6	3.7	0.7	0.7
3. More knowledge and content are generated if smartphones are used as m-learning tools in secondary schools.	44.4	46.7	6.7	2.2	0.0
4. Smartphone use enhances teaching and learning in secondary schools.	43.7	50.4	4.4	1.5	0.0
5. Inappropriate use of smartphones in secondary schools disrupts teaching and learning.	45.9	37.8	4.4	5.2	6.7
6. Each secondary school requires a school policy according to the school’s context to promote smartphones use as m-learning tools.	51.1	40.0	6.7	2.2	0.0
7. Smartphone is an effective tool for using online learning resources from the internet.	51.7	42.2	4.4	1.5	0.0

(SA = Strongly Agree; A = Agree; N = Neutral; D = Disagree; SD = Strongly Disagree)

Table 2 above revealed that most of the responses from all 7 questions have high percentages in the strongly agree and agree categories, revealing that the smartphone is the best effective m-learning tool that can be used by secondary schools’ learners. However, in question number 5, the respondents agreed that smartphones can be destructive and ineffective during teaching and learning if not used properly and accordingly. These findings support the notions by Aloteibi, Ratanasiripong and Priede (2024) who expressed the importance of promoting the use of smartphones in secondary schools by emphasizing the need to regulate learner’s smartphone usage, so that these devices can serve as an effective and efficient tools for m- learning and not seen as distraction or destructive.

In determining how the respondents perceive the effect of smartphone use as an m-learning tools in secondary schools, 8 questions which were structured in a “Yes”, “No” and “undecided” scale were asked. The responses are revealed in table 3 below.

Table 3: Effect of smartphone use as m-learning tools

Effect of smartphone use as m-learning tools in secondary schools	Yes	No	Undecided
1. Smartphone technology has brought about advancements in teaching and learning settings.	92.6	2.2	5.2
2. Smartphone technology use allows learners and educators to stay connected with each other to share learning resources.	94.8	2.2	3.0
3. Using the smartphone for education is enjoyable.	85.9	3.0	11.1
4. The mobility of smartphone enhances learning anytime and anywhere.	94.8	3.0	2.2
5. Smartphones easily connect teachers and learners to online learning resources.	97.8	1.5	0.7
6. Important stakeholders in the secondary education sector think that smartphones can be used as an m-learning tool.	80.7	5.2	14.1
7. Teachers and learners are addicted to their smartphones.	77.0	5.2	17.8
8. M-learning is easily promoted using smartphone technology.	88.1	1.5	10.4

As shown in table 3 above, the responses from the respondents revealed to what extent the effect of using smartphone as m-learning tools in secondary schools is perceived. The results showed that most of the responses have high percentages in the 'yes' category, confirming that indeed smartphone technology is relevant and has brought about some positive advancements in the teaching and learning sector. Again, smartphones make learning enjoyable, connects learners and educators whenever needed, anytime and anywhere. As perceived, SMT and other important stakeholders in the secondary education sector posit that smartphones can be used as an m-learning tools. These findings agree with the findings of Ahmad, Sewani and Ali (2024) study, where it is highlighted that the use of smartphone is effective in supporting learners to gain new skills, like critical thinking and problem-solving skills.

Table 4: Reliability test**Reliability Statistics**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.812	.781	15

The reliability analysis was carried out for the entire study, the questionnaire which had 15 items was used (across all sections of the instrument). Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. All value-indicators mentioned in table 2 were well above the prescribed 0.7, excellent! According to Hussey, Alsalti, Bosco, Elson and Arslan (2025), Cronbach's alpha should have values higher than 0.7 to be deemed reliable. The Cronbach's Alpha indicated that the questionnaire has reached the accepted reliability of 0.812 which indicates that the instrument is reliable and has high internal consistency.

Table 5: KMO test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.706
Bartlett's Test of Sphericity	Approx. Chi-Square	1581.495
	Df	528
	Sig.	0.000

Kaiser-Meyer-Olkin (KMO) test was conducted to measure internal consistency and assess the adequacy of the correlation matrix for factor analysis. The rule of thumb indicates that KMO values near 1.0 supports factor analysis and that anything less than 0.5 is not amenable to useful factor analysis. Findings from the present study show that the KMO is 0.706 indicating the appropriateness and validity of the study to use factor analysis. The study results showed a Bartlett's test value of 0.000 which is a small value indicating the significance of relationship of the variables and useful for factor analysis.

4. DISCUSSION AND CONCLUSION

Smartphone has become one of the most powerful and important devices used in the educational field because of its ubiquitous nature. One of the main functions of its usage in secondary schools is to promote and improve schools' effectiveness and efficiency in teaching and learning. It is crucial to promote and develop new strategies

and ways of infusing and supporting technology usage in schools for the betterment of the teachers and learners use of the technology for teaching and learning purposes. Kafyulilo et al. (2016) revealed that most schools without technological resources lack support from school management teams (SMT), as some have never used technology in their teaching and learning. This results in demotivation of educators and learners in using their smartphones as tools to enhance teaching and learning. SMT members in a democratic country are entrusted with the authority and responsibility to formulate and adopt school policies on the range of issues including the use of technology to improve learners' performance.

Consequently, managers of today's knowledge where smartphone technology is part of the business tools are benefiting from the ubiquitous nature of the device. School books and other learning materials are at the learners' fingertips if they are allowed to use smartphones as a tool to support curriculum implementation. As such, smartphones should be seen as an auspicious tool for improved learning and exploration. That notwithstanding, the findings of this study revealed that the use of technologies such as smartphones as an m-learning tools should be adopted for effective teaching and learning in secondary schools but requires appropriate management strategies to regulate its usage. The study recommends that the Department of Basic Education (DBE) should develop strategies for school management teams and educators to promote the use of smartphones as an m-learning tools in secondary schools.

REFERENCE

1. Abubakari, A. R., Sumaila, E. and Abdulai, M. S. (2021). Examining the Application of Mobile Phone in Business Practice Among Small Scale Businesses in Tamale Metropolis. *SSRG International Journal of Economics and Management Studies*, 8(2), 87-98.
2. Ahmad, N., Sewani, R. and Ali, Z. (2024). THE USE OF SMARTPHONES IN SHAPING OF STUDENTS' ACADEMIC PERFORMANCE AT SECONDARY SCHOOL LEVEL. *Journal of Social Sciences Development*, 3(2), pp.128-141.
3. Ahmed, R. R., Salman, F., Malik, S. A., Streimikiene, D., Soomro, R. H. and Pahi, M. H. (2020). Smartphone use and academic performance of university students: A mediation and moderation analysis. *Sustainability*, 12(1), 439.
4. Ahmad, R., Javed, F. and Naveed, S. (2020). Integration of Mobile Learning in Education: Perceptions of Prospective Teachers. *Global Regional Review*, 3, 288-296.
5. Aljaloud, A. S., Gromik, N., Kwan, P. and Billingsley, W. (2019). Saudi undergraduate students' perceptions of the use of smartphone clicker apps on learning performance. *Australasian Journal of Educational Technology*, 35(1).
6. Aloteibi, S., Ratanasiripong, P. and Priede, A. (2024). Teachers' Perspectives Toward Smartphone Usage by Students and Resulting Classroom Policies. *Journal of School Administration Research and Development*, 9(2), pp.66-75.
7. Bilal, A. and Ibriz, A. (2020). Design and Implementation of P2P Based Mobile App for Collaborative Learning in Higher Education
8. Boateng, G., Annor, P.S. and Kumbol, V.W.A., (2021). Suacode Africa: Teaching coding online to Africans using smartphones. In *Proceedings of the 10th Computer Science Education Research Conference*, pp. 14-20.
9. Bala, B.P. (2020). Significant of smartphone: an educational technology tool for teaching and learning. *International Journal of Innovative Science and Research Technology*, 5(5), pp.1634- 1638.
10. Chatterjee, S., Majumdar, D., Misra, S. and Damaševičius, R. (2020). Adoption of mobile applications for teaching-learning process in rural girls' schools in India: an empirical study. *Education and Information Technologies*, 1-20.
11. Chisango, G. and Marongwe, N. (2021). The digital divide at three disadvantaged secondary schools in Gauteng, South Africa. *Journal of Education (University of KwaZulu-Natal)*, (82), 149-165.
12. Correa, T., Pavez, I. and Contreras, J. (2020). Digital inclusion through mobile phones: A comparison between mobile-only and computer users in internet access, skills and use. *Information, Communication & Society*, 23(7), 1074-1091.
13. Godwin-Jones, R. (2017). Smartphones and language learning. *Language Learning & Technology*, 21(2), 3-17.
14. Hussey, I., Alsalti, T., Bosco, F., Elson, M. and Arslan, R. (2025). An Aberrant Abundance of Cronbach's Alpha Values at .70. *Advances in Methods and Practices in Psychological Science*, 8(1), 1-18.
15. Johnson, D. (2020). Assessment of COVID-19 Contact Tracing Options for South Africa. [Online] Available from: <https://policycommons.net/artifacts/1445761/assessment-of-contact-tracing-options-for-south-africa/2077525/> [Assessed 27 May 2025].
16. Kacatl, J. and Klímová, B. (2019). Use of smartphone applications in English language learning-A challenge for foreign language education. *Education Sciences*, 9(3), 179.
17. Kafyulilo, A., Fisser, P. and Voogt, J. (2016). Factors affecting teachers' continuation of technology use in teaching. *Education and Information Technologies*, 21(6), 1535-1554.
18. Lediga, M. S. and Ngoepe, L. J. (2020). 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*, 36(2), 104-125.
19. Maloney, C. A., Abel, W. D. and McLeod, H. J. (2020). Jamaican adolescents' receptiveness to digital mental health services: A cross-sectional survey from rural and urban communities. *Internet Interventions*, 21, 100325.
 20. Mao, Y. (2020). Efficient Communication for Mobile Devices in the New Era.
 21. Memon, S., Shaikh, H., Rind, Q. B. and Dehraj, F. U. H. (2020). Analysis of learning activities for children using smart phone applications in private schools. *Indian Journal of Science and Technology*, 13(34), 3549-3554.
 22. Moodley, K., Callaghan, P., Fraser, W. J. and Graham, M. A. (2020). Factors enhancing mobile technology acceptance: A case study of 15 teachers in a Pretoria secondary school. *South African Journal of Education*, 40(2), S1-S16.
 23. Mutambara, D. and Bayaga, A. (2020). Predicting Rural Stem Teachers' acceptance of Mobile Learning in the Fourth Industrial Revolution. *Journal of Construction Project Management and Innovation*, 10(2), 14-29.
 24. Mwapwele, S. D., Marais, M., Dlamini, S. and Van Biljon, J. (2019). Teachers' ICT Adoption in South African Rural Schools: A Study of Technology Readiness and Implications for the South Africa Connect Broadband Policy. *The African Journal of Information and Communication*, 24, 1-21.
 25. Oksiutyc, A. and Lubinga, E. (2021). Factors affecting the adoption of personal safety apps among millennials in Johannesburg, South Africa. *South African Journal of Information Management*, 23(1), 1-9.
 26. Oluwadara, A., Kolapo, B. L. and Esobi, I. C. (2020). Designing a Framework for Training Teachers on Mobile Learning in Sub-Sahara Africa.
 27. Qureshi, M. I., Khan, N., Hassan Gillani, S. M. A. and Raza, H. (2020). A Systematic Review of Past Decade of Mobile Learning: What we Learned and Where to Go. *International Journal of Interactive Mobile Technologies*, 14(6).
 28. Smith, H. E., Stair, K. S., Blackburn, J. J. and Easley, M. (2018). Is There an App for That?: Describing Smartphone Availability and Educational Technology Adoption Level of Louisiana School-Based Agricultural Educators. *Journal of Agricultural Education*, 59(1), 238-254.
 29. Spencer-Smith, G. and Roberts, N. (2019). modified analytical framework for describing m- learning (as applied to early grade Mathematics). *South African Journal of Childhood Education*, 9(1), pp.1-11.
 30. Thulin, E., Vilhelmson, B. and Johansson, M. (2019). New telework, time pressure, and time use control in everyday life. *Sustainability*, 11(11), p.3067.
 31. Yu, F. and Conway, A. R. (2012). Mobile/smartphone use in higher education. Proceedings of the 2012 Southwest Decision Sciences Institute, 831-839.