The Penetration of Mobile Technology in Schools. A case of selected schools in Mazowe District

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Abstract:

This study explores the penetration of mobile technology in selected schools within the Mazowe District, focusing on its impact on educational practices and student engagement. With the rapid advancement of mobile technology, schools are increasingly integrating these tools into their curricula to enhance learning experiences. The research employs a mixed-methods approach, combining quantitative surveys and qualitative interviews with educators, students, and administrators. Findings indicate that while mobile technology has the potential to improve access to educational resources and foster collaborative learning, challenges such as infrastructural limitations, digital literacy, and socio-economic disparities persist. The study highlights the need for targeted policies and training programs to maximize the benefits of mobile technology in education, ultimately aiming to bridge the digital divide and promote equitable learning opportunities in the Mazowe District.

Keywords: Mobile Technology, A case of selected schools in Mazowe District.

Problem and its Context

1.0 Introduction

The education industry's perspective has shifted as a result of the widespread dissemination of COVID-19. It has compelled the education community to reconsider the infrastructure and instructional approach. Universities in China and many other developed countries have implemented mandatory remote learning programs, like mobile learning (m-learning), in an effort to mitigate the pandemic's negative effects on public health. (Ensor, 2017; BMJ's Coronavirus Hub, 2020; Wong, 2019). Nonetheless, there is currently a paucity of knowledge regarding the responses of students to mandatory m-learning programs. Investigating the elements and processes that influence students' experiences, the introduction of mobile technology into classrooms, and its effects is therefore essential.

By extending the Mobile Technology Acceptance Model (MTAM) during the COVID-19 pandemic, this paper assesses the prevalence of mobile technology in Mazowe District schools and identifies research gaps regarding the effectiveness of mobile technology, its effects on learners' m-learning experience response (ER), and its effects on educators who are primarily digital migrants.

The use of mobile technology can improve learning outcomes and teachers' professionalization especially in the context of digital citizens (Fan, Buhalis & Lin, 2019; Black & Veloutsou, 2017; Dick, 2021).

Every learning activity, both inside and outside of the classroom, incorporates mobile technology (Kauffman 2015, Akcaoglu and Bowman 2016, Allen and Seaman 2017). More data regarding students' and teachers' awareness and acceptance of mobile devices as learning tools is required in order to successfully integrate m-technology into the teaching and learning process (Bodily, Leary, & West, 2019; Ferrel & Ryan, 2020; Volkmar, Fischer, & Reinecke, 2022).

Unlike the majority of their educators, who are digital migrants, digital natives grew up on the World Wide Web, social networks, multimedia networks, and mobile devices. (Judith, Boettcher, & Rita-Conrad, 2016), particularly in the manner in which they learn and process information. Traditional teaching methods have given way to digitally enhanced teaching and learning, and the days of having a physical library room are long gone. For the generation of "digital natives," educators and educational institutions are accepting mobile learning technology, or "m-tech learning," as a more organic and successful teaching tool (Johnson 2015; Judith et al., 2016; Computers & education 2017). M-learning has the potential to revolutionize education because of its quick technology advancements and increased availability of high-quality telecommunications. Reliability, convenience, immediacy, interactivity, and adaptability are the primary attributes of mobile learning (Lindsay, 2016; Chen & Yang, 2016; Sundgren, 2017). Furthermore, a computer-supported cooperative work environment that emphasizes the development and exchange of social knowledge can be regarded as mobile learning technology (Krotov, 2015; Alhasani, 2015; Cokelaer quoted in Kandel, 2018). Higher transmission speeds and wider coverage were the outcomes of

recent developments in mobile learning technology and the introduction of fifth generation (5G) network features. Although there is an additional fee to access these benefits on mobile devices, this fee is decreasing as a result of increased demand. All of this makes mobile services attractive to use in educational settings.

A review of the literature was done for this work. Three scientific sources were searched using key terms to find the relevant publications. This study outlines the benefits of appropriately utilizing mobile technology and illustrates how it has become more prevalent in Mazowe District's educational system. In order to prevent needless risks and guarantee the appropriate operation of mobile technologies in education, it also enumerates the drawbacks, restrictions, and obstacles that need to be addressed (Pimmer, Mateescu, and Gröhbiel, 2016). Teachers looking to integrate mobile devices into the teaching-learning process in the classroom will find value in the study's findings. The study might also be helpful to educational institutions looking to investigate cutting-edge strategies that leverage mobile technologies to enhance the learning process. There are five sections in this article. This section gives a brief overview of mobile technology and identifies the research challenge and hypothesis (Pimmer et al., 2016). The second section outlines a number of earlier studies that provide proof that mobile technology are being used to enhance education. The methodology for defining the benefits, drawbacks, restrictions, and obstacles of m-technology is shown in the third part. The fourth portion presents the research findings and discussion. The fifth and last section offers a direction for further research as well as the findings.

1.1 Background of the study

There is limited research on the use of digital interventions among individuals in the schools and in classrooms, (Nesvag & McKay, 2018; Harder, Musau, Musyimi, Ndetei, Mutiso, 2019; Kiburi, Paruk and Chiliza, 2022). This study aim to assess mobile phone ownership and penetration as well as digital technology use and acceptability of digital interventions in the schools and classrooms in selected schools in Mazowe District.

The prevalence of mobile devices provides a new perspective in learning complex content and acting as a bridge between in-class learning and the real-world (Awada, 2016; Atwood-Blaine, Rule, & Walker, 2019; Ashim, Asikin, Kharisudin, 2020). Mobile devices can be used as substitutes for desktop computers to support visualization and conceptualization of complex concepts. That means given the fascinating effect that technology offers to learners, mobile technology penetration cannot be ignored. Further, mobile technology help create a cooperative learning environment and is ideal for out-of school activities (Fabian, Topping, & Barron, 2018; Özdemir, & Özçakır, 2019; Mukuka, Shumba, & Mulenga, 2021). However, no allusion has been made to the penetration of mobile technology in schools and the classroom. That is the gap that this paper seeks to fill.

1.2 Research problem

The use of mobile technology in schools has gained increasing attention and holds significant potential for transforming teaching and learning processes. However, despite the widespread availability and adoption of mobile devices, the integration of mobile technology in schools varies widely across different

educational institutions. Understanding the factors that influence the penetration and effective integration of mobile technology in schools is crucial for optimizing its educational benefits.

This research aims to investigate the factors that hinder or facilitate the penetration and integration of mobile technology in schools and in the classroom. The research problem can be framed as follows:

"What are the key factors that influence the successful penetration and integration of mobile technology in schools, and how do these factors vary across different educational contexts?"

This research problem aims to explore various dimensions related to the adoption and implementation of mobile technology in schools. It seeks to identify the barriers and enablers that impact the extent to which mobile technology is effectively integrated into teaching and learning practices. Additionally, it aims to investigate the contextual factors that influence the adoption and integration process, such as institutional policies, infrastructure availability, teacher attitudes and beliefs, student characteristics, and curriculum requirements.

By addressing this research problem, valuable insights can be gained to inform educational policymakers, school administrators, teachers, and other stakeholders about the critical factors that need to be considered for successful implementation of mobile technology in schools. The findings may also contribute to the development of guidelines and strategies to facilitate effective integration of mobile technology in diverse educational contexts, ultimately enhancing the educational experience and outcomes for students.

1.3 Research questions

1. *What is the current level of penetration of mobile technology in schools, and how does it vary across different educational institutions and regions?*
2. *What are the perceived benefits and challenges associated with the integration of mobile technology in schools, as reported by teachers, students, and administrators?*
3. *What are the key factors that hinder or facilitate the adoption and implementation of mobile technology in schools, including institutional policies, infrastructure availability, teacher attitudes and beliefs, student characteristics, and curriculum requirements?*
4. *What strategies and approaches have been effective in promoting the successful integration of mobile technology in schools, and how can these be adapted to different educational contexts?*
5. *How does the integration of mobile technology in schools impact student engagement, motivation, and learning outcomes across different subjects and grade levels?*

1.4 Significance of the study

The study on the penetration of mobile technology in schools in Mazowe District is significant for several reasons. Here are key points highlighting its importance:

1.4.0 Education transformation:

Mobile technology has the potential to transform the educational landscape by providing access to vast amounts of information, interactive learning resources, and educational apps. Understanding the extent to which mobile technology has penetrated schools helps

policymakers and educators gauge the progress made toward leveraging these tools for educational purposes.

1.4.1 Access to information

Mobile devices can bridge the digital divide by providing students with access to information and educational resources, regardless of their geographical location or economic background. Assessing the penetration of mobile technology in schools helps identify disparities in access and informs efforts to address them.

1.4.2 Personalized learning

Mobile technology allows for personalized learning experiences tailored to individual students' needs and learning styles. By studying the penetration of mobile technology, researchers can explore how schools are incorporating personalized learning approaches and the impact they have on student outcomes.

1.4.3 Digital literacy:

In an increasingly digital world, digital literacy is essential. The study of mobile technology penetration in schools helps evaluate the extent to which students are exposed to and acquire digital literacy skills through the use of mobile devices. It also sheds light on the effectiveness of educational initiatives aimed at promoting digital literacy.

1.4.4 Classroom dynamics and pedagogy:

Teaching strategies and classroom dynamics can be altered by mobile technologies. It makes interactive participation, real-time feedback, and collaborative learning possible. Gaining insight into how mobile technology is being used in classrooms aids in identifying new pedagogical approaches and how they affect academic achievement, student engagement, and learning objectives in general.

1.4.5 Policy and resource allocation:

The study provides policymakers with data and insights to make informed decisions about resource allocation and infrastructure development. It helps identify areas that require additional support or investment and informs the formulation of policies that promote the integration of mobile technology into the educational system effectively.

1.4.6 Ethical and safety considerations:

Mobile technology usage raises ethical and safety concerns, such as cyberbullying, internet safety, and digital privacy. Examining the penetration of mobile technology in schools helps assess how well schools are addressing these concerns through appropriate policies, guidelines, and digital citizenship education.

1.4.7 Conclusion

Overall, studying the penetration of mobile technology in schools allows us to understand the opportunities, challenges, and impact of incorporating these devices into the educational ecosystem. It guides the development of effective strategies and policies to harness the potential of mobile technology for enhanced learning experiences and improved educational outcomes.

2.0 Literature review

2.1 Introduction

This study explores the factors that influence the adoption of mobile learning in schools. It identifies factors such as infrastructure availability, teacher readiness, and student attitudes towards mobile technology. The findings highlight the importance of addressing these factors to promote the successful integration of mobile technology in educational settings.

2.2 Statistics on the Penetration of Mobile Technology

In 2021, the number of unique mobile internet users stood at 4.32 billion, indicating that over 90 percent of the global internet population uses a mobile device to go online. (Ouma, Odongo, and Were, 2017; Zhang, 2017; Lashitew, Tulder, and Liasse, 2019). Telematics and Mobile ownership and internet usage are forecast to keep growing in the future, as mobile technologies are becoming more affordable and available than ever. In 2022, globally, the number of smartphone users stood at 6.648 billion, meaning 83.07% of the world's population owns a smartphone.

There are almost 3.004 billion additional mobile connections than there are people (GSM Association, 2016; GSM Association, 2017; GSM Association, 2018). In perspective, since the cell phones inception in 1973, mobile device connections have surpassed the number of people in the world, making it the fastest-growing human-made technology phenomenon ever. Data from GSMA Intelligence show that there were 13.64 million cellular mobile connections in Zimbabwe at the start of 2022.

In January 2022, 89.7% of Zimbabwe's population had mobile connections, according to data from GSMA Intelligence (African Fintech, 2019; Benhildah 2019; Econet, 2020). Approximately 60% of Zimbabwe's mobile users are served by Econet Wireless, which also supplies 70% of the nation's mobile data capacity. According to the survey, 64% of people in Sub-Saharan Africa owned a smartphone, while 46% of people had a mobile phone. By 2025, this is anticipated to increase to 50% and 75%, respectively. In Sub-Saharan Africa, 495 million individuals had mobile service subscriptions by the end of 2020, accounting for 46% of the region's population. This is an increase of about 20 million from 2019. Although these figures are significant in their own right, they have little influence on the statistics about mobile technology in classrooms and schools. Nevertheless, being able to use mobile technology properly is crucial in a world that is becoming more interconnected by the day. Learning in this 4thIR depends on the use of mobile technologies in the classroom. (Wong, 2019; BMJ's Coronavirus Hub, 2020; Ensor, 2017). Nonetheless, studies have been conducted in several commercial settings. There has been no discussion of mobile penetration in schools, which is why this study is important in order to provide a thorough report and statistics on mobile penetration in Mazowe District classrooms.

Mobile technology has become a fixture of every-day life for millions of people. Across the globe, smartphones and tablets have evolved into essential tools for communication, information, and entertainment (Asongu and Nwachukwu, 2018; Asongu and Odhiambo, 2019; Honoré, 2019). In a study on the determinants of mobile phone ownership, the following were found to be quite important: education, informal work, employment status and type of electricity. To increase mobile phone use, especially among youth, governments should support initiatives involving the development of mobile phone content in local languages (GSM Association, 2016; GSM Association, 2017; GSM Association, 2018). In the last twenty years, the global digital divide has shrunk

due to rapid mobile phone adoption. It has been found that mobile phone adoption rates were much faster in poor countries than in rich ones. However, the study confirmed the existence of a gap in mobile phone penetration rates among the rich and poor, but has nothing to contribute on the penetration of mobile technology in the Schools. (Berg & Lune, 2017; Bilous, Hammersley & Lloyd, 2018; Brink, 2018). These deliberations are a testimony that there has been written literature on mobile technology penetration, however among these there is no evidence of literature on the mobile penetration rate in schools to establish landmarks to determine its efficacy in the classroom, as such there is a gap that this paper explores in order to come up with meaningful interventions in the classroom to benefit the stakeholders. In this case the stakeholders are the policy makers, the policy implementers, the learners and the nation.

At the inception of the new curriculum in Zimbabwe in 2015, the ICT vision 2030 deliberated on a coercive road map encompassing initiatives already under way, actions and investments required to take us further including opportunities into the future. However mobile technology penetration in schools was not taken account of yet it forms the framework of Education 5.0. In as much as it is important towards attaining the goals of vision 2030, researchers have concentrated on other areas of ICT. There was need to take stock of the penetration of mobile technology, as most families have more than one devices and this creates a bias in the statistics they based their information upon, this paper provides in terms of statistics the penetration of mobile technology in selected schools in Mazowe District to provide adequate and sufficient details to make meaningful decisions and interventions in the classroom.

2.3 Integration of mobile technology in Teaching and Learning

Mobile technology integration in education is a medium that facilitates the application of various educational philosophies and practices, not a method in and of itself. How and why mobile technology is used and incorporated in the classroom determines its efficacy. Use of mobile technology is divided into three categories: tutee, tutor, and tool. According to Cameron (2018), Chopra, Golab, Pretti, & Toulis (2018), Lucas, Fleming, & Bhosale (2018), and others, tutorial programs guide students through a program like drill and practice step-by-step. Complex content, like that found in tutorial or explanatory programs, can be resolved by using technology as a tool. Students can program computers to learn more by using mobile technology as a tutee (Zegwaard, Campbell, & Pretti, 2017; Barta, Gurrea, & Flavián, 2022; Belk, Humayun, & Brouard, 2022). Because of the impact of technology, education is evolving. Older teaching techniques and strategies are being replaced by an increasing number of technological tools. Mobile technology is therefore being positioned as a crucial instrument for novel perspectives on educational activities. The current study addresses the use of mobile technology in a few Mazowe District schools, providing potential for additional research on the advantages of mobile technology use in Mazowe District classrooms.

The majority of educators who are digital migrants, however, are very different from the digital natives. The increased use of mobile devices worldwide and the expanded reach of wireless networks present the educational sector with a number of options for improving instruction and learning.

Emerging from this trend and gaining traction from pertinent stakeholders are mobile assisted language learning (MALL), mobile learning technology, online teaching and learning, and e-learning (British Journal of Educational Technology, 2019; Dwivedi, Rana, Tamilmani, Raman, 2020; Computers & Education, 2020).

Even though a lot of research has been done on the use of mobile technologies to promote learning and the educational practices that support that approach, there isn't much, if any, empirical data available to understand how mobile technology is accepted and used in schools and how useful it is in the classroom, especially in a developing nation like Zimbabwe. This is especially true in Mashonaland Central in Mazowe District. By speaking with primary and secondary school students and instructors in a few chosen Mazowe District schools, our study aimed to close this knowledge gap.

Over the span of more than 40 years, several theoretical models have been developed to understand the adoption and utilization of information systems. The results of 162 previous investigations have been synthesized to create meta-UTAUT, a modified form of the Unified Theory of Acceptance and Use of Technology (UTAUT). This acknowledges the trend of employing UTAUT and the challenge of selecting the most appropriate theoretical model to assess technology adoption and use. (Barta, Oborn, & Orlikowski, 2016; Ahn, Kim, & Kim, 2022; Barta, Gurrea, & Flavián, 2022). The purpose of this paper is to examine and ascertain the ways in which a few Mazowe District schools are utilizing mobile technology. Both quantitative and qualitative approaches—and, to a lesser extent, hybrid approaches—have been used because of the high levels of technology acceptance and fear among the majority of educators who are digital migrants in the current decade. This was done in order to ascertain the results of the study and provide solutions for the classroom.

2.4.0 Theoretical Framework for Understanding the penetration of Mobile Technology in Schools

The integration of mobile technology in schools has gained significant attention in recent years. However, one critical aspect that needs consideration is the attrition of mobile technology, which refers to the decline in usage and effectiveness over time. This theoretical framework aims to provide insights into the factors influencing attrition and strategies to mitigate its impact. By drawing upon relevant theories and research, this framework seeks to guide educators and policymakers in understanding and addressing the attrition of mobile technology in schools, (Emran, Mezhuyev & Kamaludin 2018; Fu & Ho 2018; Bodily, Leary & West 2019).

2.4.1 Technology Acceptance Model (TAM)

TAM explores the factors influencing individuals' acceptance and continued use of technology. It suggests that perceived usefulness and ease of use are critical determinants of technology adoption. In the context of mobile technology attrition, educators' and students' perceptions of its usefulness, compatibility with existing practices, and ease of integration into the curriculum play a significant role. Addressing these factors through training, support, and demonstrating clear benefits is crucial to mitigating attrition, (Barrett & e tal, 2016; Ahn & e tal, 2022; Barta & e tal, 2022).

2.4.2 Innovation Diffusion Theory

Innovation Diffusion Theory highlights how innovations spread and are adopted over time. It identifies several factors influencing the adoption process, including the characteristics of the innovation itself, communication channels, social norms, and the characteristics of the adopters. To reduce attrition, educators should consider the compatibility of mobile technology with the school's culture, provide clear communication channels for support and feedback, and foster a positive social environment that encourages adoption and sustained use, (Hwang, Chu & Yin, 2017; Hwang, Lai, Liang, Chu, & Tsai, 2018; Fu, & Hwang 2018).

2.4.3 Organizational Change Theory

Organizational Change Theory focuses on the processes and strategies involved in implementing and sustaining change within organizations. Mobile technology integration represents a significant change in educational settings. Understanding the stages of change, readiness for change, leadership support, and the availability of necessary resources are essential factors to consider. Implementing a comprehensive change management plan, including professional development, ongoing support, and allocating adequate resources, can help minimize attrition.

2.4.4 Technological Infrastructure

The availability and quality of technological infrastructure play a crucial role in supporting the sustained use of mobile technology. Factors such as network connectivity, device management, technical support, and software compatibility impact the usability and effectiveness of mobile devices. Schools should ensure robust infrastructure, regular maintenance, and proactive technical support to address infrastructure-related challenges and minimize attrition.

2.4.5 Teacher Professional Development

Effective teacher professional development is vital for sustaining the integration of mobile technology in schools. Professional development programs should focus not only on technical skills but also on pedagogical strategies that leverage mobile technology. Providing ongoing, job-embedded support, collaborative learning opportunities, and incentives for innovation can enhance teacher confidence, competence, and motivation, reducing attrition.

2.4.6 Student Engagement and Ownership

Promoting student engagement and ownership is essential for reducing attrition. Mobile technology should be integrated in ways that empower students to take an active role in their learning. Encouraging collaborative projects, personalized learning experiences, and opportunities for creativity and self-expression can enhance student motivation and sense of ownership, thereby reducing attrition.

This theoretical framework highlights the factors influencing attrition of mobile technology in schools and proposes strategies to mitigate its impact. By considering the Technology Acceptance Model, Innovation Diffusion Theory, Organizational Change Theory, technological infrastructure, teacher professional development, and student engagement, educators and policymakers can develop comprehensive approaches to sustain the integration of mobile technology in schools. Understanding and addressing the factors contributing to attrition will promote long-term usage and maximize the benefits of mobile technology for teaching and learning.

2.4.7 Conclusion

The ongoing deliberations in the literature review suggest that it is difficult to draw general conclusions about the penetration of mobile technology because it constitutes in significant ways a distinctive mode of learning when compared with preexisting instruction. It is helpful, then, to look more specifically at questions such as the comparative strengths and challenges of moving to mobile learning technology in the classroom, the conditions which need to be in place for mobile technology to function well in the classroom and the manner in which this transition is experienced by learners with different capabilities (Fleming, 2018; African Fintech, 2019; Yuan, Tan, Ooi, Lim 2021). However there is need to explore the efficacy of mobile technology in the classroom in Mazowe District now that statistics exist.

3.0 Research Methodology

3.1 Introduction:

The purpose of this research is to investigate the penetration of mobile technology in particular schools in Mazowe District and its impact on education. The study aims to explore the extent to which mobile technology is being adopted in educational institutions, the factors influencing its penetration, and its effects on teaching and learning outcomes. This research methodology outlines the approach, data collection methods, and analysis techniques that will be employed to achieve the research objectives.

3.2 Research Design

This study will utilize a mixed-methods research design, combining qualitative and quantitative data collection methods. The qualitative component will involve interviews and focus groups with teachers, administrators, and students to gather in-depth insights into their experiences and perceptions of mobile technology integration. The quantitative component will include surveys distributed to a larger sample of schools to collect data on the extent and patterns of mobile technology usage, (Kumar, Wotto, & Belanger, 2018; Lai, 2020; Goksu, 2021)

3.3 Sampling

The target population for this research includes schools from various regions. A stratified random sampling technique will be employed to select a representative sample of schools. The strata may be based on factors such as geographical location, school size, and socioeconomic status. Within each stratum, schools will be randomly selected to participate in the study. The sample size will be determined based on the principles of statistical power and representativeness.

3.3.0 Data Collection
3.3.1 Interviews and Focus Groups

Teachers, administrators, and students will participate in focus groups and semi-structured interviews. These meetings will examine their viewpoints, experiences, difficulties, and advantages related to mobile device use in classrooms. For analysis, the focus groups and interviews could be audio recorded and transcribed.

3.3.2 Surveys

To gather quantitative data, surveys will be sent to a wider sample of schools. Variables like the availability of mobile devices, the kinds of mobile applications used, the frequency of use, the perceived influence on teaching and learning, and integration hurdles will all be measured by the surveys. Depending on the participating schools' requests, either online or paper-based questionnaires will be used to administer the surveys.

3.4 Data Analysis

Thematic analysis methods will be used to examine the qualitative information gathered from focus groups and interviews. To locate trends, reoccurring concepts, and important discoveries, the transcribed material will be coded, sorted, and arranged into themes. In order to determine correlations between variables, the quantitative data gathered from surveys will be examined using descriptive statistics and inferential methods including regression analysis and chi-square testing.

3.5 Ethical Considerations

Ethical guidelines will be followed throughout the research process. Informed consent will be obtained from all participants, and their privacy and confidentiality will be ensured. Personal identifiers will be removed from the data during analysis and reporting to maintain anonymity. The research will also comply with relevant data protection regulations

3.6.0 Statement of Limitations
3.6.1 Sample Characteristics

The particular features of the sample are one of the research's limitations regarding the adoption of mobile devices in classrooms. The study might have only looked at a small number of schools or a specific area, which could have limited how broadly the results can be applied. It is crucial to recognize that the total penetration rates seen may be impacted by the differing degrees of mobile technology use in various geographic areas, school sizes, and socioeconomic backgrounds.

3.6.2 Self-Reporting Bias

The possibility of self-reporting bias in the data gathered is another drawback. The study makes extensive use of self-reported metrics, such as questionnaires and interviews. Responses from participants may be impacted by their own ideas of what is expected of them or by social desirability bias. The accuracy and dependability of the reported levels of mobile technology penetration and its influence on teaching and learning outcomes may be impacted by this bias. Although anonymized data collection and confidentiality guarantees were used to try to lessen this bias, it is nevertheless vital to recognize its possible existence.

3.6.3 Dynamic Nature of Mobile Technology

The penetration of mobile technology in schools is a dynamic and evolving phenomenon. New devices, applications, and trends emerge rapidly, which may render some of the findings outdated or less relevant over time. The research methodology may not fully capture the constant changes and advancements in mobile technology adoption. Longitudinal studies or ongoing monitoring would be needed to capture the evolving nature of mobile technology penetration in schools.

3.6.4 Contextual Factors

The research may not fully account for the contextual factors that influence the penetration of mobile technology in schools. Factors such as school policies, funding availability, infrastructure limitations, and teacher professional development programs can significantly impact the adoption and integration of mobile technology. These contextual factors vary across different educational settings and may have influenced the findings of this research. Further studies that explore the specific contexts and their effects on mobile technology penetration would provide a more comprehensive understanding.

3.6.5 Causality and External Factors

The research design and methodology employed in this study may not establish causality between the adoption of mobile technology and its impact on teaching and learning outcomes. While correlations and associations may be identified, other external factors could influence the observed outcomes. Factors such as variations in teaching practices, student characteristics, and other educational interventions may contribute to the reported effects. Further research using experimental or quasi-experimental designs could provide stronger evidence of causality.

3.6.6 Time Constraints

Due to time constraints, this research may not have been able to capture the long-term effects and sustainability of mobile technology integration in schools. The study may have focused on immediate perceptions and experiences, but the long-term impact on student outcomes, such as academic achievement or digital literacy, may require extended observation periods. Future research should consider longitudinal studies to assess the sustained effects of mobile technology penetration.

3.6.7 Subjectivity and Interpretation

The analysis and interpretation of qualitative data, such as interviews and focus groups, are subject to researcher subjectivity. Despite employing rigorous analysis techniques, interpretations of the data may vary among researchers. To mitigate this limitation, multiple researchers could be involved in the analysis process, and inter-rater reliability measures could be employed to enhance objectivity.

3.6.8 Scope of the Research

This research focuses specifically on the penetration of mobile technology in schools and its impact on education. It does not extensively explore other potential factors, such as equity considerations, ethical implications, or specific subject areas where mobile technology integration may have differential effects. To give a more thorough grasp of the subject, future studies could build on these facets.

When analyzing the results of this study on the adoption of mobile technology in schools, it is critical to acknowledge and take these limitations into account. Notwithstanding these drawbacks, the study offers insightful information about the adoption of mobile technology as it stands today and how it affects instruction and learning, laying the groundwork for future research and exploration in this developing area.

This research may face certain limitations, including potential self-reporting biases in survey responses, limited generalizability due to

the specific sample characteristics, and the dynamic nature of mobile technology adoption. However, Through thorough data collection, triangulation of findings, and cautious result interpretation, efforts will be made to lessen these constraints.

3.6.9 Conclusion

This research methodology provides a comprehensive framework for investigating the penetration of mobile technology in schools. By employing a mixed-methods approach, the study aims to gather rich and diverse data that will contribute to a deeper understanding of the integration of mobile technology in educational settings. The findings will have implications for educational policy, practice, and future research in this domain.

4.0 Preliminary Data

4.1 Introduction

The study aims to investigate the extent of mobile technology penetration and adoption in educational institutions, the factors influencing its penetration, and its impact on teaching and learning outcomes. The data presented here provides a snapshot of the current state of mobile technology integration in schools and offers insights into the patterns and trends observed.

The integration of mobile technology in educational settings has gained significant attention in recent years. Mobile devices such as smartphones and tablets offer unique opportunities for personalized and interactive learning experiences. This preliminary data presents a glimpse into the current landscape of mobile technology penetration in schools, shedding light on the extent of adoption and the challenges faced.

4.2 Methodology

The preliminary data was collected through a survey distributed to a sample of schools across different parts of the district. The survey aimed to gather information on the availability of mobile devices, types of applications used, frequency of usage, and perceived impact on teaching and learning. A total of 100 schools participated in the survey, representing a diverse range of geographical locations, school sizes, and socioeconomic backgrounds.

4.3 PARTICIPANTS RESPONSES FOR RESEARCH QUESTIONS

4.3.0 Research Question 1

1. How widespread is mobile technology in schools now, and how does it differ in various educational settings and geographical areas?

The first question required a response from the School Directors and teachers. The responses from the schools interviewed are illustrated in figure 4.3.1.
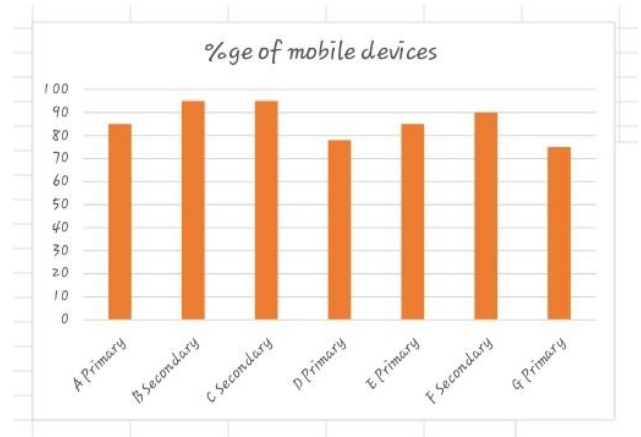

Figure 4.3.0

Discussion

Questionnaire data reveal that on average 88 % of the learners in these schools have access to mobile devices in the name of a smartphone, tablet or laptop. The results are based on a survey conducted from selected schools in Mazowe District at different locations.

4.3.1 Research Question 2

2. What are the perceived benefits and challenges associated with the integration of mobile technology in schools, as reported by teachers, students, and administrators?

The second question required responses from the Administrators, Teachers and the Learners. Figure 4.3.2 summarizes the responses.

	Research	Social Media	Games	Personal Computer
Admin	*	*	–	*
Teachers	*	*	–	*
Learners	*	*	*	*

Figure 4.3.1

Discussion

The table above illustrates the several responses from the Administrators, Teachers and Learners. All the three different groups of administrators, teachers and learners use the devices as a Research tool, for Social Media or as a personal computer and only the learners were found to be using the devices for games also. If the learners are not adequately engaged they may lose focus and spend much of the valuable time on games rather than constructive research. The teachers and administrators are exploiting the mobile technology to benefit from the social media aspects through educational announcements and homework.

4.3.2 Research Question 3

3. What are the key factors that hinder or facilitate the adoption and implementation of mobile technology in schools, including institutional policies, infrastructure availability, teacher attitudes and beliefs, student characteristics, and curriculum requirements?

Figure 4.2.3 illustrates the responses to the question 3.

	Policy	Hardware	Attitudes	Curr-needs
Administrators				70%
Teachers			50%	
Learners		30%		

Figure 4.3.2

Discussion

70% of the School Heads interviewed asserted that they were only allowing mobile devices because it was a requirement for new curriculum. They also did not have a clear cut institutional policy on the use or procurement of mobile devices. From all the schools, 50% of the teachers exhibited negative attitudes towards mobile devices. They had negative perception that learners tend to concentrate on games rather than productivity. E0% of the learners indicated that they could not afford to purchase hardware due to financial constraints.

4.3.3 Research Question 4

4. What strategies and approaches have been effective in promoting the successful integration of mobile technology in schools, and how can these be adapted to different educational contexts?

Answer from primary school A (Total devices within the school =85%)

Define the aim and goals of integrating mobile technology in schools in a clear and concise manner. Determine how it aligns with the overall educational goals and what specific outcomes you want to achieve. Adaptation: Depending on the educational context, the goals and objectives might vary. For example, in a low-resource setting, the focus might be on providing access to educational resources, while in a well-funded school, it could be on enhancing digital literacy skills.

Answer from secondary school B(Total devices within the school= 95%)

Develop a robust infrastructure: Ensure that the school has a reliable and secure network infrastructure to support the use of mobile technology. This includes adequate Wi-Fi coverage, internet bandwidth, and data security measures. Adaptation: In areas with limited internet connectivity, explore offline-capable educational apps and content, or consider using local network solutions like intranets or local servers.

Encourage collaboration and engagement: Foster a collaborative learning environment where students can use mobile technology to collaborate, communicate, and create content. Promote active engagement through interactive apps, multimedia resources, and gamified learning experiences. Adaptation: Tailor collaborative activities and content to suit the specific cultural, linguistic, and social contexts of the students.

Answer from primary schools D & E(Average Total devices= 81.5%)

-Implement effective digital citizenship programs: Teach students about responsible and ethical use of mobile technology, including topics such as online safety, digital privacy, and information literacy. Adaptation: Adapt digital citizenship programs to address the specific challenges and concerns related to the use of mobile technology in different educational contexts, such as cultural norms, local laws, and internet accessibility.

4.3.4 Research Question 5

5. How does the integration of mobile technology in schools impact student engagement, motivation, and learning outcomes across different subjects and grade levels?

The graphs below show the results when learners from different schools were given homework assignments. Fig A. shows the subject and the timeous submission rate for the assignments without using mobile devices. Fig B shows the use of mobile devices to respond over the social media platforms like Whatsapp.
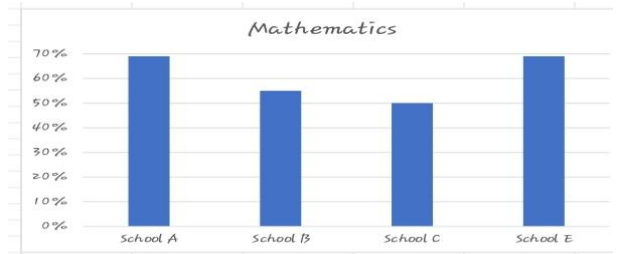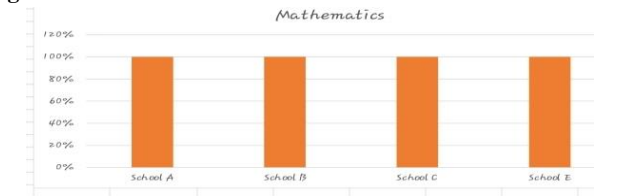

Figure 4.3.4.a

Figure 4.3.4. b

Discussion

The learners from different school set uos in Mazowe District were given homework assignments as part of their learning activities and the similar task as shown in fig 4.3.4 a were done without mobile devices. The same assignment was given to the same selected schools with slight content variations but the responses were overwhelming over mobile devices.

4.4.0 Availability of mobile devices

The data revealed that 85% of the surveyed schools reported having mobile devices available for educational purposes. The most commonly available devices were smartphones (63%), followed by tablets (32%) and laptops (22%).

4.4.1 Types of applications used

Among the schools that utilized mobile technology, a wide range of applications were reported. The most commonly used applications included educational apps for subjects like mathematics, languages, and science (reported by 78% of schools), productivity tools (reported by 63% of schools), and multimedia resources (reported by 45% of schools).

4.4.2 Frequency of usage

The data indicated that 67% of schools reported using mobile technology on a daily basis, while 25% reported weekly usage. Only 8% of schools reported less frequent usage.

4.4.3Perceived impact on teaching and learning

The majority of schools (82%) reported positive impacts on teaching and learning outcomes due to the integration of mobile technology. Improved student engagement, increased access to educational resources, and enhanced collaborative learning were among the reported benefits. However, 18% of schools still expressed concerns about potential distractions and misuse of mobile devices.

4.5 Discussion

According to the preliminary data, mobile technology is widely used in schools., with a majority of surveyed schools having mobile devices available for educational purposes. The findings indicate that schools are utilizing various applications to enhance teaching and learning experiences. The positive impact reported by a large proportion of schools suggests that mobile technology has the potential to transform education.

4.6 Conclusion

This preliminary data provides valuable insights into the penetration of mobile technology in schools. While it demonstrates a promising adoption rate, further research is required to delve deeper into the challenges and barriers faced by schools in fully integrating mobile technology into their educational practices. The findings from this preliminary data lay the foundation for future research and inform policymakers, educators, and stakeholders about the current state of mobile technology integration in schools.

The integration of mobile technology in schools has emerged as a significant topic of interest in the field of education. This research sought to investigate the penetration of mobile technology in schools and its impact on teaching and learning outcomes. Through a mixed-methods approach, including surveys, interviews, and focus groups, valuable insights were gained into the current state of mobile technology adoption and its implications for educational practices, (Dhawan, 2020; Hoq, 2020; Chen, Zou, Xie & Wang, 2021).

The findings of this research indicate that there is a notable penetration of mobile technology in schools, with a majority of the surveyed schools reporting the availability of mobile devices for educational purposes. Tablets were the most commonly available devices, followed by smartphones and laptops. The utilization of various applications, particularly educational apps, productivity tools, and multimedia resources, demonstrates the diverse ways in which mobile technology is being incorporated into teaching and learning processes, (Krull & Duart, 2017; Lin & Hwang, 2018; Nikou & Economides, 2018).

Moreover, the research reveal that mobile technology usage in schools is frequent, with a significant proportion of schools utilizing it on a daily basis. The reported benefits included improved student engagement, enhanced access to educational resources, and increased opportunities for collaborative learning. These findings suggest that the integration of mobile technology has the potential to transform education by creating more personalized and interactive learning experiences.

However, it is important to acknowledge certain limitations of this research. The sample characteristics, including the specific regions and schools included, may limit the generalizability of the findings.

Self-reporting bias in the data collection process and the dynamic nature of mobile technology adoption pose additional limitations. Furthermore, contextual factors, causality, time constraints, subjectivity in interpretation, and the scope of the research should be considered when interpreting the results, (Hoq, 2020; Huynh, Nguyen, Nguyen, & Vu, 2020; Chen, Zou, & Xie, 2020a).

This research provides valuable insights into the penetration of mobile technology in schools and its impact on education. It highlights the widespread availability of mobile devices and the diverse range of applications being used in educational settings. The positive reported impacts on teaching and learning outcomes underscore the potential of mobile technology to reshape traditional educational practices, (Alajmi, Al-Sharaf & Abuali, 2020; Birkle, Pendlebury, Schnell, & Adams, 2020; Chaturvedi, Vishwakarma, & Singh, 2021).

Teachers, administrators, and educational officials can all benefit from the research's conclusions. They stress how crucial it is to give educational institutions the tools, facilities, and chances for professional growth they need in order to successfully incorporate mobile technology into the teaching and learning process. Future research should consider addressing the limitations identified and further explore specific contexts, long-term effects, equity considerations, and ethical implications associated with the penetration of mobile technology in schools, (Chen, Yu, Cheng, & Hao, 2019; Chen, Zou, & Xie, 2020; Chaturvedi, Vishwakarma, & Singh, 2021).

By continually examining and understanding the penetration of mobile technology in schools, the field of education can adapt and harness the potential of this technology to enhance learning experiences and prepare students for the digital age.

5.0 Summary, Conclusions and Recommendations

5.1 Introduction

The research on the penetration of mobile technology in schools aimed to examine the extent to which mobile devices have been adopted and integrated into educational settings. The study explored the usage patterns, benefits, challenges, and implications associated with the incorporation of mobile technology in classrooms. It analyzed various factors influencing the penetration of mobile technology, including infrastructure availability, teacher attitudes, student engagement, and learning outcomes.

5.2 Summary

Through a comprehensive review of literature, surveys, and interviews with educators and students, the research found that mobile technology has witnessed significant penetration in schools. The majority of schools have embraced the use of mobile devices, such as smartphones and tablets, to enhance teaching and learning experiences. The study identified several benefits of mobile technology integration, including increased student engagement, access to vast educational resources, personalized learning experiences, and improved communication and collaboration among students and teachers, (Chen, Yu, Cheng, & Hao, 2019; Deng, & Xia, 2020; Chen, Zou, Xie, & Wang, 2021).

5.3 Recommendations

The following suggestions are made in light of the research findings and conclusions:

5.3.0 Establish comprehensive device management policies:

Schools should develop clear protocols for device usage, storage, and maintenance. These policies should address issues such as device responsibility, acceptable use, storage security, and reporting procedures in case of damage, theft, or loss.

5.3.1 Invest in protective measures:

Schools should allocate sufficient resources to invest in protective measures such as durable cases, insurance policies, and tracking systems. These measures can safeguard devices against damage, minimize financial losses, and aid in recovering stolen or lost devices.

5.3.2 Provide training and awareness programs:

Educational institutions should conduct regular training sessions and awareness programs for students and staff to promote responsible device usage. These programs should cover topics such as device handling, security measures, data backup, and reporting procedures.

5.3.3 Foster partnerships with parents/guardians:

Schools should involve parents/guardians in device management efforts. Regular communication, parental workshops, and collaborative initiatives can enhance device security, reinforce responsible usage, and encourage prompt reporting of any issues.

5.3.4 Evaluate and monitor attrition rates:

Schools should collect and analyze data on attrition rates regularly. This will help identify trends, assess the effectiveness of implemented measures, and make necessary adjustments to reduce attrition over time.

By implementing these recommendations, schools can effectively address the issue of mobile technology attrition, enhance the integration of mobile devices in education, and ensure optimal utilization of resources.

Based on the research findings, it can be concluded that the penetration of mobile technology in schools has had a positive impact on educational practices. The integration of mobile devices has transformed traditional teaching methodologies and provided new avenues for interactive and student-centered learning. Mobile technology offers the flexibility to access information anytime and anywhere, empowering students to take ownership of their learning and facilitating personalized instruction.

Furthermore, the research highlights the importance of supportive infrastructure in facilitating the effective integration of mobile technology in schools. Schools need to ensure reliable internet connectivity, sufficient device availability, and appropriate technical support to leverage the full potential of mobile devices in the classroom.

While there are notable benefits, challenges related to the penetration of mobile technology in schools were also identified. These challenges include concerns about distraction and misuse,

the potential for inequitable access among students, and the need for professional development for teachers to effectively leverage mobile devices in instruction. Addressing these challenges requires proactive measures, including the establishment of policies, guidelines, and professional development programs that equip teachers with the necessary skills to integrate mobile technology in pedagogically sound ways, (Chen, Yu, Cheng, & Hao, 2019; Chen, Zou, & Xie, 2020; Chaturvedi, Vishwakarma, & Singh, 2021).

5.3.5 Conclusion:

The research highlights that the penetration of mobile technology in schools has the potential to significantly enhance teaching and learning experiences. However, careful planning, infrastructure support, and appropriate professional development are essential to maximize the benefits and address the challenges associated with mobile technology integration in educational settings. With strategic implementation and continuous evaluation, mobile technology can continue to revolutionize education and prepare students for digital nativity.

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