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THE ROLE OF TECHNOLOGY IN SCHOOL RESOURCE MANAGEMENT: A STUDY ON PUBLIC ELEMENTARY SCHOOLS IN MADAGASCAR

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Abstack: *This study investigates the role of technology in school resource management in public elementary schools in Madagascar. The study adopts a qualitative research methodology, utilizing observation, interviews, and documentation as primary data collection techniques. The key informants for this study are 10 school principals from various public elementary schools across Madagascar, selected based on their experience and administrative roles. The findings of this study highlight three critical aspects: first, technology plays a significant role in enhancing school management efficiency, allowing for better planning, communication, and monitoring of school resources. Second, it contributes to the improvement of school archives, with digital records providing easy access, security, and long-term preservation of important school documents. Finally, the study reveals several challenges to technology adoption, including limited digital literacy among staff, inadequate infrastructure, and financial constraints that hinder the full integration of technology in resource management. The study concludes by recommending targeted training programs for school staff, enhanced funding for technological infrastructure, and the development of a clear digital resource management policy tailored to the needs of public elementary schools in Madagascar.*

INTRODUCTION

Education is the foundation for human development and social progress. In the modern educational landscape, effective school resource management is critical to ensuring quality learning experiences (Anwar et al., 2021). Public elementary schools rely heavily on efficient management of resources, including teaching materials, administrative records, and financial assets (Salminen et al., 2020). However, traditional methods of managing these resources, which often depend on manual processes, are prone to errors, inefficiencies, and loss of information. Technology offers a solution to these challenges by providing tools for digital record management, communication, and data storage (Emynorane et al., 2025). This study investigates the role of technology in enhancing resource management within public elementary schools in Madagascar, a country where educational development remains a national priority but faces significant management challenges.

Public elementary schools in Madagascar encounter numerous difficulties in resource management due to limited financial resources, inadequate infrastructure, and a lack of trained personnel. Traditional record-keeping methods are susceptible to data loss, poor accessibility, and inefficiency (Augustin & Emynorane, 2024). Many schools have attempted to integrate technology into their management processes, but the extent and effectiveness of these efforts remain unclear (Vial, 2019). Furthermore, the lack of a standardized approach to using technology in resource management has resulted in inconsistent practices across schools. This study addresses the problem by exploring how technology is being used in school resource management, the benefits it offers, and the barriers hindering its effective adoption.

Existing studies on educational management in Madagascar primarily focus on teacher performance, student achievement, and curriculum development (Jiang et al., 2019). While some research has touched on the use of technology in education, there is a noticeable lack of studies that specifically examine how technology is utilized for resource management in public elementary schools (Arcade et al., 2012; Rabani et al., 2023). This gap in knowledge makes it difficult for educational policymakers to design effective strategies that leverage technology for school management. This study fills that gap by providing a detailed analysis of technology's role in school resource management, based on firsthand data from school principals in Madagascar.

The novelty of this study lies in its focus on public elementary schools in Madagascar, a context that has received limited attention in existing literature. By exploring how technology is applied in school resource management, this study provides insights into the practical benefits of technology for school administration and the unique challenges faced by schools in Madagascar. It also emphasizes the importance of digital school archives, which are often overlooked in discussions about educational technology (Emynorane et al., 2024). The study further explores how language policies in Madagascar impact technology adoption, adding a unique dimension to the research.

The main objective of this study is to examine the role of technology in school resource management in public elementary schools in Madagascar. Specifically, it aims to analyze how technology is used to enhance school management efficiency, investigate the impact of technology on the management and preservation of school archives, identify the challenges faced by schools in adopting technology for resource management, and propose recommendations to improve technology integration in school resource management.

This study is significant for several stakeholders in the education sector. For school administrators, it provides insights into effective technology use for resource management. For educational policymakers, it offers evidence-based recommendations to guide the development of technology integration policies. For researchers, it fills a critical gap in the literature on technology use in school management in Madagascar. Finally, for international organizations supporting education in developing countries, this study offers a contextual understanding of the challenges and opportunities associated with technology adoption in school management.

Technology in this study refers to digital tools, systems, and software used for school resource management, including computers, software applications, cloud storage, and digital records. School resource management is defined as the process of planning, organizing, and controlling resources (human, material, and financial) within a school setting (Salminen et al., 2020). School archives are defined as digital or physical records

of school documents, including administrative records, student information, and financial data (Vial, 2019).

METHODOLOGY

This study uses a qualitative research approach, focusing on understanding the role of technology in school resource management within public elementary schools in Madagascar. The primary data sources are 10 school principals selected based on their experience and administrative roles in various public elementary schools. Data collection is conducted through three main techniques: observation, interviews, and documentation. Observation allows for firsthand insights into how technology is used in school management, while interviews provide in-depth perspectives from the principals. Documentation involves reviewing existing school records to understand resource management practices. To ensure the credibility of the data, triangulation is applied by cross-referencing findings from observations, interviews, and documentation, while the selection of experienced school principals enhances the reliability of the insights obtained (Emynorane et al., 2024).

RESULTS

The results of this study are presented in three main categories based on the data sources: Observation, Interviews, and Documentation. The tables below summarize the key findings for each category.

Table 1. Results from Observation

Aspect	Observation
Use of Technology	Limited use of computers and smartphones for administrative tasks.
Digital Record	Only a few schools maintain digital archives; most rely on paper.
Communication Tools	Correspondence book for parent communication in all schools.
Infrastructure	No electricity and internet connectivity in most schools.
Technology Maintenance	No dedicated tech equipment for teachers and schools

The observation results reveal that the use of technology in public elementary schools in Madagascar is generally limited, with most schools relying on traditional paper-based methods for administration and record-keeping. The digital record management is rare, and most archives remain in physical form. Communication with parents is primarily conducted through correspondence book. No electricity and internet connectivity in the schools, leaving teachers responsible for their teaching materials without taking advantage of the technology.

Table 2: Results from Interviews with School Principals

Aspect	Responses from principals
Perception of Technology	Technology is viewed as useful but challenging to implement.
Benefits of Technology	Improved communication, better record-keeping.
Challenges in Technology Adoption	Limited digital skills, financial constraints, no electricity and internet.
Use of Digital Archives	Most principals acknowledge the need for digital archives.
Support for Technology Adoption	Lack of technology equipment in public schools.

The interviews with school principals highlight a generally positive perception of technology, with most principals recognizing its potential to enhance communication and record-keeping. However, they also point out significant challenges to technology adoption, including limited digital skills among staff, inadequate financial resources, and no electricity and internet connectivity. Although most principals understand the importance of digital archives, there are lack of technology equipment almost in all public schools in Madagascar.

Table 3. Results from Documentation Review

Asp	Documentation findings
Student Records	Mostly paper-based, with occasional use of Excel sheets.
Financial Records	Primarily handwritten.
Administrative Records	Mixed between handwritten paper and digital documents.
Policy Documents	No clear guidelines on technology use for resource management.
Training Records	No records of training sessions related to technology.

The documentation review reveals that most school records, including student records, financial records, and administrative documents, are maintained in written paper format, with occasional use of basic software like Microsoft Excel for record-keeping. Policies on technology use for resource management are either non-existent or poorly defined, leaving schools without clear guidelines. Additionally, due to the lack of technology equipment in schools, there are no training records for teachers and staff in this context, further limiting their ability to integrate technology effectively into school management.

DISCUSSION

The importance of technology in school management

Technology is increasingly recognized as a critical tool for enhancing school management in Madagascar and across Africa. In many schools, technology enables efficient administrative processes, reducing the burden of manual tasks such as record-keeping, student registration, and staff management (Vial, 2019). For instance, digital record management systems allow schools to store and retrieve student records, attendance data, and academic performance records easily, ensuring better organization and reducing the risk of data loss (Nagy & Bigum, 2007). In the African context, where many schools still rely on paper-based systems, the adoption of technology offers a pathway to modernization, making school management more efficient and transparent.

Technology improves communication between schools, teachers, parents, and students (Anwar et al., 2021). In Madagascar, where many schools are located in remote areas, mobile technology and internet communication platforms like WhatsApp, email, and educational management software can bridge the communication gap. Schools can use these tools to send announcements, share academic progress, and maintain active communication with parents Jiang et al., 2019). Across Africa, mobile technology has been particularly impactful, as it allows schools to maintain communication even in areas where computer access is limited (Rabani et al., 2023). This ensures that parents are more engaged in their children's education and that schools can maintain regular contact with all stakeholders.

Technology also supports better financial management in schools (Augustin & Emynorane, 2024). Digital tools can be used for budgeting, tracking expenses, and maintaining transparent financial records (Jenkins et al., 2006). In Madagascar, where financial transparency is a critical issue in many public schools, technology can help prevent financial mismanagement by maintaining clear, accessible financial records (Arcade et al., 2012). In the broader African context, digital financial management systems can also support schools in complying with government regulations, making it easier for school administrators to manage funds, apply for grants, and report financial performance accurately (Klopfer et al., 2010).

However, the adoption of technology in school management in Madagascar and many African countries faces significant challenges, including inadequate infrastructure, limited access to electricity, and poor internet connectivity (Emynorane et al., 2024). Many schools, particularly in rural areas, lack the basic digital tools needed for effective management.

Teachers and school administrators often have limited digital skills, making it difficult to integrate technology into their daily operations. Overcoming these challenges requires targeted investments in infrastructure, teacher training, and the development of policies that support technology adoption in schools (Salminen et al., 2020). In this context, technology is not just a tool for improving school management but also a critical factor in achieving sustainable educational development across the continent.

Improving school archives

Technology is revolutionizing the management of school archives by transforming traditional paper-based records into secure, easily accessible digital formats (Jenkins et al., 2006). In many schools, particularly in developing regions, archives were previously maintained in physical folders and cabinets, making them vulnerable to damage, loss, or unauthorized access. With the introduction of digital archiving systems, schools can now store student records, staff files, financial documents, and academic reports in secure cloud storage or digital databases (Rabani et al., 2023). This not only protects the records from physical damage due to natural disasters, such as floods or fires, but also ensures data security through password protection and user access control.

Technology also enhances the organization and retrieval of archived records. Digital archives allow schools to categorize documents by type, date, or other relevant criteria, making it easy for administrators to locate specific records within seconds (Male & Burden, 2013). For instance, student records can be searched by name, class, or admission year, reducing the time spent on manual searches. Schools can also maintain backup copies of digital archives, ensuring that even if one system fails, the records remain accessible (Vial, 2019). In regions like Madagascar and other African countries, where administrative efficiency is often a challenge, technology can significantly reduce the workload of school staff and improve the accuracy of record-keeping.

Furthermore, technology enables schools to update their archives regularly and maintain a comprehensive record of student progress, staff performance, and financial transactions (Nagy & Bigum, 2007). Digital systems can automatically generate reports and track changes in archived documents, providing a clear record of updates and ensuring data integrity. This is particularly important for educational accountability, as it allows schools to provide accurate records during inspections or audits (Jenkins et al., 2006). Moreover, digital archives facilitate data sharing between schools, educational

authorities, and parents, promoting transparency and ensuring that important information is readily available to authorized users (Augustin & Emynorane, 2024). As technology continues to evolve, schools that embrace digital archiving will not only enhance their administrative efficiency but also strengthen their capacity to manage educational data securely and effectively.

Challenges to technology adoption in elementary school

One of the most significant challenges to technology adoption in elementary schools in Madagascar and many African countries is the lack of basic infrastructure. Many schools, especially in rural areas, do not have access to reliable electricity or internet connectivity, which are essential for using digital tools and maintaining online communication. In Madagascar, it is common to find schools that operate without consistent electricity, making it impossible to power computers or other digital devices. Even where electricity is available, frequent power outages and unstable connections further disrupt the use of technology. Across Africa, the situation is similar, with internet penetration remaining low in many regions, particularly in rural areas, making it difficult for schools to access online educational resources or cloud-based systems for digital record management (Vial, 2019).

Another major barrier is the lack of financial resources needed to purchase and maintain technology equipment (Rabani et al., 2023). Many public elementary schools in Madagascar and other African countries operate on limited budgets, with most funds allocated to basic needs such as teacher salaries, classroom materials, and school maintenance. As a result, there is little or no funding available to invest in computers, tablets, educational software, or digital storage solutions. Even when external funding is provided, schools often struggle to maintain the equipment due to the high cost of repairs, upgrades, and replacement (Male & Burden, 2013). This financial constraint prevents schools from embracing modern technology and restricts their ability to provide students and staff with digital literacy training.

Furthermore, limited digital literacy among teachers and administrative staff poses a significant challenge to technology adoption (Jiang et al., 2019). In many schools, educators are not familiar with basic digital tools or software applications, making them hesitant to use technology for teaching or administrative tasks. In Madagascar, where teacher training programs are often outdated, there is little emphasis on digital skills, leaving educators unprepared to integrate technology into their daily activities. Across Africa, the situation is similar, with many teachers having received their education in environments where technology was not part of the curriculum (Anwar et al., 2021). This lack of digital skills not only affects teaching quality but also prevents schools from effectively using technology for resource management, communication, and record-keeping.

Finally, the absence of clear policies and guidelines on technology use in schools further hinders adoption. In Madagascar, most public elementary schools lack standardized protocols for integrating technology into school management or classroom teaching. This results in inconsistent practices, with some schools attempting to use technology without any structured plan, while others avoid it entirely due to uncertainty. In the broader African context, while some countries have developed national digital education strategies, these policies are often poorly implemented at the school level due to inadequate monitoring and support (Klopfer et al., 2010). The absence of clear guidelines leaves school administrators unsure of how to adopt technology effectively,

leading to wasted resources and missed opportunities for educational improvement (Rabani et al., 2023). Addressing these challenges requires a coordinated effort from governments, educational stakeholders, and international partners to ensure that schools are equipped with the necessary infrastructure, funding, training, and policy support for successful technology adoption.

CONCLUSION

This study reveals that technology adoption in school resource management within public elementary schools in Madagascar is severely limited, with most schools relying on traditional paper-based methods for administration and record-keeping. Digital record management is rare, and communication with parents primarily occurs through correspondence books. The absence of electricity, internet connectivity, and adequate technology equipment further restricts technological integration, leaving teachers to manage their tasks without digital support. Despite a generally positive perception of technology among school principals, significant barriers persist, including limited digital skills among staff, inadequate financial resources, and a lack of clear policies on technology use. Documentation review confirms that school records are mostly maintained in written form, with minimal use of basic software like Excel, and there are no technology-related training records for teachers. These findings indicate that despite the potential benefits of technology in schools resource management, practical implementation remains a challenge. Addressing these issues requires improving infrastructure, providing essential technology tools, developing clear technology policies, and offering targeted training programs for educators and staff.

RECOMMENDATION

Based on the findings of this study, it is recommended that the government and educational stakeholders in Madagascar prioritize the provision of basic infrastructure, including electricity and internet connectivity, to public elementary schools to facilitate technology adoption. Schools should be equipped with essential technology tools such as computers and digital storage devices to enhance resource management and record-keeping. Clear policies and guidelines on technology use in school management should be developed and disseminated, ensuring that schools have a standardized approach to digital resource management. Additionally, targeted training programs should be implemented for school principals, teachers, and administrative staff to enhance their digital skills, enabling them to effectively utilize technology for school management. Collaborative partnerships with educational technology providers and non-governmental organizations can also be explored to support schools with training, technical support, and affordable technology solutions.

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