



Investigating the Experiences of Mathematics Teacher Technology Integration in the Selected Rural Primary Schools in Namibia

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ABSTRACT

This qualitative case study investigated the experiences of 15 purposely selected mathematics teachers' technology integration in Namibia's selected rural primary schools. The study used the TPACK framework while data were collected through semi-structured interviews and lesson observation. The study results indicate that mathematics teachers use various ICT available in primary schools in Namibia. While some ICTs are widely used, others are only utilized occasionally. ICT was deemed beneficial, albeit impeded by several challenges in its incorporation into the mathematics classroom. These challenges pertained to a lack of technology training, a lack of technology integration guidelines, and a change of teacher role in teaching. The study underscores the significance of subject-specific technology training to enable mathematics teachers to adopt transformative uses of technology more frequently. The study recommends further research to examine how rural mathematics teachers effectively use technology to engage and actively meet students' learning needs.

KEYWORDS

Developing Country, ICT, Mathematics Education, Rural School, Technology Integration, TPACK

INTRODUCTION

Over the years, it has been noted that some mathematics teachers use technology to develop students' prior knowledge, abilities, and skills by linking mathematical concepts to materials, addressing common understandings, and introducing more advanced ideas. According to Bakirci and Karisan (2018), technology assists teachers in developing abstract ideas. Information and communication technology (ICT) assists teachers in teaching mathematical facts, skills, knowledge, and concepts more effectively while also improving their own and their students' capabilities (Spangenberg & De Freitas, 2019; Resien et al., 2020). ICT also makes it easier to organize, present, and process

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information, enabling ideas to be shared. The National Council of Teachers of Mathematics (NCTM) acknowledges the importance of technology in teaching and learning mathematics. NCTM (2000) states that “Technology is essential in teaching and learning mathematics; it influences the taught Mathematics and enhances students’ learning” (p. 5). Integrating technology into their teaching allows teachers to adapt their pedagogical approach and devise novel teaching methodologies that augment students’ comprehension of mathematical concepts, proficiency in mathematical procedures, and strategic competence. As a result, this can lead to enhanced student performance in mathematics.

Aceto et al. (2019) define ICT as an extensive term encompassing various technological tools and resources utilized for communication, information creation, storage, management, and dissemination. The integration of technology has transformed the process of teaching and learning by facilitating the teacher’s instruction and enhancing the students’ learning experience through innovative ways of gathering, organizing, and evaluating information. Furthermore, NCTM emphasizes the significance of technology in mathematics education and suggests that proficient teachers should utilize technology’s potential to improve students’ comprehension, engagement, and skills in mathematics (NCTM, 2000).

The integration of ICT in mathematics education in Namibian schools has brought forth numerous advantages and opportunities. By implementing this integration, obstacles to capacity building have been reduced, educational accessibility and equity have improved, and enrollment has expanded across all education levels (Barakabitze et al., 2019). This is mainly because ICT provides opportunities for teachers and students to be trained and educated anytime and anywhere. Furthermore, traditional educational culture has been transformed by the incorporation of ICT, enabling timely and location-independent delivery of educational content. As a result, both students and teachers can learn and teach at their own pace, which promotes independence and accessibility (Kaisara & Bwalya, 2021). The outcome has been increased enrollment, decreased learning costs, and the achievement of educational objectives and goals in a convenient manner (Tshiningayamwe et al., 2020; Shambare & Simuja, 2022).

Mathematics is a compulsory subject at all levels of primary education in Namibia, and the government is dedicated to delivering high-quality mathematics education. Several efforts have been made in the past to improve mathematics achievement in schools. The Namibian Ministry of Education (MoE) recognizes the importance of ICT and has integrated it into the education agenda through the introduction of the ICT policy for education in 2005. The policy guides the government, through the Ministry of Education, to undertake initiatives to equip schools with ICT tools that enable teachers to integrate ICT into their teaching. These initiatives include the provision of ICT equipment and software, such as computers, laptops, GeoGebra, MATLAB, and Internet installations in schools. However, despite the adoption of the ICT policy in education and the provision of necessary ICT equipment and software, many mathematics teachers in Namibia still encounter challenges in integrating ICT into their teaching due to factors such as inadequate electricity, high poverty levels, insufficient infrastructure, and inadequate technical skills among teachers. The implementation of ICT in schools has also addressed crucial issues regarding the utilization of ICT in teaching and learning.

Despite the advancements of information and communication technology in various sectors in Namibia, there is a significant gap in the utilization of technology in mathematics education in schools. This gap is particularly noticeable in rural primary schools due to the inadequate availability of ICT infrastructure for teaching and learning. Incorporating ICT in education is widely recognized as a method of reducing the digital divide (Ye & Yang, 2020; Nepembe & Simuja, 2023), enhancing accessibility and efficiency, and promoting quality education, which can ultimately lead to improved workforce development and productivity in the country (Kaisara & Bwalya, 2021). Nonetheless, there exists a paucity of empirical research on the experiences of primary school mathematics teachers who integrate technology into their instructional practices in Namibia. As a result, the purpose of this study is to elucidate the current and initial states of technology integration experienced by successful rural primary school mathematics teachers who incorporate technology.

The research aims to achieve its objective by asking the question: What are the experiences of mathematics teachers’ integration of technology in rural primary schools in Namibia? In order

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