From Technophobia to Techno Confidence: Integration of iPad Software Applications in Teacher Training

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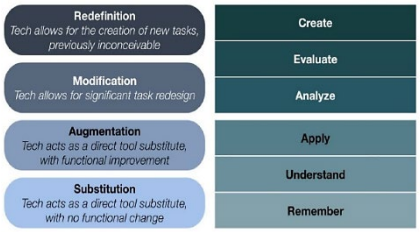
Abstract: The COVID-19 pandemic had a profound effect on higher education worldwide, underscoring the need for effective technology integration to enhance teaching and learning. This study aimed to address technophobia by introducing four iPad software applications to a group of 35 first-year Bachelor of Education preservice teachers specializing in the Intermediate phase at a private higher education institution in Westville, KwaZulu-Natal, South Africa. Conducted over six weeks in the second semester of 2024, the qualitative case study collected data through pre-intervention questionnaires, classroom use of Stop Motion, iMovie, Keynote and Plotogon in mathematics, natural science, and technology lessons, and a post-intervention focus group discussion. The findings demonstrated strong technological engagement under instructor guidance, with 91% of participants using at least one application during the intervention. The primary objective was to enhance preservice teachers' Technological Pedagogical Content Knowledge and reduce technophobia through hands-on experiences with iPad software applications. The findings revealed that preservice teachers envisioned using these four applications to create interactive, engaging, and student-centered classrooms, where learning is enriched through collaboration, creativity, and subject-specific tools for mathematics, natural science and technology. While many preservice teachers found the software applications easy to use, concerns about accessibility and teacher proficiency, especially due to socioeconomic disparities, highlighted the need for additional technology training. Stop-motion, Keynote and iMovie iPad software applications were believed to be crucial for developing technological pedagogical content knowledge, with Keynote particularly effective for blending abstract topics and concepts with innovative teaching strategies. It was recommended that Keynote be integrated into teacher training to create engaging worksheets and presentations. Stop Motion and iMovie could be used to create entertaining and interactive animations. Interestingly, the findings revealed that Plotagon was not used by the preservice teachers, possibly indicating technophobia or a lack of familiarity and confidence with the iPad software application. The study emphasized the importance of incorporating iPad software applications to assist primary school preservice teachers in overcoming technophobia and building confidence in technology integration. This integration of Stop Motion, Keynote, iMovie, and Plotogon could enhance teacher and learner experiences through creative and innovative instructional designs in mathematics, natural science, and technology.

Keywords: Technophobia, Techno confidence, iPad software applications, Technology integration, preservice teachers

The COVID-19 pandemic highlighted the issue of digitalization in higher education institutions and identified the potential of technology integration to shift traditional university teaching and learning pedagogies to digitalization as a “vital set of skills” (Akour and Alenezi 2022; Alenezi et al. 2023). The iPad is emerging as a progressive advanced handheld device for Science, Technology, Engineering and Mathematics (STEM) education and has shown improved academic achievement over traditional instruction according to a meta-analysis by Xiao et al. (2023). Pre-service teachers are not adequately prepared with technology classroom integration according to Pozas and Letzel (2023). In higher education, technophobia is hindering the integration of digital tools and impacting productivity in future organizations (Rehmat et al. 2014). Technology innovations have rapidly changed daily life and higher education (Dziuban et al. 2018). Anxiety towards technology integration in preservice teachers may arise from prior educational, socio-economic, and cultural factors, particularly in developing visualization skills in mathematics, science, and technology. Many preservice teachers often feel anxious and fearful about using technology due to a lack of training, exposure, and negative past experiences. Mpungose (2020) found that this fear can result in a reluctance to adopt new teaching methods, hindering the potential benefits of technology integration in education. Similarly, Ndebele and Mbodila (2022) discovered that preservice teachers struggle with feelings of inadequacy in their technological skills, leading to low confidence in using technology in the classroom. The constant evolution of technology adds to the pressure on educators to keep up with the latest trends, intensifying technophobia. It is essential to address these issues through effective teacher training that incorporates technology to enhance teaching effectiveness and empower future educators to embrace technology for student learning. Comprehensive training programs are needed to build techno confidence among preservice teachers, preparing them to navigate the challenges of a technology-driven educational environment. Technophobia, derived from the Greek words technē and phobos, refers to an irrational fear or anxiety related to the negative effects of advanced technologies (Osiceanu 2015:1139). This fear can lead individuals to avoid new technologies such as coding, robotics, and artificial intelligence, separate from computer anxiety (Xiao et al. 2023). Without proper training programs to address technophobia, preservice teachers may struggle to adapt to emerging technologies, widening the knowledge gap (Khasawneh 2018; Osiceanu 2015; Xiao et al. 2023). Overcoming technophobia through training can empower individuals to

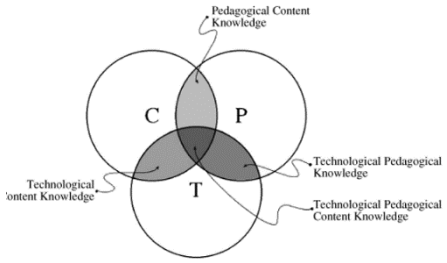
succeed confidently in today's digital landscape. Implementing interventions using iPad software applications like Stop Motion, iMovie, Keynote, and Plotogon can enhance visual-spatial skills and Technological Pedagogical Content Knowledge (TPACK) development in future preservice teachers. This approach should be integrated with pedagogical frameworks such as the TPACK and Substitution Augmentation Modification Redefinition (SAMR) models that highlight the synergistic relationship between technology and content integration in subjects like mathematics, natural science and technology (Li et al., 2024). Teachers play a crucial role in integrating iPad software applications and fostering technologically proficient learners in the classroom.

Future teachers must develop subject-specific technological knowledge and effective pedagogical strategies for teaching math, science, and technology in primary classrooms (Xiao et al., 2023; Pozas & Letzel, 2023). This study draws on two theoretical models: TPACK and SAMR. TPACK, as described by Hilton (2016) and Alivi (2019), helps teachers integrate technology in classrooms through seven components, including Technological, Pedagogical, and Content Knowledge. SAMR, explained by Hilton (2015), follows four stages—Substitution, Augmentation, Modification, and Redefinition. The latter stages have been adopted in the United Arab Emirates to improve teaching practices (Miles, 2019). Future research should examine how TPACK and SAMR models could guide iPad technology integration as these models could provide deeper insights into the effective use of technology in educational settings.



Mishra and Koehler (2006:1025)

Figure 1: TPACK Model



Puentedura(2013)

Figure 2: SAMR Model

An initial meeting was held with the Bachelor of Education Intermediate phase first year preservice teachers to discuss the study's timeline and the use of iPad software applications for hands on activities in mathematics, natural science and technology. Ethical clearance was obtained from the Research Ethics Committee to conduct the research on site at the private higher education institution and participation in the study was voluntary. The Stop Motion and Keynote iPad software applications were used by the preservice teachers to explore two- and three-dimensional shapes in mathematics, perceptions of scientists and the water cycle in natural science and technology. In October, the preservice teachers used various iPad software applications such as Stop Motion, iMovie, and Plotogon to showcase their understanding of the water cycle in natural science and technology. Videos were uploaded on the Learning Management System and analysed thematically. A focus group discussion was held to gain deeper insights on the preservice teachers' technology integration experiences. The study was guided by two research questions: (1) "What are the most effective iPad apps for enhancing pre-service teachers' techno-pedagogical content knowledge?" and (2) "How does iPad integration impact pre-service teachers' technological pedagogical content knowledge (TPACK)?" Data collection included a pre-intervention questionnaire, a hands-on intervention with four iPad applications in math, science, and technology, and a focus group discussion with ten pre-service teachers. Three key themes emerged for the first research question: ease of use, enjoyment, and interactivity. Stop Motion, Keynote and iMovie were favoured due to their simple interfaces and engaging features, which helped reduce technophobia and improve the learning experience. The

participants' needs ranged from basic iPad skills to advanced application integration for complex topics. Further research is needed to explore the limited use of Plotogon. For the second research question, findings showed that iPads enhance subject-specific teaching in math, science, and technology through visual learning and interactive problem-solving. In technology, iPads were useful for teaching coding, robotics, and digital design, preparing students for future technology careers. The interactive nature of the applications promoted active learning, improved content retention and understanding.

According to Figure 3 below, out of thirty-five pre-service teachers, thirty-two used iPad software applications. Stop Motion and iMovie were the most popular, each used by 11 teachers (31%), while Keynote was used by 10 teachers (29%), likely for presentation-based lessons. Notably, no teachers used Plotagon, possibly due to technophobia, unfamiliarity, or lack of confidence in using the application.

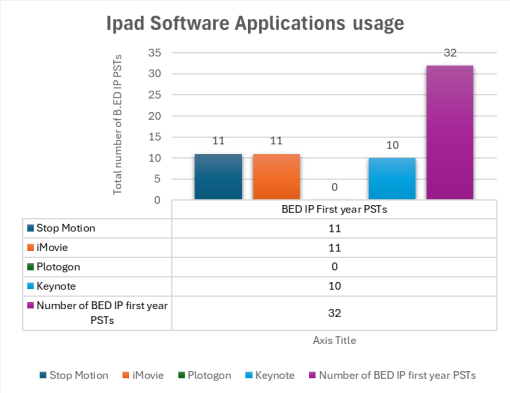


Figure 3: iPad Software Applications Usage

Several participants expressed the need to become familiar with the iPad's functionality and interface, particularly those more accustomed to Android devices. For individuals not comfortable with iPads or who do not own one, understanding basic device operation is viewed as an essential initial step. It was important that the selection of software applications is aligned with curriculum standards. Participants expressed a desire to explore Stop Motion, Keynote, iMovie and Plotogon applications for math visualization, science simulations, coding and robotics to make abstract concepts more engaging and interactive. While minor technical issues such as buffering and updates were noted, and a few participants faced difficulties finding resources, most reported no major challenges with using iPad applications. This study highlighted the importance of preservice teachers becoming proficient with new technologies, overcoming technophobia, and building confidence in their technological skills. Incorporating innovative technologies like iPad software applications in teacher education programs could empower preservice teachers to confidently use technology, preparing them for the demands of 21st-century teaching and a digitalized workforce. By developing technologically proficient primary school learners, South Africa could advance in economic growth, social development, digital innovation, and global competitiveness.

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