Reimagining Education in The Digital Age: Narrative Insights from Pre-Service Teachers on The Impact of Technological Advancements

Hilary K. Y. Ng
Hong Kong Metropolitan University

Abstract

The rapid technological advancements continue to shape the future of education. What will be the future of education? This research conducted interviews with a group of pre-service teachers (N = 25) who have grown up in the digital age and are well-versed in the latest technology trends. Their perspective equipped them to bring a fresh and contemporary perspective to inspire and drive changes in technology-enriched educational practices. Other than this, they have direct relevance to the development of future education after they graduate. Through in-depth interviews, this research uncovers multifaceted implications of technology-enriched teaching and learning practice. The interview scripts were analysed with a thematic analysis approach. The narratives of pre-service teachers illuminate the transformative potential of technology in 1) increasing engagement, 2) enhancing learning performance and global competitiveness, and 3) fostering student-centred learning. This generational perspective offers valuable insights into how technology is integrated into their own education and its potential impact on future generations. Such recognition can facilitate policymakers, educational institutions management, and educators in preparing for and effectively incorporating technology to shape the future of education. The results can pave the way for a more effective education model that pushes beyond the boundary of traditional teaching practices.

Keywords: digital learning; educational technology; pre-service teachers; technological implications; pedagogical adaptation

1. Introduction

The advancement of technology has accelerated the changes in education across the globe. It has a history of gradually shaping the education landscape with innovative methods in content delivery, learning activities, and classroom management via different technological tools (e.g., Berndt et al., 2017; Car et al., 2019; Fingrut & Ng, 2023). It has also been the solution for education when facing the emergence of the COVID-19 pandemic. During the
threat of COVID-19, the challenge of reducing social contact and continuing education has forced educators to explore alternative instructional methods – suspending classes without disrupting teaching. This myth has become true only with the technological advancement of videoconferencing, the Internet, and digital devices (Lam & Ng, 2023). Although entering the post-pandemic period, the rapid technological advancement is believable to transform education continuously. As we find ourselves witnessing the evolving technology-rich education, understanding the transformative potential of technology towards the future of education becomes crucial.

This research delves into the unique perspective of pre-service teachers positioned to become the educators of the next generation. Students in this discipline exhibited a welcoming and enthusiastic attitude towards new pedagogical approaches (Ng & Lam, 2022; Ng & Lam, 2023a), with their views on technology’s role in education holding direct relevance to shaping the future educational landscape. Beyond their potential impact on education, pre-service teachers offer novel and contemporary perspectives as they are digital savvy and grown up in the digital age (Prensky, 2001; Smith et al., 2020). They inherently possess an intimate familiarity with the latest technological trends and hold the potential to make the best use of technology. They are the groups that have already incorporated technology to benefit their own learning or at least have the potential affordances to use technologies in their learning (Smith et al., 2020). Thus, this group of pre-service teachers can not only share their views as a student about the existing technological trends but also as a teacher on the future development of technology. Hence, comprehending the views on technology of these prospective educators becomes paramount.

This investigation adopts interviews and thematic analysis to understand how future teachers view technology in education and explore the consequences their insight may carry into the future of education. Placing these focuses in this investigation, this investigation adopts a proactive approach to understanding the emerging trends of technology-enriched teaching. It can also inform the development of technology-enriched teaching and learning practices and curriculum design that align with the needs of the existing students and the preferences of the next generations of educators. This information can guide the development of policies and teaching practices that foster innovation and address the associated challenges. The results of this research also have the potential to pave the way for a more inclusive, dynamic, and supportive teaching environment.

2. Method

Participants

This research employed a qualitative approach to explore the view of technology among pre-service teachers. Purposive sampling was adopted to recruit the pre-service teachers. Altogether, twenty-five pre-service teachers participated in this research. The inclusion criteria specifically targeted undergraduate students in the final stage of their education programs. Such criteria could help ensure that the participants were transitioning into the teaching profession and could share both teaching and learning experiences from a first-person perspective.

Data Collection

All participants were invited to attend a focus group interview. There were 4 to 5 participants in each group. To provide more flexibility in questioning, semi-structured interviews were conducted.
Data Analysis

Thematic Analysis was adopted to systematically identify, analyse, and report patterns and themes in collected data. The data was coded by two researchers independently. If there were any discrepancies in coding, the two researchers discussed for a consensus.

3. Results and Discussion

The findings from this research can provide valuable insights in understanding the technology-enriched teaching and learning. It is especially important to understand the perspective of pre-service teachers, who are comparatively to have the highest impact on the future of learning. This discussion synthesises three key themes derived from the results, including 1) increasing engagement, 2) enhancing learning performance and global competitiveness, and 3) fostering student-centred learning.

Increasing Learning Engagement

A key finding in this research highlights the benefit of technology in enhancing learning engagement. Technology tools can provide extended opportunities for students to participate in their learning process. Increasing learning engagement is particularly important in the current era, as university students usually have multiple idiosyncratic identities (Ng et al., 2023), implying they are now engaging in different social groups that could easily distract them from their studies. The responses from the future teacher participants provided additional insight into how technology can enhance learning engagement.

Technology is especially useful in information retrieval. Participants mentioned that the availability of information on the Internet can facilitate their learning. They no longer need to visit libraries or bookstores for relevant materials to complete their coursework. Another participant further mentioned that the Internet allowed access to different perspectives. They could also refer to the global situation easily, and thus, their learning was not confined to the traditional textbooks and local context. Instead, they could learn more about different issues around the world and apply theoretical knowledge to those issues to gain a better understanding. Such a shift contributed to broadening their perspectives, fostering an open and diverse learning environment, which in turn increased their learning engagement as they saw the direct relevance of their studies to real-world phenomena.

The integration of technology, particularly through learning games, was found to be an effective strategy for enhancing student participation in both physical and virtual classrooms. Participants pointed out the engaging nature of games-based learning activities, using student response systems such as Kahoot! for interactive classroom sessions. In fact, gamification learning was found to be an effective way to engage students in both physical and virtual classrooms (e.g., Lam & Ng, 2023; Qiao et al., 2023; Subhash & Cudney, 2018). Moreover, online learning platforms and social media features enable students to share and discuss their learning after class, as well as provide channels to maintain continuous communication between teachers and students. Teachers can provide guidance to students whenever they are in need, fostering a supportive environment to engage students in learning.

However, concerns about potential negative effects on learning engagement were raised by some participants. In particular, one participant pointed out the possibility of reduced engagement, especially in the distance learning setting where physical interactions were
limited. Compared to the physical classroom, interactions in virtual classrooms were rather limited as students were less active in communicating with teachers. The reduction in classroom interaction worsened when there was a sudden shift from physical to virtual classrooms in response to the uncontrollable situation (Lam & Ng, 2023). It is imperative to provide guidance to current and future teachers on effective interaction and communication strategies for different settings, such as synchronous and asynchronous online settings.

**Enhancing Learning Performance and Global Competitiveness**

Future teacher participants in the study recognised the transformative potential of technology in enhancing their learning performance. Based on previous research findings, technology can positively impact learning performance by not only boosting engagement but also enhancing self-directed learning under carefully designed curricula (Rashid & Asghar, 2016) or different pedagogical approaches (Lam et al., 2021). Participants expressed agreement on the opportunity to access information from different channels. These channels usually have different points of view that enrich their coursework and promote critical thinking.

Moreover, participants highlighted the specific benefits of technology in science education. Some technological tools, such as iPad apps, could simulate the experiments and pinpoint the possible sources of students’ errors. These opportunities to conduct experiments were seen as instrumental in consolidating knowledge and improving academic performance.

Beyond academic success, participants were optimistic about global competitiveness. They all agreed that the incorporation of science, technology, engineering, and mathematics (STEM) and information technology (IT) content into K-12 education (primary and secondary schools) in Hong Kong was applauded. They observed that some schools had developed new curricula for students to learn technology-related subjects. This initiative not only offers future students more opportunities to explore technology but also cultivate their interest and deepened their subject knowledge. Having a good foundational knowledge of technology becomes a key factor in global competitiveness. Early exposure equipped teachers and students with a solid foundation to place them in an advantageous position for global competition. Moreover, those students talented in technology could identify and nurture their interests early on to receive tailored education and resources for future success. This proactive approach played a crucial role in maintaining the global competitiveness of Hong Kong students in the current information age.

**Fostering Student-Centred Learning**

Technology facilitates various constructivist pedagogies, including student-centred learning, personalised learning, differentiated learning (Lam et al., 2021), and experiential learning (Mayer & Schwemmle, 2023). These pedagogies place students at the centre of the learning process to learn according to their learning progress.

Future teacher participants pointed out that technologies facilitated a constructivist curriculum design, enriched experiential learning experiences, and helped develop personalised learning experiences tailored to students’ individual needs. The current trend of constructivism underscored the importance of students actively establishing linkages between new concepts and their pre-existing knowledge to construct their knowledge (e.g., Lam et al., 2021; Windschitl, 2002), moving away from being passive listeners of lengthy lectures. One participant mentioned that, recently, more schools encouraged changing teaching methods and curriculum design to embrace both constructivism and technology. Therefore, introducing
various learning activities by adopting technological tools in the classroom would be essential for teachers.

Most of the participants highlighted the opportunities technological advancements provided to facilitate experiential learning. This approach emphasises learning and reflecting through direct experience (Kolb, 2015). Participants pointed out that multimedia, especially videos and 3D animations, could enhance students’ attention and help them understand abstract concepts easily (Gannod et al., 2008). One participant further shared her idea of using extended reality, such as virtual reality and augmented reality, to teach literature. From her experience, she learned the importance of the scenarios that inspired authors to compose literature. These scenarios can help students understand the different meanings of the literature. Extended reality can provide a medium for students to immerse themselves in these scenarios, which, in turn, students can learn beyond simply recitation and truly experience the essence of the literature. Other participants also agreed on the usefulness of extended reality in simulation for experiential learning.

Finally, future teacher participants expressed that technology could be useful in addressing students’ unique learning needs by providing a personalised learning experience. Research has shown that personalised learning can enhance learning performance (e.g., Alsobhi & Alyoubi, 2019; Kong & Song, 2015). Participants imagined that the future development of technology could directly identify individual learning difficulties and, based on this, design appropriate learning activities to help students overcome their unique challenges. This is not impossible. The emergence of learning analytics techniques has already attempted to identify at-risk students (e.g., Shiao et al., 2023; Yürüm et al., 2023). Teachers could refer to the results to provide differentiated learning activities for students with diverse learning needs (Lam et al., 2021). Thus, technology could also facilitate the development of student-centred learning.

4. Conclusion

In conclusion, the advancement of technology is foreseeable to continue accelerating education reforms. Yet, the effective integration of technology into education requires a thoughtful and balanced effort. Specifically, the number of lessons adopting a new instructional approach was shown to impact course outcomes (Ng & Lam, 2023b). In contrast, a carefully devised curriculum was found to be effective even when learning in a large class with different instructors (Ng et al., 2020). Educators and policymakers should collaborate to explore possible strategies that leverage the numerous benefits of technology while proactively addressing the challenges it may present. By embracing this principle, future education shall navigate the complexities of technology-enriched environments to provide students with a well-rounded and enriching learning experience.

References


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