

Digitalization of Education Programs to Enhance Cambodian Students' Digital Performance

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Abstract

This study examined the effects of digitalizing the education programs to enhance the students' digital performance. It aimed to examining the influences of digitalizing the education programs on the development of interactive and personalized learning, skill development, improved access to resources, and blended and online learning. This study also determined the challenges of digitalizing the education changes – focusing on the infrastructure and access, digital literacy, teacher training, and financial and institutional support. By examining digitalization of the educational programs, this study used the analytical research design, with the secondary data analysis method for collecting and analyzing data. Secondary data was used for gathering information. The theoretical analysis method was employed to analyze the data gathered in determining the perspectives of digitalizing education programs to enhance the students' digital performance. The results of this study elaborated on the effects of digitalizing the education programs, which improve the interactive learning, digital skill, digital access resources, and distance or hybrid learning. Digitalizing the education program significantly contributed to the betterment of students' digital competence, skills, and literacy. Therefore, this study benefited the reform of education programs with the internet digital platforms in term to developing the teaching and learning methods, quality, outcomes, competence, and literacy.

Keywords: *digital program, digitalization, quality, digital performance, literacy, competence*

1. Introduction

Digital transformation is the optimal for contributing to quality education and accessing the students' digital performance (Giannoutsou et al., 2024; Timotheou et al., 2023). Besides, the digital technology shares the negative impacts of education, such as infrastructure and access, digital literacy, and teacher training (Cain, 2018; Gottschalk, 2019; Meates, 2020; Komar Rikreay Association, 2021; OECD, 2024b) and harmful learning behaviors (Copp et al., 2021; Dhamodharan & Sunaina, 2023; Slaughter & Newman, 2022). Several education institutions mastery students' digital technology, promoting their understanding of how it works (OECD, 2018, 2023). However, digital literacy

is the critical challenge for students face with limited access to resources and learning in schools (UNICEF, 2021). The global shift to digitalization in the education program left a gap in the access to technology and digital skills – meeting the challenges in shaping sustainable education through education transforming (James et al., 2021; OECD, 2018; UNESCO, 2019a).

Many education-institutions (EIs) commits to creating the enabling learning environments and transforming education system (UNESCO, 2022). With the increased reliance on digital technologies, digital education program (DEP) plays critical role in transforming education, encompassing the main aspects of utilizing the digital tools and platforms (UNESCO, 2023). By supporting policymakers, educators, and students with tools and resources to navigate digital landscape, it guided integration of digital technologies in education (UNESCO, 2019a). Digital Literacy articulates the competencies – cognitive, behavioral, and socio-emotional dimensions of the students’ development in the digital world. The digital framework emphasizes the need for students’ digital literacy, acknowledging technical skills, critical thinking, innovation, and competency for lifelong learning in the digital landscape.

Transformation of digital education plays a role in transforming the digital technology into the education programs – improving the education quality, education systems, learning frameworks, and learning outcomes to meet the policy of digital transformation in education (Hang-chuon, 2021; Supreme National Economic Council [SNEC], 2021). Digital technology streamlines the process of teaching and learning and is a critical mission for educational institutions to advancing the digital literacy in the education integration (Dirk et al., 2021). Transforming of digital education is a challenge for processing the e-teaching and remote learning through digital internet platforms (Parlak, 2017). The growth of transforming the digital education program is critical gap for digital teaching and learning process (Taşkıran, 2017). Further, digital competence is a crucial factor for teachers to handling the distance teaching (Balyer & Öz, 2018; Parlak, 2017). With the challenge of digitalizing education programs, digital literacy is crucial for educational institutions to boosting education quality and learning outcomes. Digital education should be in the process of transforming digital teaching and learning to enhance digital competence, literacy, and skills.

2. Conceptual Framework of Literature

Education Transformation on Students’ Digital Performance

Digital adoption and digital literacy, making digital education a priority, were essential to protect cyber risks and empower use of technology to promote

the societal development (MoEYS, 2019). In Cambodia, the pivotal demands of Internet-powered devices significantly increased in research, learning, and competency in the digital technology engagement (Ministry of Post and Telecommunications [MPT, 2023; UNICEF, 2022a). However, digital literacy for Cambodian students remains unclear. Accordingly, students in the urban areas were active Internet users (UNICEF, 2022b). The studies in Cambodia highlighted the cyber risks and online behaviors toward digital media literacy, defining as the prevalent concerns (Lim, 2023; MPT, 2023; UNICEF, 2022b). The index of school responsibility for carrying out curriculum readiness for digital learning were low in education programs. Student performance was unsatisfactory, while students spent hours on screen lesson time.

Technology use is increasingly affecting students' academic performance, (Fekih-Romdhane et al., 2023; Gottschalk, 2019; Komar Rikreay Association, 2021; Nizariah, 2021). This really reflects students' limited competence in harnessing digital technology. Further, institutional support is a critical gap in equipping with digital knowledge and skills to contribute to the digital era. Chea et al. (2022) highlighted unreadiness of Cambodian to integrate ICT in teaching and learning. Regarding the digital sensitivities, Cambodia was the partial freedom country in handling Internet access and affecting digital behavior (Funk et al., 2024). Typically, Cambodian students had mindset with less critical, curious, and flexible, hindering development of digital global education (CASADIO et al., 2021; Supreme National Economic Council [SNEC], 2021). Also, digital skills, supporting to market demand, remains an urgent focus in the process of developing the education quality and learning outcomes (DASH et al., 2021).

Digital curriculum formed the institution-planning strategies to enhancing students' learning competencies and outcomes. It was a complex concept, encompassing the content and structure of digitalizing education to facilitate learning. Consequently, digitalizing the education programs is essential to nurture the students' learning competencies for the education landscape by ensuring digital educational contents at all settings (OECD, 2024a; UNESCO, 2023). Deepening the students' understanding of implement a purposeful digital curriculum as an essential asset for digital skills. Digital education and technology influenced the changes of digital teaching and learning outcomes (Bates, 2015). Digital technology significantly contributed to the involving individual needs for developing digital competence and skills (Balyer & Öz, 2018; Sisman, 2016). With digital education transformation (DET), it helped develop students' digital competence (Paulo, 2020).

Integrating the digital technology in education was a process of transforming the digital education system with the internet platform (Dirk et al., 2021; Paunescu et al., 2022). Digital transformation was the regeneration of technology in digital education (Forrester, 2016; IDC, 2015) and the digital creation (OECD, 2017; Raab & Griffin-Cryan, 2011). Educational institution's digital transformation was part of digital process in education and learning environment (Balyer & Öz, 2018; NV, 2017). In addition, digital technology contributed to qualifying education, using digital and internet, using the computer technology, enhancing online learning, carrying out collaborative learning, and integrating the digital technologies in teaching and learning process (Dirk et al., 2021; Paulo, 2020). With existing ICT devices, education institutions were driven by collaborating to create and share knowledge and resources that led to digital transformation, improving the education quality (Paunescu et al., 2022).

Digital Transformation on Education System

DET involved that comprehension that integrated digital technologies into the Els' aspects, such as operations, education delivery, and stakeholder interactions. DET encompassed the learning methods, quality, outcome, and engagement (Benavides et al., 2020; Shenkoya & Kim, 2023; Alenezi, 2023). Typically, Els adopted the digital platforms to enhance learning experience and efficiency and online and digital learning environments – supporting decision-making and improving students' learning outcomes (Shenkoya & Kim, 2023; Abad-Segura et al., 2020). This transformation contributed to sustainable practices, innovation, and technological changes (Shenkoya & Kim, 2023; Abad-Segura et al., 2020). By implementing DET, it necessitated the strategic planning to develop the education frameworks in effectively integrating the digital technologies to build learning competition and literacy (Mohamed Hashim et al., 2022; Valdés et al., 2021; Bisri et al., 2023). This transformation drove changes in Els' innovation and adaptation to the new digital landscape and leveraging chance with literacy of digital technology (Bisri et al., 2023; Rof et al., 2020).

DET in Els was challenged with the environmental, strategic, organizational, technological, and cultural barriers (Gkrimpizi et al., 2023; Gkrimpizi & Peristeras, 2022; Rima Aditya et al., 2021). These challenges required the technological innovations and transforming education culture (Díaz-Garcia et al., 2023). Cultural and mental shifts are defined as support technological advancements to a digitally enabled educational environment (Akhmetshin et al., 2020; Bucăța et al., 2022). The digital divides are obstacles in academic

and professional roles (Akour & Alenezi, 2022). The key factors influenced DET, including technological readiness, educator digital competencies, and student digital skills. Digital frameworks are very crucial for digital learning environments (Larionov et al., 2021). Education institutions must ensure that students and teachers are well-equipped with the technological tools and resources (Latifah et al., 2022).

Teachers must develop digital competencies to effectively support students in a digital learning environment (Larionov et al., 2021; Latifah et al., 2022). In addition, students must possess the digital competencies to engage with digital learning platforms, including digital literacy, navigating online learning environments, and using digital tools for collaboration. Training in ICT and attitudes towards digital technologies can influence students' digital skills (Litiņa & Miltuze, 2023). With the 21st-century competencies, readiness for e-learning might indicate a need for development of digital skills (Elçiçek & Erdemci, 2021). The DT of EIs influenced teaching and learning outcomes in various ways. The ICT integration in the educational practices improved the student engagement (Valverde-Berrocoso et al., 2022). Digital technologies encouraged students to learning with constructive and interactive learning activities, associated with learning outcomes (Wekerle et al., 2022). Digitally transformed environment significantly enhances student engagement (Niță & Guțu, 2023).

DT helped the education institutions develop digital strategy planning. For this reason, DT was used as a whole and change by implementing the digital thinking and using frameworks to manage the digital initiatives (Silva, 2017). DT was important in reforming education systems, facilitating the distance learning, creating the digital education platform, and digitalizing teaching and learning environments (Paulo, 2020). Yureva et al. (2020) argued that the educational institutions had the vision directly linked to the digitalization in line with global digital trends. With the increase of DT, EIs embraced the digital teaching practices in developing the teaching quality (Alenezi, 2021).

3. Methodology

This study used the analytical research design (Chhorn, 2024; Denzin & Lincoln, 1994; Ivankova & Crewell, 2009), with secondary data analysis for data collection and analysis. Secondary data were used for data to address the researched results. This paper employed the theoretical analysis method was used for analyzing qualitative data in determining the perspectives of transforming the digital education to enhance students' digital performance (Biecek & Burzykowski, 2021; Hsieh & Shannon, 2005; Masadeh, 2012).

Instead, the analysis of secondary data was about a contextual analysis to examine the effects of transforming digital education in Cambodia. The research ethics was demonstrated by keeping safety. Thus, a well-conducted study required the presentation of methods, clear data collection tools, data collection methods and appropriate data analysis methods and research ethics.

4. Critical Arguments

Digital Transforming on Educational Outcomes

The importance of DET lies in a sense of responsibility that engages with the online learning with a constructive digital landscape, reflecting technology advancements (Chen et al., 2021). This study explores the perspectives on DET, highlighting its multifaceted nature influences the students' learning outcomes (Council of Europe, 2019; James et al., 2021; Kim & Choi, 2018; UNESCO, 2019a). The nature of DET has a complex digital realm, such as social networks, which produce the diverse educational perspectives on DET (Culminas-colis & Reyes, 2024; Fernández-Prados et al., 2021). The concept of DET comprehensively, however, remains misunderstood in enhancing the students' learning outcomes (Chen et al., 2021; Ribble & Park, 2019). This challenge arouses researchers to propose multiple frameworks and models with guidelines of integrating curricula for understanding and teaching DT – cultivating digital competence and engaging students in the digital learning environment (Chen et al., 2021; James et al., 2021; Kim & Choi, 2018; Ribble & Park, 2019; UNESCO, 2019a).

The fundamental elements of DET guided the students on interacting with digital technology and emphasizing the skills and behavioral practices with digital literacy (Ribble & Bailey, 2007). With the development of technology, EIs commits to updating the practical standards aligned with the responsive implementation (Ribble & Park, 2019; The Council of Europe, 2019). This framework offers a practical lens through digital Education transformation (DET), focusing on teaching and learning with the internet digital platforms. The competency framework incorporates DET as the key dimension to foster digital learning (Council of Europe, 2019). It was conceptualized by digital domain in lying on and underpinning the competencies – knowledge and critical understanding, skills, attitudes, and values of the responsible digital learners.

Digital Intelligence (DI) collaborates with and endorses a DET Framework, encompassing digital literacy, skills, and readiness. DI is known as a set of comprehensive technical competency that enables individuals to face the

challenges of digital life (DQ Institute, 2019). DI framework comprises the competencies across the digital life – identity, use, safety, security, emotional intelligence, and literacy, addressing students’ digital education demands. The framework aims at understanding of digital competence, encompassing the ability to use digital technologies, and navigating the critical thinking and problem-solving skills (UNESCO, 2019b). Digital transformation was a digital education strategy that helps EIs innovate digital-experiences. For this case, EIs digitalize the critical thinking with digital internet frameworks to manage the digital initiatives in education – developing the digital learning outcomes and quality (Paulo, 2020; Silva, 2017). DT embraces and changes the digital teaching and learning practices (Alenezi, 2021; Yureva et al., 2020).

Critical Perspectives of Transforming Digital Education

With the studies confirmed by James et al. (2021), students commonly concern their digital lives in education. The digital landscape and students’ experiences are as digital drama and social media’s impact on learning self-esteem. The responsive DET curriculum address students’ concerns with the digital world’s complexities, understanding of digital competence enabled students to engage confidently, critically, and safely with digital technologies – systems driven by artificial intelligence (AI) (Vuorikari et al., 2022). The framework centers on digital skills across data literacy, collaboration, digital content creation, and problem-solving – being applicable for workforce training and lifelong learning. This interlinks with the competencies, such as literacy, digital competence, STEM, and language. DET frameworks are interconnected and aligned with effective engagement in the digital world and share the core competencies, focusing on digital literacy and innovation – contributing to the digital education, policy orientation, and workforce development.

Digital teaching transformation (DTT) contextualizes Cambodian education with E-learning and distance learning. Digital technology was the view that the digital transforming concerns about technological change in education. Transformation of digital education was the process of transforming digital technology into teaching and learning process. By being proficient in digital skills of technology in teaching, it requires teachers and students have the competencies in using the digital technologies. Accordingly, transforming the digital education provides benefits to development of learning outcomes, facilitation of the teaching process, methods, and quality.

DET plays a crucial role in students’ learning development to navigating complex and dynamic environments (Jones & Mitchell, 2016). DT curricula

and teaching approaches emphasize its complex and multifaceted nature, embedding DET concepts that can offer students authentic contexts in which to apply the digital skills (James et al., 2021). With the transition of DET into practice, digital curriculum provides a tool to determine what aspects of DT learners should acquire (Ribble & Park, 2019). By addressing critical issues of DET, students confront in the digital realm to ensure their resilience to digital dilemmas. DET frameworks emphasize the digital skills and competencies. DET provides significant implications for educational policies and curriculum development, reflecting the importance of aligning educational practices with students' digital competencies by fostering beyond ICT skills in response to SDGs (UNESCO, 2019a).

DET curricula can provide a comprehensive foundation for students to thrive in the digital learning outcomes by integrating DET concepts across subject areas, developing the critical thinking and literacy skills, enhancing digital literacy, encouraging creativity and innovation, and addressing the emerging technologies. The curricular within the DET framework plays a vital role to highlight analysis of existing policies in educational settings (Öztürk, 2021). The MoEYS consequently updates education system through DET curriculum to support and provide students with the digital skills needed to thrive in a competitive global market (MoEYS, 2024). Cambodia's education reform focuses on modernizing teaching practices, improving educational outcomes, and bettering the students' digital competencies. According to PISA 2022, student' learning performance increasingly develops due to critical factors, including DT curricula. MoEYS (2024) prioritized its education reform efforts in strengthening school governance and advancing digital education. Further, future-ready education system shifts toward competency-based education, critical thinking, problem-solving, digital literacy, and digital skills (MoEYS, 2016). By prioritizing competency-based learning, STEM, digital literacy, and equity, it addressed the evolving needs of students and the labor market. As Cambodia's journey toward education modernization, educational reform will be central to achieving long-term development using ICT and digital skills, integrating technology into the education system, with the digital literacy and technological infrastructure (Flores & Mean, 2024; Keo et al., 2024a; MoEYS, 2024; Pang et al., 2022). The concerns of digital skills have a positive attitude toward using ICT in teaching with the Internet platform (Pang et al., 2022). Digital education transformation in Cambodian EIs influences the teaching and learning outcomes and challenges digital literacy (Flores & Mean, 2024). In addition, the integration of educational technology in EIs

involves challenges and leveraging opportunities by enforcing policies to enhance educational outcomes and digital literacy (Keo et al., 2024a).

Digital Transforming on Education Change and Reform

Implementing DET has been an urgent focus to empower digital technologies in endorsing the next generation to obtain digital competencies that embeds in key education policy in Cambodia. The goal of DET policy outlines the EIs' endeavor to build students' ICT knowledge and skills. MoEYS acknowledges the significance of technology-enhanced learning ecosystem, improving innovation and digital skills. These initiatives guided the Cambodian curriculum frameworks to empower learners, developing competency concerned with ICT as a basis for lifelong learning. The concept of DET likely addressed digital competencies that emphasize ICT and media literacy. However, the digital resilience, digital self-awareness, and digital creativity remain far behind.

This study highlighted the competencies concerned with utilizing technology in enhancing students' digital competencies. Modernization of teaching and learning to ensure students can engage in improving learning outcomes. Based on the Master Plan for ICT in Education 2009-2013, digital skills and competencies are important for students to learn in changing. A policy and strategy for ICT in education were set out to integrating ICT in the education system to ensure learners are equipped with the computer skills literacy for lifelong learning. With Cambodia Education Roadmap 2030, the DET's vision empowers the education system for digital knowledge. In line with digital education transformation, EIs fully digitalizes students' learning outcomes by shaping skills and attitudes for digital space. Transformation of digital education facilitates the process of digital teaching and learning in the context of 21st century education (Hang-Chuon, 2021). DT in teaching plays an essential mission for the EIs reform educational quality and outcomes (Dirk et al., 2021). Technological system can digitalize the teaching and learning process. Hence, transforming digital technologies in education can be the digital education policy, adopting to digitalize teaching knowledge, competencies, skills, literacy, and quality.

Digital Competency for Education Development

Digital competency plays a role in creating new technologies, transformative innovations, and digital interactions. However, the digital resilience, artificial intelligence, and digital innovation neglects measurable technical abilities that are increasingly recognized the success in technology-driven landscape of education reforms. In this situation, digital resilience (DR) is crucial for

empowering students to navigate risky digital situations (Khan et al., 2024; UNESCO, 2023). The Cambodian curriculum with utilizing digital resilience suggests that students may miss critical skills – hindering personal growth and academic performance in the educational settings (Choi et al., 2017). According to this study, digital emotional intelligence (DEI) demonstrates the digital capacity to navigate properly in digital interactions (UNESCO, 2019a). With the Goleman's (1996) studies on key aspects of DEI that are effective intrapersonal and interpersonal interaction and performance, DEI cultivates and enhances students' empathy, ethics, and capabilities to navigate online learning in the digital realm (Segura et al., 2020).

Likely, digital creativity and innovation (DCI) involves the capacity to leverage digital technology in creating new identity. As the studies by Koehler et al. (2013), integrating technological knowledge into education fosters creativity in digital education contexts. Thy et al. (2023), however, demonstrate low competency in ICT literacy to support the profession students' learning. ICT-based teaching mainly important for teachers develop teaching methods. The limited emphasis of curriculum on digital competency could hinder students' learning creativity and critical thinking skills, contributing to the digital economy and global innovation ecosystems (Morel & Spector, 2022). Critical digital competencies and DET framework in Cambodia's education curriculum (UEC) creates notable gaps to education institutions.

The development of educational curricula shapes the conventional teaching approaches and national identity preservation in transforming the digital technologies in education. Education policy might conventionally focus on emerging competencies, such as digital resilience, digital intelligence, and digital innovation (MoEYS, 2024). Promoting ICT in education prioritizes digital infrastructure and literacy (UNESCO Institute for Statistics, 2018). Since DET is an emerging endeavor, many Cambodian teachers lack the digital engagement in fostering high-level digital competencies and soft skills (In-Seong et al., 2022; Sok & Heng, 2024). DET constantly evolves to the development of digital human resources and competence (Balyer & Öz, 2018; Parlak, 2017).

Ultimately, cultural digital perspectives prioritize Cambodia harmony and individuals, fostering digital creativity (Gong et al., 2023), critical thinking, digital emotional navigation, and creativity (MoEYS, 2016; Thy et al., 2023). With the digital resource Constraints, educational curriculum deficiencies hinder the effective teaching and learning (Sot et al., 2022). Digital education often prioritizes digital needs, such as digital infrastructure, teacher digital

training, and digital curriculum (Yılmaz Özden, 2023; Öztürk, 2021; Szmodis et al., 2015). Additionally, the digital inequalities persist in rural areas, with lacking access to Internet and digital devices (MoEYS, 2024). Integrating the digital competencies becomes need in having equitable access to technology in practicing and developing the digital skills (NV, 2017; Paulo, 2020; Timotheou et al., 2023). Thus, DET benefits to development of educational outcomes, such as distance learning, E-learning, online learning.

5. Conclusion

This study highlighted the need to harmonize Cambodia's DET framework in equipping students with digital competencies. Critical digital competencies increase students' evolving digital world – digital challenges. This study also shed in light with integrating cross-disciplinary of DET to understand the effective and ethical digital participation. In terms of contextual constraints, the study encourages EIs to create and invest in digital curriculum and tools addressing the essential digital competencies for students and teachers. The EIs' curriculum should reinforce the learnership education, particularly DR, DEI, and DCI competencies, following digital literacy. Addressing this area can ensure that the curriculum leveraged substantial digital competencies. Further studies should extend these findings to educational settings seeking innovative approaches to integrating DT in curricula and understanding the practices and challenges of DET frameworks. Accordingly, DET enhanced the outcomes and quality of digital learning. The findings addressed that the DET contributed to reforming the education systems, digitalizing teaching and learning competence, literacy and skills.

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