

Original Paper

A Review of Decades of the Opportunities and Challenges for Digital Mobile E-Learning in Taiwan

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Received: April 2, 2024

Accepted: May 8, 2024

Online Published: May 27, 2024

doi:10.22158/jecs.v8n2p83

URL: <http://dx.doi.org/10.22158/jecs.v8n2p83>

Abstract

This study examines the current status of digital mobile e-learning in Taiwan using a literature review. Taiwan's digital mobile e-learning implementation plan is divided into two plans: the first targets high schools and higher vocational education, while the second targets elementary and junior high schools. Previous research shows that digital mobile e-learning can improve school efficiency and promote teaching innovation in Taiwanese high schools. Factors, such as school size, teacher-student ratio, number of tablet PCs, technical teacher ratio, total equipment expenses, and various school attributes are essential in influencing schools' willingness to adopt digital mobile e-learning. Public schools have better operational efficiency than private schools, possibly because of the funding provided for accessory equipment. Therefore, public high schools may be better equipped to promote mobile e-learning environments and improve both teaching quality and operational efficiency.

Keywords

Digital Mobile E-learning, M-learning, Operational Efficiency, Literature Review

1. Introduction

In recent years, traditional teaching methods have undergone a significant transformation. The conventional approach of using textbooks and whiteboards for teaching has given way to digital mobile e-learning (m-learning), which refers to the use of mobile computing devices, such as Palms, Windows CE machines, and even digital cell phones, for e-learning (Behera, 2013; Polsani, 2003). With the rapid

increase in the use of mobile devices and the Internet, these devices have become important tools for communication, learning, and economic growth. Therefore, it is imperative that educators recognize the importance of incorporating digital mobile e-learning in their teaching methods since it has become an emerging trend in classrooms (Li et al., 2019).

In the 21st century, technology has become an integral part of our daily lives. Consequently, it is essential for professionals, educators, and learners to re-examine their fundamental beliefs to leverage technologies for the redesign or re-engineering of the education and training system (Kumar et al., 2018).

Over the years, several schools across various counties and cities in Taiwan have implemented education reforms and innovative teaching practices, including the use of digital m-learning. Many studies have reported that digital m-learning can enhance students' interest and motivation toward learning (Li et al., 2019; Liu & Kuo, 2021).

Several prior studies have identified mobile devices as valuable tools for facilitating personalized learning in the classroom. Personalized learning is a self-directed approach to education that requires learners to establish their own learning objectives, assess their own progress, select their preferred learning channels, and access relevant materials (Crompton, 2013). Mobile devices enable learners to complete these tasks at their own pace and using their own preferences (Sampson et al., 2013). Consequently, the efficacy of mobile devices in supporting learning is contingent upon individual goals and the learning style of individual learners (Herrington et al., 2009).

According to Taiwan's Ministry of Education, only a small percentage of high schools in Taiwan have implemented digital m-learning plans. Specifically, between 2013 and 2018, only 50 schools adopted digital m-learning plans, and after 2018, this number decreased to only five schools. This suggests that approximately 95% of schools are not interested in implementing digital m-learning plans. The reasons for this lack of interest remain unclear, and existing theoretical frameworks do not fully explain the factors that influence schools' decisions. Additionally, shifting the target of the digital m-learning plan from high schools to elementary and middle schools in 2020 presented a new challenge. Thus, the current study aims to identify the factors that hinder the implementation of digital m-learning plans and provide related policy recommendations.

This research paper is structured as follows: Section 1 presents the research background and goals. Section 2 provides a policy overview and the conceptual framework of this study. Section 3 describes the research methodology, while Section 4 presents the outcomes of the digital m-learning program. Section 5 identifies the factors that influence schools' willingness to adopt digital m-learning plans. Finally, the last section presents the concluding remarks of this study.

2. Conceptual Framework and Policy Overview

This section aims to provide an overview of the conceptual research framework and Taiwan's digital m-learning program policy to address the research question of this study.

2.1 Conceptual Framework

In the 21st century, mobile devices, such as smartphones, PDAs, and tablet computers, have become prominent tools for learning and their importance is being increasingly emphasized. In particular, smartphones offer various features, such as the ability to read, browse the internet, and process information at any time, making them promising learning devices. The digital m-learning model simplifies learning and provides access to educational content through the use of mobile devices (Davies et al., 2012; Laurillard & Pachler, 2007; Mohammad et al., 2012).

Prior research has shown that mobile devices have a positive impact on education. For instance, Kukulska-Hulme et al. (2011) found that mobile devices can enhance learning experiences by providing access to educational resources, encouraging collaboration, and facilitating communication between students and teachers. Chen et al. (2018) demonstrated that the use of mobile devices in classrooms can improve student engagement, motivation, and learning outcomes.

Given the benefits of the use of mobile devices in education, the United Nations Educational, Scientific and Cultural Organization has recognized their importance as tools for learning in its educational policy. Therefore, it is crucial for educational institutions and policymakers to embrace the use of mobile devices in teaching and learning to ensure that students can access quality education in the current digital age.

2.2 Policy Overview

In 2013, the Ministry of Education and the LearnMode (VIA Technologies) Education Foundation in Taiwan collaborated at the grassroots level to promote digital m learning in schools located in different counties and cities in Taiwan with the aim of popularizing this new learning technology. Their plan is known as the “New Generation Digital Learning Project” and is geared toward high schools. After seven years of promoting this new technology for learning, the Ministry of Education and the LearnMode Education Foundation expanded their “New Generation Digital Learning Project” to their “E-Learning Sprout Project” in 2020. The goal of this plan is to cultivate students’ digital abilities in the 21st century and mainly targets middle and elementary schools. Moreover, it addresses topics like organizational policies for the integration of information technology with teaching. The Department of Information and Technology Education at the Ministry of Education (R.O.C. Taiwan) aims to improve the overall teaching experience and increase students’ interest in learning by promoting the use of digital m-learning. This educational policy is intended to enable teachers and students to leverage wireless networks and mobile applications to enhance teaching and learning in schools.

2.3 New Educational Technology: Digital M-learning

The application of mobile devices in learning began around 1995, when they were primarily used to access electronic documents. During this phase, the focus was on the mobile devices themselves, particularly their features and functions. Until 2019, the total number of mobile phones exceeded 8 billion, officially surpassing the entire world’s human population (World Bank, 2019). Thus, it is not surprising that mobile devices are increasingly being used for pedagogical purposes (Gan &

Balakrishnan, 2017) and in recent years, increasing attention has been paid to their use in informal educational scenarios (Crompton, 2013; Pachler et al., 2010; Unwin, 2015). Thus, with increased mobile connectivity via the 5G technology, it is projected that five billion people will access the Internet using their mobile devices by 2025 (GSM Association, 2019).

Digital m-learning has gradually changed the scope of traditional digital learning activities, thereby increasing the freedom and convenience of teaching and learning. With personalized digital m-learning no longer restricted, students can participate in learning more actively and share resources more spontaneously and interactively. The integration of digital mobile learning devices in the classroom supports personalized learning by allowing students to complete learning tasks at their own pace and according to their own preferences. Consequently, the effectiveness of mobile m-learning depends on unique learning goals and needs, as well as the preferred digital m-learning style of each student. Notably, the convenience of accessing information anytime and anywhere is a significant advantage of digital m-learning, which extends the learning environment beyond the physical classroom and highlights the potential of mobile learning as a valuable educational tool.

3. Methodology

3.1 Literature Review

Conducting a literature review is an essential aspect of academic research across all disciplines. It involves reviewing and building upon existing knowledge to ensure the accuracy and reliability of research. However, the task of conducting a literature review has become increasingly challenging in the field of business research due to its rapidly evolving and interdisciplinary nature. Staying informed of the latest research findings and assessing collective evidence can be a daunting task. Therefore, literature reviews are still a relevant research method. According to Baumeister and Leary (1997) and Tranfield, Denyer, and Smart (2003), a literature review involves adopting a systematic approach to gathering and synthesizing previous research.

In this study, the analysis of Taiwan's digital m-learning scenario mainly focuses on teaching. At present, little is known about the import and implementation effectiveness of digital m learning in Taiwan. Therefore, this study employs the document analysis model to gain an in-depth and holistic understanding of digital m-learning. method is a form of qualitative research wherein the researcher interprets various research documents to provide a voice and meaning to an assessment topic (Bowen, 2009). Therefore, in this study, the results of the analysis of a few articles are utilized to identify the factors that influence m-learning adoption and provide suitable policy recommendations.

4. Import Execution Results

This section discusses the results of the digital m-learning program in Taiwan.

4.1 Analysis of the Present Status of Implementation in Taiwan Digital M-learning

According to the statistics provided by Taiwan's Ministry of Education, there are 506 high schools in

Taiwan. During the period 2013–2018, only about 50 schools implemented digital m-learning plans; however, after 2018, only five schools adopted digital m-learning. Moreover, in 2020, the objectives of the digital m-learning plan shifted from high schools to elementary and middle schools. These changes in learning objectives are aimed at using the new learning model to strengthen students' interest in learning. However, among a total of 3,400 primary and secondary schools, only 200 schools, i.e., about 5% of the total number of national schools in Taiwan, have implemented m-learning plans. This shows that many Taiwanese schools have adopted a wait-and-see attitude. Therefore, it is important to determine how school units can improve their action-learning infrastructure and help teachers understand action-learning methods and develop appropriate teaching models to make students more interested in learning.

5. Results Analyze

In this study, we analyzed the main issues associated with the use of digital m learning in Taiwanese high schools by reviewing the findings of relevant articles. Specifically, we divided these issues into the advantages observed after implementation of m learning and the shortcomings that arise following implementation.

5.1 Advantages gained by Schools after Implementation

Taiwan's digital learning implementation plan is divided into two parts, one targets high schools and higher vocational education, while the second targets elementary and junior high schools.

Liu et al. (2019) found that the use of digital m-learning can affect school efficiency and teaching innovation in Taiwanese high schools. In a related study, Liu and Kuo (2021) aimed to identify the factors that influence school management efficiency. Their findings suggest that several factors, such as school size, teacher-student ratio, number of tablet PCs, technical-teacher ratio, total equipment expenses associated with tablet PCs, and various school attributes, play a critical role in determining schools' willingness to adopt digital m learning.

The two above-mentioned studies provide evidence that public schools exhibit better operational efficiency compared to private schools. These findings are attributed to the fact that the accessory equipment budget of public schools is provided by the central government, while private schools have to rely on their own funding to obtain such equipment. Consequently, public high schools may find it easier to adopt m-learning environments that utilize the latest technologies to create an interactive learning experience, which can lead to improved teaching quality and operational efficiency, thus giving public schools an advantage over private schools.

5.2 Disadvantages Faced by Schools after Implementing Recommendations

Based on the current research's findings, the use of action-learning methods are recommended to promote digital m-learning in Taiwanese schools. Digital m-learning involves the delivery of educational content and resources via mobile devices, such as smartphones and tablets, which provide learners with greater convenience and flexibility in accessing materials. To this end, the following

methods are suggested (Chen & Lai, 2019; Huang et al., 2016; Lin et al., 2017; Shen Lin et al., 2020; Wu et al., 2019):

Utilize mobile-friendly platforms: Given the high level of mobile device usage in Taiwan, it is important to ensure that e-learning platforms are mobile-friendly and easily accessible from smartphones and tablets (e.g., the Chrome OS uses the Google Chrome browser as its primary user interface. Thus, the Chrome OS mainly supports web applications, which is convenient for integrating devices and students.).

1. Incorporate interactive features: To keep learners engaged, interactive features, such as quizzes, games, and simulations, should be incorporated into e-learning content. This can also help learners retain the material better.
2. Offer diverse learning resources: It is recommended that students be provided with a range of learning resources, such as videos, audio recordings, and visual aids, which can help in accommodating the different learning styles and preferences of students.
3. Emphasize real-life applications: M-learning should be focused on real-life applications of the learning material to make it more relevant and practical for learners (e.g., Google Maps can be used for geographic reality analysis).
4. Encourage collaboration: Learners should be encouraged to collaborate with each other through online discussion forums, group projects, or other interactive activities. This can help build a sense of community and make learning more engaging.
5. Continuously evaluate and improve: The effectiveness of the e learning content should be continuously evaluated and improvements be made based on learner feedback and performance. This can help ensure that the m-learning experience is effective and meets the needs of the learners.

Overall, digital m-learning has the potential to revolutionize education and make learning more accessible, engaging, and effective for learners of all ages and backgrounds.

6. Conclusion

In Taiwan, the digital learning implementation plan is divided into two parts, one with a focus on high school and higher vocational education and the other with a focus on elementary and junior high schools. Liu et al. (2019) found that the use of digital m-learning tools can improve school efficiency and promote teaching innovation in Taiwanese high schools. Additionally, Liu and Kuo (2021) identified the factors that affect the efficiency of school management, including school size, teacher-student ratio, number of tablet PCs available, technical teacher ratio, total equipment expenses associated with tablet PCs, and various school attributes. These factors are essential in influencing schools' willingness to implement digital m-learning.

Other findings from the two aforementioned studies indicate that public schools have better operational efficiency than private schools, potentially due to the funding provided for accessory equipment. Public schools receive funding from the central government, while private schools have to finance their own

accessory equipment. Consequently, public high schools may be better equipped to promote m-learning environments that utilize the latest technologies to create interactive learning environments. This may lead to improved teaching quality and overall operational efficiency of public schools.

The conclusions and recommendations provided are based on the models developed, sample data collected, and research methodologies used in this study. Therefore, it is important to consider the current situation and environmental changes that may affect schools in the Taiwan District. Any applications of our findings should be adapted to the specific circumstances of individual schools to obtain more accurate results.

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