

Transforming Higher Education Through AI-Driven Digital Learning: Sustainability and Student Readiness Perspectives

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ABSTRACT

The recent rapid development of information and communication technologies (ICT) and accelerated expansion of online learning during the COVID-19 period have transformed the global education landscape. Digital learning represents one of the most significant transformations in higher education worldwide. This concept refers to the process of integrating digital and online technologies into education to enhance the learning experience. Thus, this conceptual paper explores digital learning, including its opportunities, challenges, and implications for higher education institutions, with specific attention paid to Malaysia. Using current literature, the paper discusses digital literacy, e-learning readiness, blended learning, and factors affecting successful implementation of digital learning. In particular, digital learning is seen as offering several opportunities, including improved flexibility, access, and collaboration, as well as increased student empowerment. The main challenges associated with implementing digital learning include technological infrastructure, the digital divide, students' readiness and self-regulation, and engagement. The paper proposes a conceptual framework that relates different dimensions of digital learning to academic performance and digital empowerment of students. In sum, the paper contributes to the growing literature on digital transformation in higher education.

Keywords: Digital Learning, E-Learning, Blended Learning, Digital Literacy, Higher Education.

INTRODUCTION

Recent advancements in digital technologies have had a transformative effect on the education sector across the globe. In line with digital transformation in modern higher education, various digital learning approaches have been adopted by educational institutions to facilitate learning experiences in terms of effectiveness, flexibility, and accessibility (Peters, 2000). Digital learning denotes a process of integration of different digital technologies, online platforms, and digital educational resources to facilitate the learning process. In particular, Malaysia has increasingly focused on the introduction of digital learning after the advent of the coronavirus disease in 2019, which has triggered changes in higher education teaching and learning practices in the country.

As a result, the Malaysian government has sought to enhance digitalisation of the education system. For example, the Malaysian Education Blueprint 2015-2025 (Higher Education) envisages blended learning as a pedagogical model that incorporates online education as an integral part of higher education curriculum at least 70%. This policy is aligned with IR4.0 goals in that universities have been encouraged to utilise digital technologies such as Learning Management System (LMS), Massive Open Online Courses (MOOCs), AI-assisted learning, virtual classrooms, and cloud-based collaborative technologies (Al Rawashdeh et al., 2021).

Also, considerable attention has been paid to enhancing digital literacy of university graduates in Malaysia. In particular, universities have integrated into their curricula a range of twenty-first-century skills, including data analytics, artificial intelligence, and other technological skills that contribute to the competitiveness and employability of university graduates in the digital economy.

In addition, a number of recent studies indicate that the development of digital literacy skills has positively impacted the learning experience and performance of Malaysian students. According to the findings of Quraishi et al. (2024), the development of digital literacy has helped to increase students' academic performance, self-directivity, and readiness for technological environments. Furthermore, with the development of digital technologies, learning became more engaging through mobile technologies, social media platforms, and other types of interactive multimedia applications (Al Rawashdeh et al., 2021).

Another opportunity associated with digital learning has been related to fostering sustainable lifelong learning through flexible learning models. The growth of open and distance learning (ODL) projects has enabled students with access to education opportunities regardless of their location in terms of geographical distribution.

However, despite all these developments in digital learning and digitalization of higher education in Malaysia, a number of challenges associated with digital learning still persist. These include uneven internet connectivity, unequal access to digital devices, lack of digital literacy among some students, poor technological infrastructure in Malaysia (Kamaruddin et al., 2023). Also, researchers found that students' motivation, engagement, self-discipline, and readiness for online or blended learning are the areas where there are considerable weaknesses among students (Adams et al., 2018). In turn, educators face challenges in adjusting their approaches to teaching, creating digital course materials, and conducting effective assessments in digital spaces.

Nevertheless, digital learning has become an integral element of transformation of higher education in the digital environment. Digitalisation, digital learning, and digital literacy have become some of the key elements of digital transformation in higher education to prepare graduates for the future. Accordingly, this conceptual paper aims to review literature on digital learning and present a conceptual framework for understanding the effects of digital learning on learning experience, engagement, and performance in higher education in Malaysia.

LITERATURE REVIEW

Digital Learning in Higher Education

Digital learning is a type of transformation in higher education that is associated with the rapid advancement of ICT. Specifically, it means the application of digital technologies, online systems, multimedia, and Internet-based resources in education for enhancing learning experience (Peters, 2000). Digital learning includes e-learning, blended learning, virtual learning, mobile learning, and other online environments. In particular, Peters (2000) points to pedagogical opportunities provided by digital learning environments by means of integration of multimedia in instruction and using multisensory instruction that allows students to become more self-directed and autonomous and facilitates interaction of educators and students by allowing them to become more interactive and engaging.

With the use of different elements such as text, video, graphics, audio, animations, and virtual communications, digital learning becomes even more engaging and facilitates delivery of information to students more effectively. The development of digital learning has had a profound impact on the development of higher education since the rise of e-learning allowed learners to learn anywhere and anytime because of the flexibility provided.

According to Adams et al. (2018), blended learning represents one of the most popular forms of learning in the higher education sector in recent years. It combines advantages of conventional classroom education and digital environments and creates engaging and productive learning environments in comparison with conventional approaches.

Moreover, several recent studies show that blending conventional education with online learning helps increase student academic performance, motivation, and overall learning satisfaction. Finally, blended learning is considered a strategic approach to the transformation of higher education because of Malaysia's ambitions to implement IR4.0.

Consequently, in the wake of the pandemic-related transition to online education, Malaysian universities have been increasingly incorporating digital platforms such as LMS, MOOCs, virtual learning platforms, and other

cloud-based technologies to facilitate their education missions. In order to achieve the IR4.0 goals, digital technologies including AI, big data analytics, cloud computing, and virtual simulations have also been employed in higher education for digital transformation.

Digital Literacy

Digital literacy is regarded as an essential element in today's higher education because of the increased use of digital technologies for delivering education and in workplace. According to UNESCO, digital literacy involves the ability to use digital devices, communication applications, and digital media platforms safely, effectively, ethically, and efficiently for accessing, evaluating, managing, analysing, communicating, and generating information. Besides, digital literacy involves more than basic skills associated with using digital tools and devices. It includes such aspects as evaluating information, conducting online communication, digital ethics, critical thinking, and problem-solving skills.

The development of digital technologies and their increased use in higher education have made the development of digital literacy a vital component of university education. Quraishi et al. (2024) claim that the integration of digital literacy into education programmes is important for increasing success in academic studies and readiness for working in digital environments and online.

It is worth noting that digital literacy has a close connection with twenty-first century skills because in order to succeed in digital learning environments students need to possess these skills to evaluate information online, collaborate with others online, and apply a variety of digital tools and applications to complete the tasks.

The concept of digital literacy was elaborated by Eshet-Alkalai (2004), who identified several dimensions of this concept. According to him, there are at least five components of digital literacy: photo-visual literacy, information literacy, reproduction literacy, branching literacy, and socio-emotional literacy. This means that apart from technical competencies associated with digital technologies and devices, it requires the development of cognitive and social skills necessary to engage in digital environments successfully.

Digital literacy and the development of students' digital competencies have become some of the priorities in Malaysia in recent years. During the pandemic and the shift to online education, it has become clear that there are substantial discrepancies between levels of digital competencies and access to technological resources among university students. For instance, according to Kamaruddin et al. (2023), the main barriers to effective digital learning are internet accessibility, digital divide, lack of infrastructure, and access to digital devices.

Thus, with the aim of overcoming the aforementioned barriers, Malaysia has started embedding digital literacy in education programs to ensure the preparation of students for the future and their success in IR4.0 environment.

Student Readiness for Digital Learning

Readiness is commonly perceived as a critical factor that affects the success of any kind of learning. Readiness of students means that they are prepared to learn in digital spaces by possessing appropriate technological competencies, having motivation, demonstrating self-regulation, and holding positive attitudes towards digital learning.

Adams et al. (2018) distinguish six dimensions of readiness of students to engage in blended learning environments including technological skills, technological usage, technological availability, self-directed learning, computer and internet efficacy, and attitudes toward blended learning. In this respect, the results of this study suggest high readiness for blended learning with some disparities in age, gender, ethnicity, and education level.

In particular, the researchers have found that self-directed learning skills are a vital component of digital learning because students are responsible for regulating learning processes and being autonomous. In turn, some problems related to students' motivation and self-regulation skills affect their adaptation to online environments.

Also, technological readiness appears to be important for engagement and overall experience in online education. Students who are competent in terms of technology and hold high internet efficacy can be more engaged and perform better compared to those who have insufficient digital competencies because of problems with accessing the Internet.

Finally, there are many challenges in achieving high levels of digital learning readiness, which include social isolation, decreased interaction with other students and teachers, difficulties with technology, and motivation-related challenges in e-learning (Al Rawashdeh et al., 2021). According to Adams et al. (2018), problems associated with Internet access and poor digital infrastructure have been hampering effective blended learning among Malaysian students.

Therefore, in order to achieve higher readiness levels, higher education institutions can do a lot including fostering institutional support, conducting digital literacy training, developing infrastructure, and implementing effective strategies in digital environments.

Opportunities and Challenges of Digital Learning

Digital learning provides many opportunities to institutions, educators, and students because it is flexible in many ways since it allows access to learning materials and activities anytime and anywhere (Al Rawashdeh et al., 2021). Digital learning also facilitates resource accessibility, collaboration among students, and personalized learning due to the presence of AI and learning analytics.

On the other hand, there are several challenges associated with digital learning. First, the digital divide is a serious challenge in that regard because some students might not have good access to the Internet and devices to access online platforms. Another challenge is low digital literacy among students and educators, which negatively affects students' engagement in learning activities. Also, it could be challenging for educators to design online activities and maintain students' attention because of difficulties with adaptation.

Nevertheless, despite these challenges, it should be noted that digital learning plays a crucial role in digital transformation in education.

DISCUSSION

Reviewing the literature on digital learning, it can be seen that digital learning plays an important role in the global and Malaysian transformation of higher education. Due to the rapid ICT development and transition to online learning as a consequence of the COVID-19 pandemic, higher education institutions have begun to incorporate digital learning environments in their educational processes as an important step in transforming learning.

Flexibility is an essential element of digital learning because students get the opportunity to learn irrespective of their locations and access the materials anytime (Al Rawashdeh et al., 2021). In other words, it helps expand access to education for students of diverse backgrounds, who are often affected by movement restrictions. Moreover, another feature of digital learning is that it encourages active and self-directed learning as a consequence of creating engaging and interactive environments (Peters, 2000).

Furthermore, digital literacy is seen as an important prerequisite of digital learning because it includes information evaluation skills, communication, collaboration, and ethical use of digital technology. According to Quraishi et al. (2024), digital literacy helps to increase students' academic performance, technological competence, and digital readiness.

In addition, Malaysia has taken many measures aimed at increasing the digital competencies of students to prepare them for the future, including IR4.0 requirements. In particular, there has been an incorporation of digital skills and AI into education programs at Malaysian universities.

However, despite numerous opportunities offered by digital learning, a few challenges exist as well. They relate to the digital divide when some students have poor Internet access and technological infrastructure, making them experience poorer learning outcomes. Furthermore, student readiness for digital learning has been influenced by students' technological skills, Internet efficacy, self-regulation skills, and attitudes towards online learning (Adams et al., 2018).

Another challenge associated with digital learning is that educators have to redesign their courses and assessments for blended or online learning environments because of the gap in their digital pedagogical skills caused by rapid changes in education as a result of the COVID-19 pandemic.

In the case of Malaysia, there have been a substantial amount of digital developments that involve AI, learning analytics, and smart educational technologies, which is consistent with IR4.0 goals. However, this implies special attention to ethics, cybersecurity, and other problems associated with personal information security.

Therefore, in conclusion, digital learning should be seen as a part of a larger digital transformation, and it requires support from educational institutions in terms of creating a digital environment that would encourage students to learn effectively.

CONCLUSION

In the digital age, digital learning has become an important aspect of the transformation of higher education worldwide. As a result of ICT development and accelerated expansion of online learning during the COVID-19 pandemic, digital learning has brought changes to global and Malaysian higher education.

In this context, the present paper provides definitions of digital learning, including e-learning, blended learning, online learning, and other virtual learning environments. According to the findings reviewed in the literature, digital learning provides several opportunities such as increased flexibility, improved resource accessibility, active student involvement, and self-directed learning. With the help of digital learning, universities are able to prepare future-ready graduates with critical skills required by IR4.0.

Besides, the paper also touches upon the importance of digital literacy, which entails a variety of critical thinking and other twenty-first-century skills that have been incorporated into university curricula to prepare students for future digital environments.

However, challenges still exist, such as problems with internet access and infrastructure, the digital divide, student readiness for digital learning, difficulties with engaging students in the learning process, poor self-regulation skills, and lack of digital skills among educators. Therefore, educational institutions need to take many actions to address these issues.

In conclusion, digital learning should be considered an important strategic transformation and an important component of IR4.0 goals. Institutions should strive to enhance their digital environments and promote innovative pedagogical approaches to enhance digital empowerment of students.

This conceptual paper adds to the literature on digital learning in higher education in that it reviews the current discussions in this field and develops a conceptual framework concerning digital learning in Malaysia. Future research could test the relationship among digital learning, digital literacy, and academic performance to prove its importance.

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