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Digital Learning Demand for Future Education 4.0—Case Studies at Malaysia Education Institutions

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Abstract: The rapid growth of the Industrial Revolution (IR) 4.0 has prompted the Malaysian Education Institution to transform the current education system into the future education system 4.0. The impact of IR 4.0 has opened a new paradigm for the Malaysian Educational Institution to ensure that all lecturers are capable of using information and communication technologies (ICT) in teaching and learning. However, there is a challenge in identifying appropriate digital learning platforms and tools to engage students in learning at their own pace. In this paper, we aimed to investigate the demand for digital learning platforms and tools according to the needs of students in Polytechnic Malaysia. The study was conducted randomly among 320 students from various fields of study in selected polytechnics. The analysis method used in this study was a quantitative method using questionnaires as an instrument. The results of our study indicated that e-learning platforms were the highest demand students' preferred compared to other learning platforms and tools. Hence, the implications of this study could be useful as a guideline to assist Malaysian Polytechnic lecturers in strengthening the practice of using digital learning and develop digital proficiency for enabling education 4.0 in the future.

Keywords: digital learning; digital learning platform; digital tool; education 4.0; Polytechnic Malaysia; ICT

1. Introduction

Malaysia is one of the Industrial Revolution (IR) 4.0 nations involved in globalization, changing in technology-driven for economic growth. It empowers digital technology with the aid of interconnection through the Internet of Things (IoT), big data, virtual and augmented reality, artificial intelligence, and other IT paradigms that trigger most industries [1]. This positive impact provides an opportunity for many industries to increase productivity and strategy not only in the manufacturing sectors but also in the Malaysian education sector as well. Correspondingly, the impact of it towards the education

paradigm has led to future education 4.0 by considering the benefits to the new vision in learning skills and knowledge trends [2]. Students have to be trained, mentored, and facilitated in a different pedagogical approach to correspondence with new possibilities.

Digital learning is an instructional practice in any educational activity that uses technology to improve the learning experience of the students. It makes use of a wide range of technology-enhanced educational strategies that ultimately helps students. Not only is digital learning a highly advanced form of technology, but it allows students much flexibility for them to study at any time at their convenience without thinking about their schedules. This advantage has made digital learning hugely popular not only among engineering students but also triggers among social science students as well. As for the engineering field, engineering education has redesigned the role of their education practice to ensure the content and concept of education 4.0 can be sustained to aligned with the industry 4.0 [3]. This involves blended learning, flipped learning, personalized learning, and other techniques that rely on small or large-scale digital platforms and tools. Hence, it can improve the students' engagement in the subjects they are interested in and can share their learning experiences with peers. Therefore, Malaysia polytechnic must provide education trends to ensure that technology, values, and modern industry are integrated, and yet at the same time, the lecturers should be equipped enough to fulfill the level of expertise to produce high-quality skilled graduates.

The motivation for this study was based on the discussion by [4], who stated that polytechnic lecturers are still inexperienced in education technology and have difficulty in fully utilizing information and communication technologies (ICT) in teaching. Therefore, the findings of this study can be used for polytechnic lecturers to strengthen their digital ICT proficiency practice based on the needs of future education 4.0 introduced by [5]. By this, the polytechnic lecturers need to make an informed decision about digital learning platforms and tools that could meet the students' interests. Thus, the objective of our paper was to highlight the level of student demand towards the use of digital learning platforms and tools for lecturers strengthens the digital proficiency practice in Polytechnic Malaysia. Figure 1 showed the proposed theoretical framework of this study.

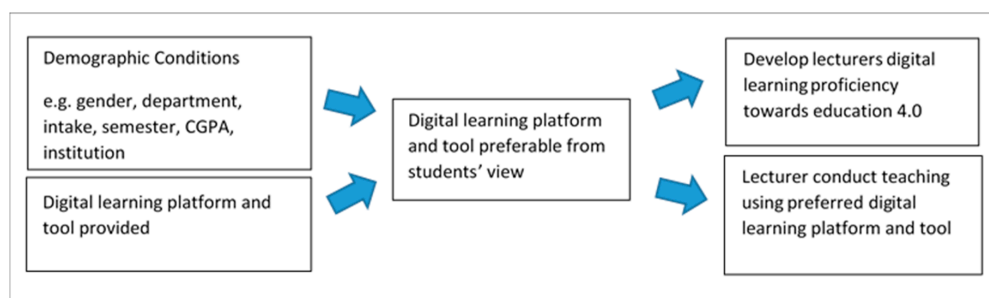


Figure 1. Proposed theoretical framework.

The structure of this paper is organized as follows. Section 2 presents related works of the previous studies. Section 3 presents the materials and methods used and limitation for the research. Research findings and analysis of this study is detailed and justified in Section 4. Section 5 presents the discussion of this study. Finally, future directions and conclusions are pointed out in Sections 6 and 7 respectively.

2. Related Works

2.1. Advantage of Education 4.0 for Malaysia Education

The existence of IR 4.0 continues to change the world, and even Malaysia education also faces the challenge of preparing students to meet the demands of the IR 4.0 industry. Through the IR 4.0 revolution, the method of approach in teaching and learning is known as education 4.0, has changed to a new era of the learning system. This 4.0 education has characteristics that shape students for

self-learning, critical thinking, digital capabilities, and problem-solving ability [6–8]. According to [9], education 4.0 is a new learning system that enables students to develop lifelong learning and skills. It provides the notion of teaching and learning innovation and uses ICT in its processes. Moreover, Hussin [2] also stated it enables self-directed and more flexible learning regardless of time and place through accessible ICT platforms and tools everywhere. Therefore, the learning process can become more affordable and faster because students can learn in mobility through blended and virtual learning with the BYOD (bring your own device) approach. As well as ICT supported, students are also fully empowered to determine how they learn and independently able to improve the educational learning process based on their needs and achievements [10].

2.2. Digital Learning Platform and Tool

Anttila [11] stated that digital learning is a digital tool for obtaining digital teaching materials to carry out online or offline learning activities over wired or wireless networks. With the advancement of information technology and related technologies, digital learning can be leveraged by lecturers to create innovative features to provide students with systematic knowledge and teaching materials. In the IR 4.0 era, digital learning has increased its field to support the various industries in Malaysia. According to [12] the sufficient knowledge or digital learning of the industrial operations before the employment or during the work may motivate the learners positively. In addition, digital learning can develop learners’ self-motivation and professionalism for quality improvement [13]. In [14], it described that digital learning could be accessed to online learning and adapt to digital instructional that makes use of technology devices such as smartphone and tablet. Therefore, learning can be done via an online or web-based model where students can study independently [15]. As to support education 4.0, there are various digital learning tools and platforms that could engage and motivate students to study. The choice of digital learning is essential in determining a sustainable learning lifestyle [16]. Table 1 shows several platforms and tools of digital learning that possibly facilitate communication between lecturers and students.

Table 1. Digital learning platforms and tools [17].

Digital Learning	Features	Activity	Type
Edmodo	To create online collaborative groups, administer and provide educational materials, measure student performance, and communicate with parents, among other functions.	Polls Quizzes Assignment Notes Blogs Award Badges Online	Tool
Socrative	To allows lecturers to create exercises or educational games	Quizzes Quick Question Class Count	System
Projeqt	To create a real-time dynamic presentation platform	Dashboard Slide Powerpoint	Platform
Thinglink	To save and share notes and observations about real-world spaces, situations, and artifacts.	Customized visual material	Tool
TED-Ed	To allows democratizing access to information, both for lecturers and students.	TED-style talks Discussion Sharing ideas	Platform
ClassDojo	To improve student behavior with instant feedback	Share photo, video, and announcement on class story Private message	Tool
eduClipper	To share and explore references and educational material	Virtual class Digital record	Platform
Animoto	To create a high-quality video in a short time	Audiovisual content	Tool
Kahoot!	To promotes game-based learning	Questionnaires Discussion Survey Education by gaming	Platform

Note: TED—Technology, Entertainment, Design is an American media organization that posts talks online for free distribution.

As seen in Table 2, there are several related studies of digital learning platforms and tools commonly applied for Malaysian education polytechnic—the chosen of the platform and tools based on the students' awareness and experience in class.

Table 2. Related studies of digital learning platforms and tools.

Digital Learning	Researcher	Description
e-Learning	[18]	E-Learning is a learning platform that uses electronic technology to access learning courses anywhere and anytime. Curriculum information document online system (CIDOS) is an online learning platform developed by the Department of Polytechnic and Community College (JPPKK) for polytechnic lecturers and students. The platform allows students to access teaching materials such as notes, assignments, and videos also can perform quizzes and tests through the digital environment.
Mobile Learning Apps	[19–21]	It is one of the significant potential platforms that can be accessed at anytime and anywhere based on multiple mobile devices such as smartphones, iPods, tablets, and wearable technology. The emergence of various innovations in mobile has created a conducive learning environment among students to develop self-paced and self-study learning. Students can use many types of mobile learning applications such as Coursera, Google Classroom, or the learning course application downloaded in the Google Play store.
Open Learning Massive Open Online Course (MOOC)	[22–25]	MOOC is one of the social learning approaches that provide an open learning platform, through video content sharing on learning topics by social networks. This online learning is freely accessible through the web that enables students to learn skills in a new environment on their own. The platform covers a wide variety of course content that allows them to study online anytime.
Video-based	[26,27]	Video-based learning has become part of a new generation of students. They enjoy learning through YouTube, social blogging, and other video platforms. However, Fathil [26] has stated that using online video without active learning activities preserves a traditional environment in teaching and learning.
Augmented Reality or Virtual Reality Apps	[28–31]	This is a new teaching and learning model that has incredible capabilities to support the 4.0 education approach. The device has been redesigned with high-tech hardware that can create virtual scenery, 3D objects, and interactivity with students. Using AR and VR apps such as Aurasma, Layar, Google Expeditions, and other more, students can experience and engage in virtual learning. Using AR and VR promotes more effective teaching and learning, even though they are physically far from each other.
Educational Online Game	[32–35]	Gamification is a design based on game elements and principles to increase engagement and motivation students in learning. Several gamification platforms that been implemented included Kahoot! and Quizziz. Based on the previous research, gamification able to give a positive, moderately effect on the student's achievement and exciting learning environment in developing students' understanding.

3. Materials and Methods

3.1. Data Collection

In this study, a sample of 320 students was obtained from 180 (56.3%) females and 140 (43.8%) males from 7 departments in 11 Malaysian polytechnics. We surveyed students from the Department of Commerce (JP), Department of Tourism and Hospitality (JPH), Department of Design and Visual Communication (JRKV), Department of Information and Communication Technology (JTMK), Department of Electrical (JKE), Civil Engineering Department (JKA), Department of Mechanical (JKM), and Department of Aircraft Maintenance (JPP). The questionnaire was selectively distributed

to the lecturers for the students in the classroom to answer online based using a self-administered approach [36].

This study was designed using quantitative methods through open and closed questions. A set of questionnaires was developed and consisted of two sections for collecting data. Students are required to fill in demographic data in Section A as shown in Table 3. As for Part B (Table 4), questions related to digital learning platforms and tools based on students' personal experiences in Polytechnic Malaysia. Question items are designed based on Table 2 as they are the basis of the research presented in this paper.

Table 3. Demographic items.

No	Demographic	Indicator
AQ1	Gender	Female, Male
AQ2	Institution	Data obtained from 11 polytechnic Malaysia
AQ3	Department	Data obtained from students of engineering and non-engineering field
AQ4	Semester	$1 \leq \text{semester} \leq 9$
AQ5	Intake	Community College, Sijil Pelajaran Malaysia (SPM)
AQ6	CGPA	Cumulative Grade Pointer Average

Table 4. Survey items for Section B.

No	Question
BQ1	Have you ever know or heard about Education 4.0.
BQ2	Choose which digital learning platform and tool that interests you most in class. Please stated why.
BQ3	Which digital platform gives you easy access to get learning materials related to the course?
BQ4	Choose digital learning platforms and tools that can increase your understanding of class.
BQ4	Choose the digital learning activity that you interested in joining in the class.
BQ5	Does digital learning have an impact on your understanding of knowledge?

3.2. Limitations

There were some challenges in our research when collecting data, as we found that the number of participants did not reach the target of representing the entire Malaysian Polytechnic Institution. Therefore, we have identified some limitations to this fact; (1) the selection of lecturers to assist in the research during the dissemination of the questionnaire could influence the number of students participating in answering the survey and therefore, only students who are taught by them can respond to the given survey; (2) we stated digital learning platforms and tools in the general interest, which refer only to the personal experiences of students at Polytechnic Malaysia. However, our study has achieved the aim by demonstrating the demand for appropriate digital learning platforms and tools among students for lecturers to strengthen the digital ICT practices towards education 4.0 in Polytechnic Malaysia.

4. Results

In this study, we have selected the group of students that represent 11 Polytechnic Malaysia from seven departments based on the current cohort of study (some of the courses not be offered at the same polytechnics). The respondents' distribution of all departments were presented in Figure 2. It shows that the percentage of respondents from JTMK students is considerably highest with 63% whereas JKE students 16%, JP students 9%, JKA students 4%, JPH and JRKV students 2% respectively and JPP students 1%. From the results, we have found there is a gap in the number of participants for each departments, as such we have discussed in Section 3.2.

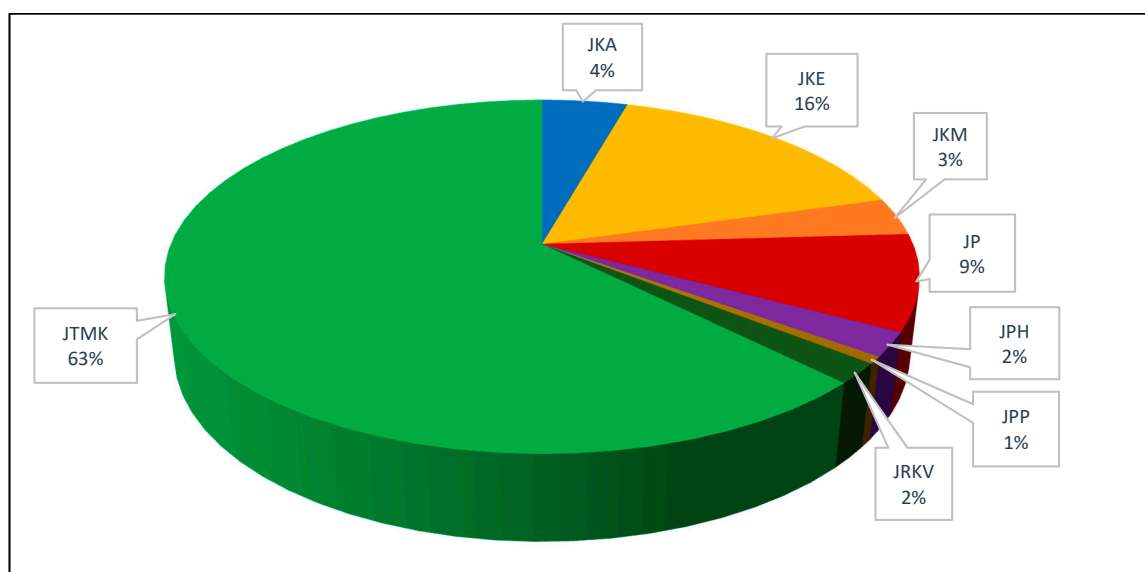


Figure 2. Distribution of respondents by the department.

We performed a set of questionnaire to investigate the demand for digital learning platforms and tools according to the needs of students in Polytechnic Malaysia. As seen in Figure 3, we also have included traditional methods (chalk and blackboard) as control features in the questionnaire for comparative purposes. The data indicates that majority of the respondents have a high interest in the use of the curriculum information document online system (CIDOS, 25%) in classroom learning followed by mobile learning apps at 16%, chalk, and blackboard at 16%, augmented and virtual reality (AR and VR) apps at 14%, YouTube at 13%, gamified via Kahoot! and Quizizz and MOOC at 8%, respectively. The reason for this corresponds as students perceive CIDOS would be easier to access the materials related to the course taken by them.

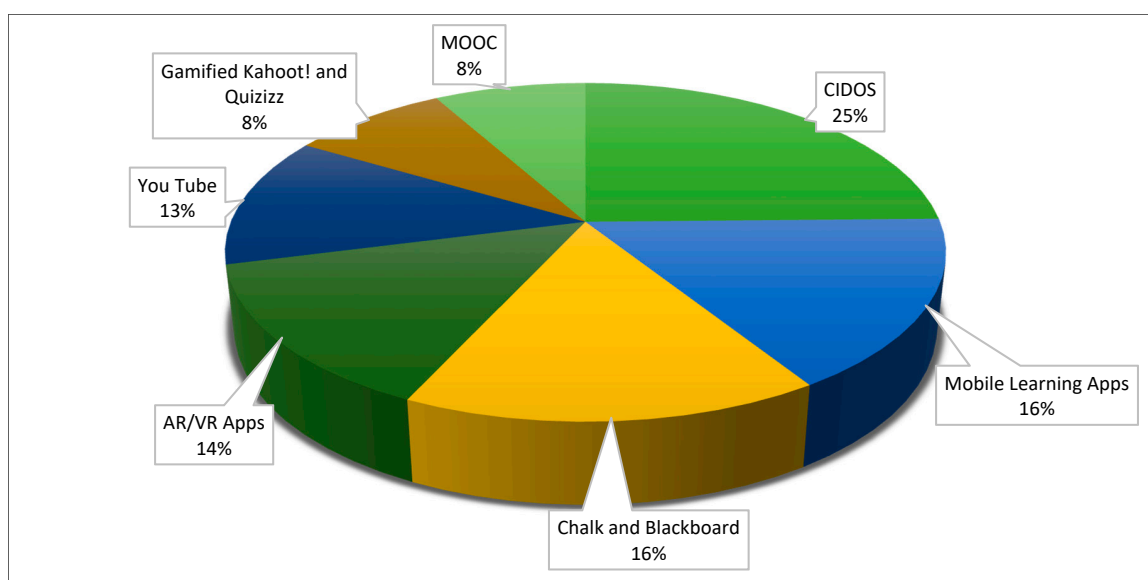


Figure 3. Digital learning platforms and tools preferred by students.

Previously, we have mentioned some challenges in our research which might influence our results. Therefore, we tried to address this problem by grouping the respondents into two groups, namely engineering and non-engineering students. As such, we have selected four departments from JP,

JPH, JRKV and JTMK to represent the non-engineering students whereas another four departments from JKE, JKA, JKM and JPP represent the engineering students. The results presented in Figure 4 shows that engineering students have a higher demand for traditional methods, with 29.1% compared to others. As for non-engineering students, the CIDOS learning platform is the highest demand in the classroom, with 27%. Interestingly, we realized that the use of traditional methods among the engineering students is higher compared to non-engineering students, as only students thought it could enhance their understanding in the classroom.

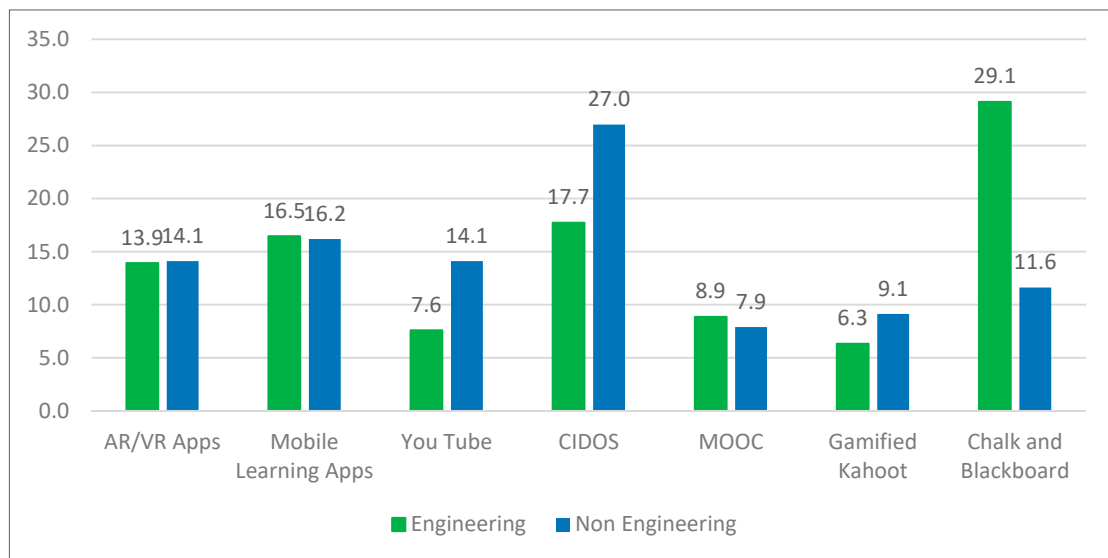


Figure 4. Students’ demand for the use of digital learning platforms and tools by field of studies.

Additionally, in Figure 5, we found that female students have dominated the interest in learning to use CIDOS more than male students. However, male students dominate the use of mobile apps and gamified platforms through Kahoot! and Quizizz more than females. In addition, the results also reveal that both genders have the same demand for digital learning through YouTube.

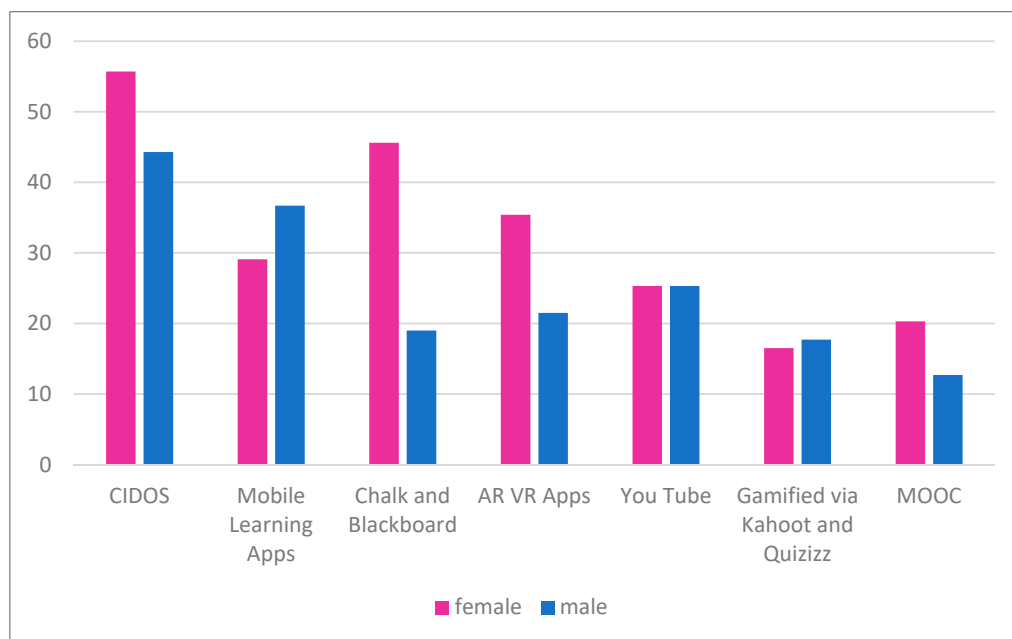


Figure 5. Students’ demand for the use of digital learning platforms and tools by gender.

Predominantly, the use of appropriate digital learning platforms and tools as a medium to attract students to learn at their own pace can enable lecturers to teach better and develop digital proficiency towards education 4.0. Figure 6 shows the results to see how the use of preferred digital learning could impact students' understanding of knowledge. From the results, 91% (291) students agreed that digital learning influenced their learning in the classroom whereas only 9% (29) said no. Therefore, the preferred digital learning platforms and tools from the students have shown the most positive impact to the understanding of learning.

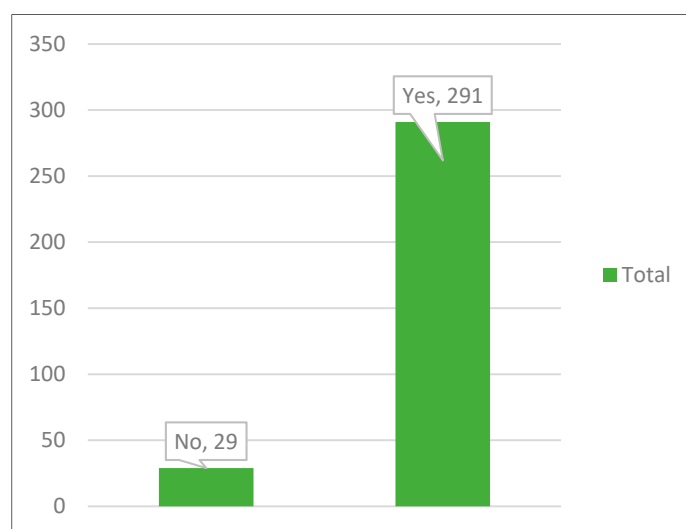


Figure 6. Students' response to the impact of digital learning.

5. Discussion

This paper aims to investigate the demand for digital learning platforms and tools according to the needs of students in Polytechnic Malaysia. Our study has revealed that e-learning platforms using CIDOS are the highest learning platforms in which students most preferred to be used in the classroom for learning purposes. The results are in line with other studies conducted from [37], which indicated that CIDOS is well received among students, which was supported in our study. However, we have found previous studies [38] that stated some of the lecturers were not convenient in using CIDOS due to the time and difficulties constraints. By these issues, our findings have proven that CIDOS mainly should be utilized in an extensive way and more efficient among lecturers to motivate the students to learn. In another way, by implementing this platform efficiently or use different platforms like google classroom, webinar or Coursera, lecturers can guide students to learn independently for moving towards the transformation of education 4.0.

Secondly, our study shows that digital learning using a mobile learning application platform has the potential to attract students for sustainable learning. A study from [39] showed that mobile learning is a useful learning tool for learning. Therefore, it can be concluded that learning to use mobile applications can provide lecturers the opportunity to explore and innovate useful software materials by filling the digital practice gap.

Thirdly, there are other digital learning platforms and tools that take into account, which possibly gives excitement in learning, such as AR and VR apps, YouTube, online gamification, and MOOC. Using an online gamified platform such as Kahoot and Quizziz, proved to increase the students' interest, which is beneficial to lecturers utilized it in the classroom. However, our study has discovered that there is a lack of demand for learning through MOOC platforms among the students. We believe this circumstance has related to the challenges and issues discussed due to lifestyle, infrastructure, infostructure, and professional development [22]. Thus, perhaps by using MOOCs in individual courses of study, it would be able to give a promising response from students in the future [40].

Demand for digital learning platforms and tools among students in Polytechnic Malaysia remains high favored compared to traditional methods. Nevertheless, there are various potentials digital learning that lecturers can use to interest students; our results have revealed that engineering students are more likely to choose traditional methods through chalk and blackboard in class. We consider these barriers as learning in engineering fields would depend on the material support, curriculum, management decisions, and the readiness of lecturers to use the technologies [3]. Although there are a number of challenges faced by lecturers in the use of digital learning [41], the importance of technology towards education 4.0 is an opportunity for efficient future learning.

6. Future Directions

For future research, this study will collect more samples with detailed survey questions in order to support a personalized learning environment among students which may contribute to the field of learning analytics. We also like to explore the usage of digital learning platform and tools among lecturers in Malaysian educational institutions in order to share knowledge and support the education 4.0.

7. Conclusions

In this paper, we present the demand for digital learning among students and a theoretical framework to help lecturers develop digital competencies to implement education 4.0 in the future. The use of appropriate digital learning platforms and tools can drive student engagement in learning in line with educational 4.0. Therefore, lecturers should prepare, adapt and enhance digital proficiency and ICT to meet the demands of students who want technology in their learning.

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