



A Comparative Assessment of Online Learning Readiness for First Year and Final Year Engineering Undergraduates

Yee-Yong Lee^{1*} & Su-Hie Ting²

¹Faculty of Engineering, Universiti Malaysia Sarawak

²Faculty of Language and Communication, Universiti Malaysia Sarawak
94300 Kota Samarahan, Sarawak, Malaysia.

ABSTRACT

Measuring student readiness in online learning should also be of great concern to institutions, including all areas from their curricular development to the pedagogies they experience. Although there have been attempts at universities to develop online learning courses, students' readiness has yet to be investigated, particularly for engineering students who take a mix of theoretical and practical-based courses. This study evaluates the readiness of civil engineering students toward the implementation of online learning and their preferences and acceptance towards online instructional delivery and assessment methods. Ways for improvement are proposed in line with the students' readiness to determine the best desirable practices and strategies for online pedagogy. Respondents are selected from first and final year students, to examine and compare their online learning perspectives. A survey questionnaire was used. Findings revealed that year one and year four students' readiness were relatively moderate for most of the components and relatively high for the components that involved hardware/software requirements and technology skills. Most respondents indicated a moderate acceptance level on online assessment, ranging from a mean score of 3.46 to 3.81. As online learning is gradually becoming another method for life-long and self-determined learning, findings from the study might help university educators to develop better online learning strategies, especially delivery methods and assessments, to help students cope with online learning.

Keywords: engineering undergraduate, delivery preference, online learning, readiness

ARTICLE INFO

Email address: yylee@unimas.my (Yee-Yong Lee)

*Corresponding author

<http://doi.org/10.33736/jcshd.3051.2021>

e-ISSN: 2550-1623

Manuscript received: 19 February 2021; Accepted: 15 March 2021; Date of publication: 25 March 2021

Copyright: This is an open access article distributed under the terms of the CC-BY-NC-SA (Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License) which permits unrestricted use, distribution, and reproduction in any medium, for non-commercial purposes, provided the original work of the author(s) is properly cited.

1 INTRODUCTION

Online learning is a form of distance learning or distance education. It has become the largest sector of distance learning in recent years, especially during the COVID-19 pandemic. Face-to-face learning was placed on hold in most higher education institutions (Bartley & Golek, 2004; Evans & Haase, 2001; Nguyen, 2015). Lockdowns or quarantines are necessary as protective measures for physical health during the pandemic outbreak. Teachers and students are required to stay at home and conduct online classes. Online learning is defined as "learning that takes place partially or entirely over the Internet" (Gilbert, 2015). Learning synchronously and/or asynchronously appeals to a segment of learners and is becoming more common in higher education. Online learning can fulfil students' academic needs by providing quality education, regardless of location and time, if internet access is available. The flexible learning environment caters to potential learners who are hospitalised or have phobias linked to school environments. Online learning opens educational opportunities to single parents, students who have been expelled or dropped out of school and working, and dropouts seeking to gain a diploma (Gilbert, 2015). However, not all learners are ready for online learning. To Borotis and Poullymenakou (2004), online readiness means that students are mentally and physically ready to learn online, including using e-resources such as the Internet (Choucri et al., 2003). Student readiness in online learning is an area of concern and encompasses curricular development and pedagogies. The COVID-19 pandemic has sped up the shift from the traditional classroom to online learning (Azzi-Huck & Shmis, 2020; Lim, 2020; Shahzad et al., 2020). The institutions of higher learning in Malaysia had begun to implement online learning since the late 1990s (Hussin et al., 2009). However, the reliance on online learning during the COVID-19 pandemic has brought to light some pertinent issues besetting students, particularly limited accessibility to the Internet and limited infrastructure experienced by students from low-income families and those living in remote villages (Said, 2020). In addition, students also experience difficulty in communicating with their lectures, interacting with their friends, and having laboratory access for practical work, which has affected their studies (Selvanathan, 2020). Lecturers also experience mental stress from adjusting to online teaching and learning (Sia & Abbas Adamu, 2020) and trying to offer the same level of education quality that students would receive if they were on campus. Some of the challenges faced by lecturers include the learning management system (LMS) application and hardware readiness, the hidden cost of LMS application, and lack of LMS training (Seth, 2017). Lecturers and students alike have to cope with a change in assessment method from invigilated to take-home examinations and long-time exposure to electronic devices necessitated by online delivery of lectures. While some universities have developed online learning courses such as Developing Massive Open Online Course (MOOC) and LMS application, the readiness of students has yet to be investigated, especially for the engineering degree programme, which has a substantial portion of practical work.

Research on readiness for online learning has focused on a variety of concepts, but two central concepts of student behaviour and attitudes have been investigated in most studies are self-management of learning and technological skills (McVay, 2000, 2001; Parnell & Carraher, 2003; Smith, Murphy, & Mahoney, 2003; Watkins, Leigh, & Triner, 2004). For example, in Smith's (2005) study, the "comfort with e-learning" and "self-management of learning" of 314 Australian undergraduate students were measured using the McVay (2000, 2001) Readiness for Online Learning questionnaire. The students in Smith's (2005) study were able to access the Internet for

their studies and were comfortable communicating electronically. Most of them were willing to spend 8-10 hours per week on their studies. Typical characteristics such as self-directed learning, academic-related skills and communication skills and technological skills such as word processing, email and basic communication software have been studied in online readiness models (Bernard, Brauer, Abrami, & Surkes, 2004; Mattice & Dixon, 1999; McVay, 2001). For students to experience successful learning, researchers (Dabbagh, 2007; Tallent-Runnels et al., 2006) have identified strong academic self-concept, fluency in the use of online learning technologies, interpersonal and communication skills, collaboration, self-directed learning skills as critical. In addition, Engin (2017) revealed that there was a meaningful relationship between students' online learning readiness and emotional intelligence. Engin's (2017) Online Learning Readiness Survey by including five dimensions of computer/Internet self-efficacy, self-directed learning, learner control, motivation to learn, and online communication self-efficacy. However, the effectiveness of these characteristics in successful online learning has yet to be investigated in the Malaysian context. The study examined the readiness of civil engineering students towards the implementation of online learning and their preferences and acceptance towards delivery and assessment methods.

2 METHODOLOGY

A descriptive study was conducted to examine students' online learning readiness using questionnaires to find out whether there was a difference between Year 1 and Year 4 students. Table 1 shows the background of the respondents. The respondents were 215 civil engineering students in the Faculty of Engineering in a comprehensive university in Malaysia (112 Year 1; 103 Year 4). All the students in Year 1 and Year 4 were expected to participate in the study, and the return rate was 82.4% (112 out of 136) for Year 1 and 88.8% (103 out of 116) for Year 4 students. The rationale for selecting junior and senior students was to investigate the difference in perception between students newly exposed to tertiary education via the online mode and final year students who had experienced blended learning since their first year in university. There were 58.6% female and 41.4% male students in the study. Most of the respondents were from Foundation (47.9%), followed by matriculation (29.3%), diploma (11.6%) and STPM (11.2%).

Table 1. Background of respondents (N=215)

Characteristics		Frequency	Percentage
Year	Year 1	112	52.09
	Year 4	103	47.91
Gender	Female	126	58.6
	Male	89	41.4
Educational background	Foundation	103	47.9
	Matriculation	63	29.3
	Diploma	25	11.6
	STPM	24	11.2

The instrument used for data collection was a questionnaire comprising four sections as follows:

- Section A: Demographic information, including gender, years of study, and education background.
- Section B: Students' awareness and involvement in Massive open online course (MOOC) (4 items)
- Section C: Students' self-learning internet facility and tools (5 items)
- Section D: Readiness for self-learning based on six components such as hardware/software requirements (6 items), technology skills (10 items), self-learning habits (9 items), self-direction (6 items), learning preference (5 items) and internet discussion (4 items).
- Section E: Online learning delivery preference.
- Section F: Acceptance toward online assessment.

The five-point Likert scale was from 1 for "completely disagree" to 5 for "completely agree". The questionnaire was formulated with reference to other online readiness questionnaires using the McVay Readiness for Online Learning questionnaire. Smith (2005) studied 314 Australian undergraduate university students and confirmed that the McVay (2000, 2001) Readiness for Online Learning questionnaire might have useful applicability to research and practice in the area of student dispositions and preferences associated with online learning. The items on student readiness, technology assessment and student interests in the questionnaire formulated for the present study were based on Mattice and Dixon (1999). The items in Section D on technology skills and Section E on online learning delivery preference were formed by referring to Gay's (2018) e-ready online survey on technical competence, lifestyle aptitude, and learning preference for the e-learning systems which were used to produce an e-readiness score. The items in Section D pertaining to self-learning habits and self-direction were formed with reference to Forson and Vuopala's (2019) questionnaire, which was underpinned by theories of self-regulated learning, collaborative learning, and ICT skills. In addition, Martin, Stamper & Flowers, (2020) questionnaire, which focused on university students' online student attributes, time management, communication, and technical readiness for online learning, was also referred to. The questionnaire developed for the present study included acceptance towards online assessment (Section F), previously not investigated in other studies.

The online questionnaire was designed using Google Forms, and the link was shared with the students through a WhatsApp group in December 2020. The questionnaire data in the form of an Excel sheet were coded for analysis. IBM SPSS Statistics version 26.0 was used to compute mean, standard deviation, percentage, and frequency. For the five-point Likert scale items, based on Pallant (2010), the mean value was categorised as follows: low, 1.00–2.33; medium, 2.34–3.66; and high, 3.67–5.00.

3 RESULTS AND DISCUSSION

Before describing the results, some background on the lecturers' use of technology-enhanced learning is given. The lecturers were already using the eLEAP platform for E-Learning and already had competencies in online teaching and virtual interaction with students, such as facilitating discussions in a digital platform and providing feedback. Some of them have used online live streaming and pre-recorded teaching sessions for their instructional delivery.

3.1 Comparison of Year 1 and Year 4 students' awareness and involvement in MOOC

Table 2 shows the frequency and percentage of Year 1 and Year 4 students' awareness and involvement in Massive open online course (MOOC). When the students are asked whether they were aware of MOOC, most of them are aware of MOOC with 66.5% (Year 1, 31.6%; Year 4, 34.9%).

Table 2. Frequency and percentage of Year 1 and Year 4 students' awareness and involvement in MOOC

Aspect	Year 1		Year 4		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Awareness of MOOC	68	31.6%	75	34.9%	143	66.5%
Involvement in MOOC	20	9.3%	56	26.0%	76	35.3%
Participant role in MOOC	19	25 %	56	73.7%	75	98.7%
Support of MOOC	1	1.3%	0	0%	1	1.3%

Even though there is a high percentage of MOOC awareness, the involvement of Year 1 students towards MOOC was much lower (9.3%) than the Year 4 students (26.0%), as shown in Table 2. It means that senior students had more exposure to online learning compared to the new students who had no such prior experience. During their school years, they were taught face-to-face by their teachers.

Besides that, final year students' prior experiences towards utilising the technology itself with the available online resources and facilities provided by the university also lead to their higher engagement with MOOC. From the result shown in Table 2, most of them (98.7%) took the student role as a participant in the learning process.

3.2 Readiness for self-learning

Changing the mode of teaching from the traditional classroom to the online classroom requires a change in student behaviour and the availability of online facilities or devices. Based on the results, all the students owned a smartphone and a laptop or tablet. Consequently, most of the students had the devices to connect them with their lecturers virtually. Only two Year 1 students did not own a laptop or tablet, and they used their mobile phones for their online classes.

Reliable internet accessibility is an issue for students to enrol in the online course (Gilbert, 2015). Table 3 shows the frequency and percentage of Year 1 and Year 4 students' self-learning internet facility and tools. The results on the monthly streaming quota subscribed by students showed that most of them had unlimited access. There was slight difference between Year 1 (31.6%) and Year 4 (21%) in their unlimited monthly streaming quota. Year 1 students exhibited a higher percentage prior to getting ready for the online class before they enter the university. Most students spend more than three hours per day surfing the Internet. This is necessary because they have about four to six hours of online class with the lecturers daily. Some of them spent fewer hours on daily web surfing due to the lower monthly streaming quota they subscribe to.

Table 3. Frequency and percentage of Year 1 and Year 4 students' self-learning internet facility and tools

Aspect		Year 1		Year 4		Total	
		Frequency	%	Frequency	%	Frequency	%
Monthly Streaming quota	1-5 GB	8	3.7%	10	4.7%	18	8.4%
	6 – 10 GB	5	2.3%	11	5.4%	16	7.4%
	11 – 15 GB	5	2.3%	6	2.8%	11	5.1%
	16 – 20 GB	26	12.1%	18	8.4%	44	20.5%
	Unlimited	68	31.6%	58	27%	126	58.6%
Daily web surfing	<1 hr	1	0.5%	3	1.4%	4	1.9%
	1-2 hr	12	5.6%	11	5.1%	23	10.7%
	2-3 hr	10	4.7%	10	4.7%	20	9.3%
	>3 hr	89	41.4%	79	36.7%	168	78.1%
Reading online		90	41.9%	101	47%	191	88.8%
Mobile application as a learning tool		105	48.8%	96	44.7%	201	93.5%
Self-learning through Technologies		96	44.7%	86	40%	182	84.7%

Based on the results reported, most of the students both in Year 1 and Year 4 agreed that mobile applications could be good learning tools. Among them, 84.7% of the students (Year 1, 44.7%; Year 4, 40%) were willing to self-learn through technologies using a mobile application and online system. Table 3 also shows that most students read books and articles online. However, about 10.23% of the Year 1 students did not read book and articles online compared to 0.9% of Year 4 students. Lack of prior experience compromised the new students' readiness towards self-learning on online learning platforms, especially searching for online resources (Abuhassna et al., 2020). These students would be left behind because educators take advantage of recent advances in the capabilities of a smart mobile application to design learning activities as a tool in learning that foster student's knowledge and learning process (Karabatzaki et al., 2018).

3.3 Six Components of Online Readiness

The questionnaire on the readiness of students in online learning has six components, namely, "hardware/software requirements", "technology skills", "self-learning habits", "self-direction", "learning preference", and "internet discussion". An overall comparison of the means for the six components showed that Year 4 students were more ready for online learning (Table 4).

Table 4. Overall comparison of six components of online readiness for Year 1 and Year 2 students

Component	Mean score	
	Year 1	Year 4
1. Hardware/software requirements	3.99	4.05
2. Technology skills	3.82	4.15
3. Self-learning habits	3.61	3.57
4. Self-direction	3.61	3.67
5. Learning preference	3.40	3.43
6. Internet discussion	3.68	3.81
7. Delivery format	PPT with video	PPT with video

Note: PPT refers to PowerPoint slides

Mean scores just over the mid-point of three show that students were slightly ready in the aspects of learning preference, self-learning habits and self-direction. Online learning is highly dependent on self-directed learning, where most of the time, students need to actively engage in the learning process to adopt proper learning strategies according to the learning setting. Among the mean score, the major problems causing students to be less ready for online learning is troubleshooting problems associated with using a computer (mean year 1 = 3.12; mean year 4 = 3.55), managing/planning their time well (mean year 1 = 3.22; mean year 4 = 3.03) and self-readiness for e-learning (mean year 1 = 3.27; mean year 4 = 3.34). In terms of learning preference, the students were slightly agreeable to learning at home and not coming to campus (Year 1, 3.26; Year 4, 3.23). They had little confidence in the effectiveness of e-learning compared to the traditional classroom-based approach (Year 1, 2.71; Year 4, 2.96).

The detailed results of the six components will be described next. Table 5 to Table 10 present the mean score and standard deviation of Year 1 and Year 4 students based on six components.

Most of the highest mean scores based on the students' perceptions belong to hardware/software requirements and technology skills components (Table 5). Most students were ready and had regular access to a computer or laptop as well as the Internet each week for the courses (Year 1 mean = 4.41; Year 4 mean = 4.49). They also had access to headphones or speakers for video conferences or to record presentations (Year 1 mean = 4.02; Year 4 mean = 4.10). Both Year 1 and Year 4 students had a printer at home (Year 1 mean = 4; Year 4 mean = 3.74). There is a slight difference between year 1 and year 4 students on the aspect of hardware/software requirements, and they were well-equipped for online learning. The only problem faced by them is internet access with a fast, reliable connection which might be an obstacle in online learning.

Table 5. Mean score for readiness for online learning based on hardware and software requirements

	Hardware/Software Requirements	Mean		Std deviation	
		Year 1	Year 4	Year 1	Year 4
1.	I have regular access to a computer or laptop each week for my course(s) (4 to 5 times a week)	4.41	4.49	0.81156	0.83858
2.	I have regular access to the Internet each week for my course(s) (4 to 5 times a week)	4.30	4.27	0.78084	1.00190
3.	I have access to a printer.	4.00	3.74	1.32882	1.38593
4.	I have access to headphones or speakers for courses that may have video conferences or require student-recorded presentations.	4.02	4.10	1.02632	1.08386
5.	I have access to a microphone for courses that may have video conferences or require student-recorded presentations.	3.87	4.06	1.06961	1.05557
6.	I have Internet access with a fairly fast, reliable connection.	3.36	3.62	0.93825	1.12995

Learning with technology does not only depend on technical knowledge, but users of technology should also have the interest and skill to use technology as a learning tool (Forson & Vuopala, 2019). Table 6 shows that Year 4 students had a higher mean score for online learning readiness based on technology skills for Items 7 to 16 of the questionnaire. Students had the skill to use a web browser/search engine to navigate the Internet using *Firefox*, *Safari*, *Internet Explorer*, and *Google* (Year 1 mean = 4.37; Year 4 mean = 4.50). The students also had basic skills to operate a computer, including deleting or renaming a file (Year 1 mean = 4.23; Year 4 mean = 4.36). Both Year 1 and Year 4 students reported that they have experience using software such as Microsoft Office (e.g., *Word*, *PowerPoint* and *Excel*) (Year 1 mean = 4.07; Year 4 mean = 4.4).

Table 6. Mean score for readiness for online learning based on technology skills

Technology Skills	Mean		Std deviation	
	Year 1	Year 4	Year 1	Year 4
7. I am able to use a web browser/search engine to navigate the Internet (e.g., Firefox, Safari, Internet Explorer, Google)	4.37	4.50	0.83823	0.81498
8. I am comfortable conducting searches and downloading files from the web.	3.99	4.25	0.92508	0.93639
9. I can use digital file management tools (e.g., deleting or renaming a file on your computer).	4.23	4.36	0.88003	0.86153
10. I am proficient at typing on a keyboard.	3.91	4.14	0.98231	1.01023
11. I have experience using software such as Microsoft Office (e.g., Word, PowerPoint, and Excel)	4.07	4.40	0.91744	0.87828
12. I have experience downloading/installing programs or plugins such as Java, Adobe Reader, Quick Time, etc.	3.37	3.98	1.22287	1.13743
13. I have experience using a Learning Management System (eLEAP, iFolio, SPIN, Moodle, etc.)	3.52	3.79	1.26621	1.27303
14. I am proficient at sending/receiving emails.	3.86	4.27	0.98509	0.95172
15. I am proficient at sending/receiving emails with attachments.	3.80	4.26	1.03226	0.95959
16. I can troubleshoot most problems associated with using a computer	3.12	3.55	1.17883	1.03591

On the other hand, there were some technology skills which the Year 1 students might not have, as shown by mean scores close to the mid-point of three on the Likert scale. The Year 1 students were not as skilled in conducting searches and downloading files from the web (Year 1 mean = 3.99; Year 4 mean = 4.25). The Year 1 students (mean = 3.91) were also less proficient in typing on a keyboard than Year 4 students (mean = 4.14). Undoubtedly, the Year 1 students (mean = 3.37) had even less experience downloading/installing programs or plugins such as Java, Adobe Reader, and Quick Time compared to Year 4 students (mean = 3.98). Similarly, only about half of the Year 1 students (mean = 3.52) had experience using a Learning Management System such as eLEAP, iFolio, SPIN, and Moodle, but the Year 4 students were only slightly better (mean = 3.79).

As for using technology to communicate via email, the results showed more familiarity among Year 4 students. Year 4 students could send or receive emails with and without attachment (mean = 4.26) than Year 1 students (mean = 3.80).

When it comes to troubleshooting problems associated with using a computer, most students chose the neutral option (Year 1 mean = 3.12; Year 4 mean = 3.55). Although the younger generation is commonly described as being technology-savvy, they are basic computer users and do not have the skills to fix unusual problems with their computer. The results imply that Year 1 students, even when they are frequent digital technology users, did not use these technologies to regulate their learning process. However, Year 4 students have acquired their experience throughout the previous semesters. They have greater readiness and better basic technology skills and are better equipped for distance learning via the online platform.

Motivation is an essential part of successful online learning because the structure of online education programmes substantially relies on self-learning (Engin 2017; Lim, 2004). Table 7 shows the mean scores for self-learning habits of Year 1 and Year 4 civil engineering students (Items 17-25).

Table 7. Mean score for readiness for online learning based on self-learning habits

	Mean		Std deviation	
	Year 1	Year 4	Year 1	Year 4
Self-learning habits				
17. I am very good at managing/planning my time well.	3.22	3.02	0.85645	0.99466
18. I am able to meet deadlines on a regular basis.	3.72	3.57	0.79650	1.03471
19. I am able to work independently.	3.75	3.54	0.83288	0.97796
20. I am able to work in groups.	3.82	3.97	0.86174	0.87958
21. I am able to spend approximately 9 hours a week on lessons, activities, homework or readings for every 3-credit course in which I am enrolled.	3.63	3.40	0.96791	1.17440
22. I am comfortable asking for assistance when needed.	3.61	3.71	0.89287	1.03499
23. I am a proficient reader.	3.49	3.29	0.88017	0.94590
24. I am willing to send emails to or have discussions with people in different places using online discussion and video conferencing.	3.51	3.64	0.98635	1.05584
25. I am able to do my homework by using electronic technology facilities.	3.73	3.96	0.99532	1.00900

The results (Table 7) show that the students had a moderate level of readiness for online learning in their self-learning habits as the mean scores were between three and four. Interestingly, the Year 1 students reported slightly better self-learning habits than the Year 4 students in managing their time, meeting deadlines, working independently, and spending about nine hours per week on their learning activities. More of the Year 1 students claimed that they were proficient readers (mean =

3.49) than Year 4 students (mean = 3.29). Based on these results, the Year 1 students had better self-learning habits than their seniors. They were more motivated to manage their time well, to manage their learning activities, and to handle distractions.

The mean scores for the rest of the items in Table 7 show that Year 4 students had better self-directed learning habits. After three years in the university, the Year 4 students had learnt to work in groups (mean = 3.97) better than Year 1 students (mean = 3.82). They were also more comfortable asking for assistance when needed (Year 1 mean = 3.61; Year 4 mean = 3.71). More of the Year 4 students were willing to send email to or have discussions with people in different places using online discussion and video conferencing (Year 1 mean = 3.51; Year 4 mean = 3.64). Both groups were capable of doing their homework using electronic technology facilities (Year 1 mean = 3.73; Year 4 mean = 3.96).

Next, self-direction in learning was examined to acquire information, plan, and evaluate the learning activities (Geng et al., 2019). The results (Table 8) show that both Year 1 and Year 4 students had a moderate level of readiness toward self-direction in online learning.

Table 8. Mean score for readiness for self-direction in online learning

Self-direction	Mean		Std deviation	
	Year 1	Year 4	Year 1	Year 4
26. I am good at following direction.	3.85	3.97	0.76181	0.80994
27. I am good at conveying my ideas in writing and speaking.	3.55	3.65	0.78084	0.81299
28. I am comfortable receiving constructive feedback.	3.92	3.96	0.69927	0.76597
29. I think I would be able to ask questions and make comments in clear writing.	3.57	3.70	0.79087	0.81451
30. I would describe myself as self-motivated.	3.49	3.42	0.92994	1.03397
31. I feel that I am ready for e-learning	3.27	3.34	1.03960	1.03425

Year 4 students had a higher mean score for all the items, except Item 30. For this, Year 1 students were slightly more inclined to describe themselves as self-motivated (mean = 3.49) than Year 4 students (mean = 3.42). For the other five items, the Year 4 students reported a better ability to follow their lecturers' directions. They had moderate readiness to convey their ideas in writing and speaking, which is important because written assignments and oral presentations are usually graded in continuous assessment. Besides that, the students also reported that they had moderate skills in asking questions and making comments, indicating that they had the communicative ability to participate in online class discussions.

Next, students' readiness in terms of learning preference was examined (Table 9). Both groups of students did not believe that e-learning was more effective than the traditional classroom-based approach (Year 1 mean = 2.71; Year 4 mean = 2.96). These results for Item 36 were consistent

with Item 32, whereby the students were marginally comfortable learning away from campus (Year 1 mean = 3.26; Year 4 mean = 3.23). Nevertheless, the other results shown in Table 9 indicated that students were able to learn from the things that they hear, such as lectures, audio recordings, or podcasts, as well as learn from various instructional formats (e.g., text, video, podcast, online discussions, video conferencing). They were comfortable communicating through writing. The results concur with Smith (2000), whose study on 1,252 vocational students showed that students could engage with learning sequences that were presented verbally (text or listening) as opposed to sequences that were largely non-textual (direct experience, observation, practice). Students tended to be non-verbal learners and non-self-directed (Smith et al., 2003).

Table 9. Mean score for readiness in terms of learning preference

Learning Preference	Mean		Std deviation	
	Year 1	Year 4	Year 1	Year 4
32. I am comfortable learning in an environment in which I come to campus infrequently or not at all.	3.26	3.23	1.12902	1.23037
33. I can learn from various instructional formats (e.g., text, video, podcast, online discussions, video conferencing)	3.66	3.70	0.80038	0.87262
34. I can learn from things I hear, like lectures, audio recordings, or podcasts.	3.73	3.73	0.82726	0.95172
35. I am comfortable communicating through writing.	3.63	3.53	0.96912	0.96828
36. I believe that e-learning is more effective than the traditional classroom-based approach.	2.71	2.96	1.10224	1.17091

Table 10 shows that the students clearly had readiness for internet discussion, as shown by mean scores between 3.5 and four. The students were able to carry on a conversation with others using the Internet (e.g., Internet chat, instant messenger). In fact, they reported the ability to be in several discussions taking place in the same online chat and follow along with online conversations. However, when it came to answering questions, they preferred to have more time to prepare responses (Year 1 mean = 3.96; Year 4 mean = 4.05). The scores for Items 37-40 were slightly higher for Year 4 students because they were more familiar with one another than Year 1 students who did not have the chance to meet face-to-face as COVID-19 movement control the lockdown was imposed before their new semester began.

Table 10. Mean score for students' readiness to have internet discussion

Internet Discussion	Mean		Std deviation	
	Year 1	Year 4	Year 1	Year 4
37. I think I would be able to carry on a conversation with others using the Internet (e.g., Internet chat, instant messenger).	3.67	3.88	0.87393	0.99312
38. I think I would be comfortable having several discussions taking place in the same online chat even though I may not be participating in all of them.	3.41	3.58	0.94491	1.09834
39. I think I would be able to follow along with an online conversation (e.g., Internet chat, instant messenger) while typing.	3.69	3.74	0.89071	0.97981
40. I sometimes prefer to have more time to prepare responses to a question.	3.96	4.05	0.82077	0.84457

3.4 Online Learning Delivery Preference

The integration between face-to-face and online delivery of lectures is believed to improve student engagement and learning of the course curriculum. The results on online learning delivery preference presented in Figure 1 shows that a majority of 15.35% Year 4 students and 10.70% Year 1 preferred to have 50% face-to-face and 50% online lecture delivery. When the percentages of a greater percentage of face-to-face delivery to online delivery were added together, the total was 55.82% (33.96% Year 1; 21.86% Year 4). Similarly, when the percentages of a greater percentage of online lecture delivery to face-to-face delivery were added together, the total was 19.09% (8.38% Year 1; 10.71% Year 4). The results showed clearly that students preferred face-to-face lecture delivery. Comparatively, more Year 1 students felt comfortable with traditional face-to-face learning compared to Year 4 students. The students' readiness towards online learning is still low despite having the hardware and software for online learning and technology skills.

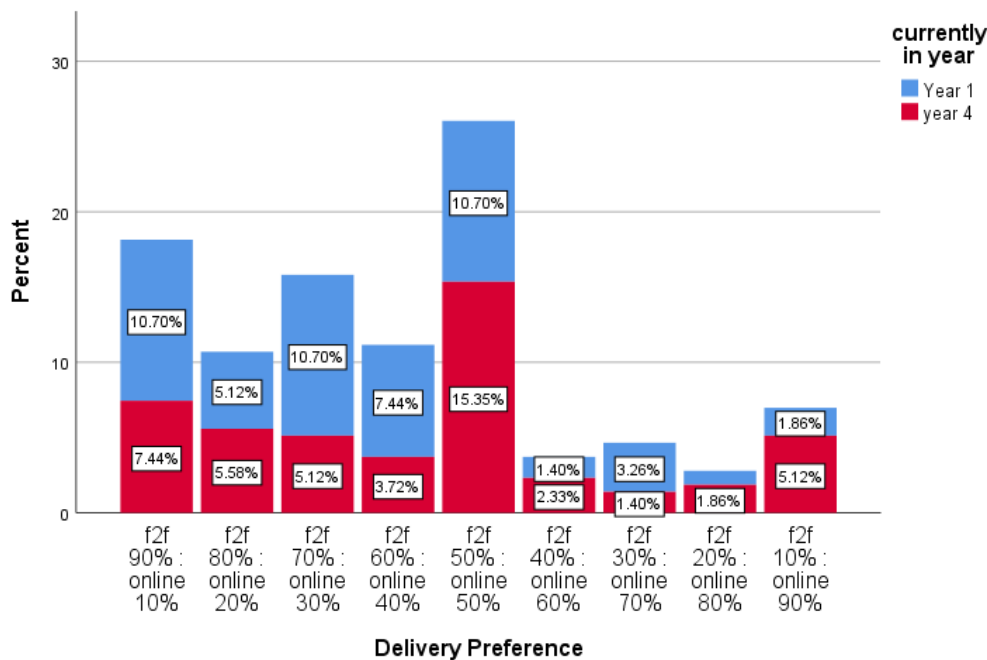


Figure 1. Delivery preference based on difference in percentage of face-to-face and online implementation

Figure 2 presents the results of the preferred delivery format for online learning. Most of the students preferred to have PowerPoint with video (PPT with video) (Year 1, 35.3%; Year 4, 34.9%), and the percentages were similar for the two groups. However, Year 1 students preferred to have a PowerPoint presentation either in the form of audio or video. In contrast, Year 4 students preferred video as the delivery format, regardless of whether the video is with PowerPoint, text, or video-only. Course delivery is presented in various formats such as using videos, audios, other technologies, or software can make text-based materials more interesting and allow students to respond in multiple formats (Sun & Chen, 2016). However, it is surprising that both groups of students still preferred reading texts and PowerPoint slides only without any audio and video, with 16.3% and 20.5%, respectively. It may be due to limitations in hardware/software and the internet connection because audio and video files have a bigger size format and they took a longer time to load or download.

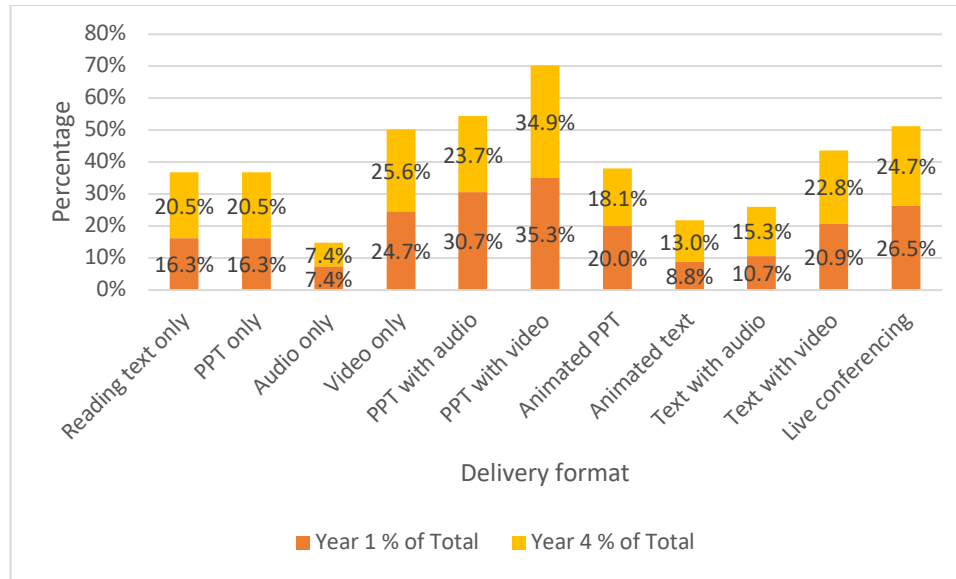


Figure 2. Year 1 and Year 4 students' preferences in online delivery format

3.5 Acceptance toward Online Assessment

Students may be ready to go for the online teaching and learning process, but it does not mean they can accept the online assessment system. Table 11 shows a moderate acceptance level on online assessment (mean score of 3.46 to 3.81). Year 1 students liked the quiz to be carried out for every sub-topic to check their understanding. Interestingly, Year 1 also liked assessment through problem-solving case studies and presentations on informational web pages. Due to the COVID-19 movement restriction and compulsory social distancing, students could not conduct experiments and site visits. As an alternative, lecturers gave them case studies to solve the problems while waiting for the situational developments which would permit real-time exposure to the site.

Table 11. Online assessment acceptance

	Mean		Std Deviation	
	Year 1	Year 4	Year 1	Year 4
A simple assessment like a quiz should be carried out for every sub-topic in order to examine learners' understanding.	3.80	3.61	0.85042	1.07770
Assessment through assignment (work with virtual team in self-learning process)	3.46	3.81	0.86876	0.91885
Assessment through discussion (work with virtual team)	3.51	3.53	0.77105	1.07389

Assessment through peer-based eLearning feedback (peer evaluation)	3.57	3.81	0.85650	0.92946
Assessment through open-ended questions	3.63	3.63	0.76081	0.95988
Assessment through Problem-Solving Case Studies	3.63	3.45	0.80678	0.98745
Assessment through presentations in the form of informational web pages such as blogs, web-based student-generated quizzes, video/audio, or slide shows	3.46	3.59	0.89974	1.00427

On the other hand, Year 4 students preferred online assessments through assignment and peer-based eLearning feedback. A possible explanation is that they were accustomed to the learning system over the years, and they know one another well enough to work in groups. The students in this study were able to move away from their experience of paper-based assessment, and they consistently reported positive attitudes towards online assessment. They did not exhibit inherent distrust for the technology, as described by Khan and Khan (2018).

4 DISCUSSION AND CONCLUSION

The study shows that the Year 1 and Year 4 civil engineering students had a moderate readiness for online learning, with the senior students being more ready than the junior students. Among the essential components for successful online learning, the students' readiness level was high on hardware/software requirements and technology skills components. As their readiness of self-learning habits, self-direction, learning preference and engagement in internet discussion were at a moderate level, these are the areas in need of improvement. The students' preferred delivery format for lectures is PowerPoint slides with video. They were open to various forms of online assessment, including quizzes, assignments, discussions, peer-based eLearning feedback, open-ended questions, problem-solving case studies and oral presentations.

Some pedagogical implications for student learning, instructor's teaching and support services can be drawn from the results. It is important to familiarise students with the concept and strategies in conducting online learning and the process of this type of learning before they enter the online learning education system. The approach can be done by giving the introductory course to promote self-development and self-learning so that new students are knowledgeable about online teaching and learning activities and can derive the maximum benefit from the distance learning experience. As for assessment, lecturers should gradually make the change, starting with low-stake assessments such as a simple quiz to make online assessment more acceptable and familiar for students. Kearns (2012) stated that the instructor needs to be more creative in designing assessments for the new environment. Also, an examination of instructors' thinking and decision-making about assessment, including how they evaluate their assessments' effectiveness, would be worthwhile before it is beneficial to the students through an online assessment. Bugbee (1996) also recommends that they invest additional time and effort to design quality tests and exam items for

online assessment. Finally, the faculty and/or university should also provide technical support and helplines to help students troubleshoot technical problems they may encounter in distance learning. It includes giving students clear guidelines on starting an online course so that students are clear about what they must do, and this would minimise frustration and possible loss of interest due to confusion.

REFERENCES

Abuhassna, H., Al-Rahmi, W.M., Yahya, N., Megat Zakaria, M.A.Z., Mohd Kosnin, A., & Darwish, M. (2020). Development of a new model on utilising online learning platforms to improve students' academic achievements and satisfaction. *International Journal of Educational Technology in Higher Education*, 17 (38), 1-23 <https://doi.org/10.1186/s41239-020-00216-z>

Azzi-Huck, K., & T. Shmis. (2020). Managing the impact of COVID-19 on education systems around the world: How countries are preparing, coping, and planning for recovery. *Education for Global Development*. Retrieved from <https://blogs.worldbank.org/education/managing-impact-covid-19-education-systems-around-world-how-countries-are-preparing>

Bartley, S. J., & Golek, J. H. (2004). Evaluating the Cost-Effectiveness of Online and Face-to-Face Instruction. *Educational Technology & Society*, 7(4), 167-175.

Bernard, R. M., Brauer, A., Abrami, P.C., & Surkes, M. (2004). The development of a questionnaire for predicting online learning achievement. *Distance Education*, 25(1), 31-47. <https://doi.org/10.1080/0158791042000212440>

Borotis, S., & Poulymenakou, A. (2004). E-Learning Readiness Components: Key Issues to Consider Before Adopting e-Learning Interventions. Paper presented at the E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2004, Washington, DC, USA. <https://www.learntechlib.org/p/11555>

Bugbee, A. C. (1996). The equivalence of paper-and-pencil and computer-based testing. *Journal of Research on Computing in Education*, 28, 282-299. <https://doi.org/10.1080/08886504.1996.10782166>

Choucri, N., Maugis, V., Madnick, S., Siegel, M., Gillet, S., O'Donnell, S., & Haghseta, F. (2003). Global e - readiness-for what. Center for eBusiness at MIT. Group for Globalisation of e-Business, Center for eBusiness at MIT, Sloan School of Management.

Dabbagh, N. (2007). The online learner: Characteristics and pedagogical implications. *Contemporary Issues in Technology and Teacher Education*, 7(3), 217-226. Retrieved from <http://www.citejournal.org/>

- Engin, M. (2017). Analysis of students' online learning readiness based on their emotional intelligence level. *Universal Journal of Educational Research*, 5(12A), 32-40. <https://doi.org/10.13189/ujer.2017.051306>
- Evans, J., & Haase, I. (2001). Online business education in the twenty-first century: An analysis of potential target markets. *Internet Research*, 11(3), 246-260. <https://doi.org/10.1108/10662240110396432>
- Forson, I. K., & Vuopala, E. (2019). Online learning readiness: Perspective of students enrolled in distance education in Ghana. *The Online Journal of Distance Education and e-Learning*, 7(4), 277- 294.
- Gay G. H. E. (2018). Fixing the 'ready' in E-learning readiness. *Trends in E-learning*. Chapter 5, 65 – 83. <http://dx.doi.org/10.5772/intechopen.74287>
- Geng, S., Law, K. M. Y., & Niu, B. (2019). Investigating self-directed learning and technology readiness in blending learning environment. *Int J Educ Technol High Educ*, 16, 17. <https://doi.org/10.1186/s41239-019-0147-0>
- Gilbert, B. (2015). Online learning revealing the benefits and challenges. *Master Thesis*. St. John Fisher College.
- Hussin, H, Bunyarit, F, & Hussein, R (2009) Instructional design and e-learning: examining learners' perspective in Malaysian institutions of higher learning. *Campus-Wide Information System*, 26(1), 4-19. <https://doi.org/10.1108/10650740910921537>
- Karabatzaki, Z., Stathopoulou, A., Kokkalia, G., Dimitriou, E., Loukeri, P.I., Economou, A., & Drigas A. (2018). Mobile application tools for students in secondary education: An evaluation study. *International Journal of Interactive Mobile Technologies (iJIM)*, 12(2), 142-161.
- Kearns, L.R. (2012). Student assessment of online learning: Challenges and effective practices. *MERLOT Journal of Online Learning and Teaching*, 8(3), 198-208.
- Khan, S., & Khan, R.A. (2019). Online assessments: Exploring perspectives of university students. *Education and Information Technologies*, 24, 661-677. <https://doi.org/10.1007/s10639-018-9797-0>
- Lim, D. H. (2004). Cross-cultural differences in online learning motivation. *Educational Media International*, 41(2), 163-175. <https://doi.org/10.1080/09523980410001685784>
- Mattice, N. J., & Dixon, P.S. (1999). Student preparedness for distance education (Research Report). Santa Clarita, CA: College of the Canyons
- Martin, F., Stamper, B., & Flowers, C. (2020). Examining student perception of their readiness for online learning: Importance and confidence. *Online Learning*, 24(2), 38-58. <https://doi.org/10.24059/olj.v24i2.2053>

- McVay, M. (2000). Developing a Web-based distance student orientation to enhance student success in an online bachelor's degree completion program. Dissertation, Nova Southeastern University, USA. Retrieved from <http://web.pdx.edu/~mmlynch/McVaydissertation.pdf>
- McVay, M. (2001). How to be a successful distance education student: Learning on the Internet. New York: Prentice-Hall.
- Nguyen, T. (2015). The effectiveness of online Learning: Beyond no significant difference and future horizons. *MERLOT Journal of Online Learning and Teaching*, 11(2), 309-319.
- Pallant, J. (2010). *SPSS survival manual*. New York, NY: McGraw-Hill Education.
- Parnell, J. A., & Carraher, S. (2003). The Management Education by Internet Readiness (Mebir) Scale: Developing a scale to assess personal readiness for internet-mediated management education. *Journal of Management Education*, 27(4), 431-446. <https://doi.org/10.1177/1052562903252506>
- Said, S.M. (2020). No Internet but lessons go on for students in a remote village. Accessed, January 18, 2021, <https://bernama.com/en/features/news.php?id=1838574>
- Selvanathan M, Hussin NAM, Azazi NAN. (2020). Students' learning experiences during COVID-19: Work from home period in Malaysian Higher Learning Institutions. *Teaching Public Administration*.
- Seth S. (2017). Challenges & benefits of learning management systems. Accessed January 25, 2021, from <https://www.gnosisconnect.com/resources/blog/challenges-benefits-of-learning-management-systems-lms/>
- Shahzad, A., Hassan, R., Aremu, A.Y., Hussain, A., & Lodhi, R.N. (2020). Effects of COVID-19 on E-learning on higher education institution students: the group comparison between male and female. *Qual Quant*. <https://doi.org/10.1007/s11135-020-01028-z>
- Sia, J. K.-M. and Abbas Adamu, A. (in press), Facing the unknown: pandemic and higher education in Malaysia, *Asian Education and Development Studies*.
- Smith, P. J. (2000). Preparedness for flexible delivery among vocational learners. *Distance Education*, 21(1), 29-48. <https://doi.org/10.1080/0158791000210103>
- Smith, P. J. (2005). Learning preferences and readiness for online learning. *Educational Psychology*, 25(1), 3-12. <https://doi.org/10.1080/0144341042000294868>
- Smith, P. J., Murphy K.L., Mahoney S.E. (2003) Towards identifying factors underlying readiness for online learning: An exploratory study. *Distance Education*, 24(1), 57-67. <https://doi.org/10.1080/01587910303043>
- Sun A., Chen, X. (2016). Online education and its effective practice: A research review. *Journal of Information Technology Education: Research*, 15, 157-190. <https://doi.org/10.28945/3502>

Tallent-Runnels, M. K., Thomas, J. A., Lan, W. Y., Cooper, S., Ahern, T. C., Shaw, S. M., et al. (2006). Teaching courses online: A review of the research. *Review of Educational Research*, 76(1), 93-135. <https://doi.org/10.3102/00346543076001093>

Watkins, R., Leigh, D., & Triner, D. (2004). Assessing readiness for e-learning. *Performance Improvement Quarterly*, 17(4), 66-79. <https://doi.org/10.1111/j.1937-8327.2004.tb00321.x>