Embracing e-learning in a higher education institution in the Philippines

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ABSTRACT

Although online learning plays an increasingly significant role in education, this learning strategy cannot be fully implemented unless resources, the efficacy of key players, and the intention to use the modality are given utmost attention. In this context, this study was conceptualized to identify the readiness of higher education students in terms of technology resources, technology self-efficacy, and willingness to embrace online learning, utilizing descriptive-correlational research design. A survey was conducted among systematically and randomly sampled students in a higher education institution, which included both sexes and various year levels from its three campuses, to gain a better grasp of the current situation of the university. An expert-validated and reliability-tested survey questionnaire was used to gather data. Findings revealed that cellular phones were widely used; cellular data was the data connection source of the majority; the Internet was mainly described at moderate speed; and blended learning was preferred by many. Weak correlations existed between available gadgets, Internet speed, and learning modality preference, with a willingness to embrace e-learning. Technology efficacy was positively and moderately correlated with willingness to embrace online learning. Thus, one's desire to embrace online learning was greatly influenced by his effectiveness in using technologies. With this, students' technology self-efficacy should be considered an essential factor in implementing online learning in the University while considering other variables. Should online learning be implemented, students must be disciplined and directed towards active learning. At the same time, teachers require professional development in using this technology to take advantage of the benefits of online learning.

1. Introduction

The sudden spread of Covid-19 enforced a global threat, mandated countries to impose quarantine protocols and measures, and rapidly changed how most things occur, including how education is provided (Ipapo et al., 2021). The pandemic tested the agility of educational institutions (Wu, 2020) and the decision-making skills of academic leaders (Tria, 2020) to transition from traditional face-to-face to alternative learning modalities (Crawford et al., 2020). Various delivery modes were implemented, such as online, modular, and hybrid learning (Tria, 2020).

Additionally, historically seen as a substitute for mainstream education, online learning suddenly emerged in the limelight during the pandemic (Ray, 2020). Moreover, online learning opportunities continue to expand, and online tools continue to increase beyond the pandemic (Yuhanna et al., 2020) because it is advantageous since it can be done in synchronous and asynchronous approaches, real-time and recorded to cater to different learning styles and preferences (Crawford et al., 2020). It allows students to access educational materials and take part in classes from any location, providing flexibility and convenience. This approach will enable students to learn at their own pace and on their schedule without being physically present in a classroom (Mukhtar et al., 2020). In addition, online learning provides benefits for students from diverse cultural backgrounds. These advantages include opportunities for reflection, better integration of knowledge, improved communication, and increased responsibility for education (Shaw, 2020).

However, the implementation of online learning has demonstrated a threatening impact on poorly resourced institutions and socially disadvantaged learners; the digital divide, as they call it, yields a gap between those who have access to technology and those who do not (Kolodziejczyk et al., 2020). Further, the "second divide" refers to the disparity between those who have technology efficacy and those who have not intensified the problem (Chetty et al., 2018).

In the Philippines, students face various educational challenges, including disparities in technology access and proficiency among demographic groups. This has been further aggravated during the pandemic as online learning has become the primary mode of education (Alinsunurin, 2021). The country faces a digital gap in remote learning among students (Santos, 2020), which is believed to aggravate inequalities and create online learning barriers. For instance, a nationwide study found 32% of 3,670 medical students struggled with new learning styles. Additionally, 22% lacked reliable Internet access (Baticulon et al., 2021). Also, e-learning adoption is challenged by insufficient computer access, poor Internet connectivity for lower-income groups, curricular constraints, and inadequate teacher training or assurance in utilizing technology (Rodrigo, 2021). Cleofas and Rocha (2021) also found that poor students have limited Internet access and do not possess technology devices like laptops and desktops.

The previous research has highlighted the differences in technology access and proficiency among students but does not dig into the relationship between technology efficacy and willingness to embrace e-learning. This research, therefore, highlighted the need to conduct this study. While online learning shows promise, assessing students' readiness and willingness to adopt this approach is crucial, especially in the Philippine context. This research addresses these gaps by exploring the relationship between students' desire to engage in e-learning and factors like available devices, Internet connection source, speed, preferred learning mode, and technology skills. The research intends to grasp how variables relate to one another. This knowledge can shape strategies that improve Filipino students' preparedness for online education and reduce their obstacles. The goal is to create more equitable and effective virtual learning e-nvironments in the Philippines.

2. Theoretical basis

It is understood that in all educational contexts, learners' success should be ensured. Efforts to consider pedagogical changes to understand learners' backgrounds are critical to successfully delivering the education they deserve. Online learning, a form of distance learning, offers a less structured experience for learners since both learners and teachers can face many

technological challenges. The success of learning in an online platform may depend on several factors, but it can be taken lightly so as not to compromise the quality of education.

Online learning is grounded in constructivism (Piaget, 1964), which has played a significant role in teaching and learning. This core educational paradigm emphasizes learners' active creation of knowledge. According to Piaget's theory, learners actively engage with their environment, assimilate new information into existing cognitive structures (schemas), and adapt their schemas to include new knowledge (Piaget, 1964). Constructivism is an effective technique for increasing e-learning efficacy and implementation (Berestova et al., 2022). It emphasizes students' active construction of knowledge rather than passive information collection (Kamath & Kumar, 2023). Using digital technology, such as online platforms and collaborative learning, can help e-learning teachers apply constructivist concepts more effectively (Vagele-Kricina, 2021; Yeravdekar, 2022). Integration of Information and Communication Technology (ICT) capabilities into the teaching and learning process has improved learning outcomes (Reid-Martinez & Grooms, 2021). Constructivism in e-learning includes using pedagogical tools and technologies, problem-based learning, student-centered learning, and personalized learning paths. The combination of constructivism and quickly evolving technical breakthroughs have affected future online teaching and andragogy tendencies.

Moreover, this study is also rooted in self-regulated learning. Self-regulated learning is crucial in e-learning. The individual can control learning behavior and monitor progress toward a goal. Self-regulated learning practices are critical to success in online educational contexts (Yu, 2023). Clickstream data can be used to examine and evaluate patterns of user learning behavior in online learning environments, allowing researchers to compare online learning behaviors to academic performance (Rusdi et al., 2023). Experts believe self-regulated learning consists of three major components: cognition, metacognition, and motivation. Self-regulation requires all three of these significant components. Individuals who have cognitive talents but are reluctant to utilize them, for example, do not perform at the same level as those who have skills but are driven to use them (Zimmerman, 2000). This means that cognitive and metacognitive skills, with motivation aside, lead to higher self-regulation. In this context, the success of online learning can be founded on the efficacy of students to use technologies that could be used for the purpose. Thus, students' skills or abilities in using digital media or technologies must be determined.

Constructivism and self-regulated learning theorie-s are connected. They share key principles and practices. Both highlight learners actively building an understanding of themselves. Constructivist ideas focus on actively engaging and working together in digital learning environments. Meanwhile, self-regulated learning skills help students navigate and adapt to e-learning platforms effectively. By exploring how students' confidence in technology affects their openness to e-learning, the research sheds light on constructivism and self-regulated learning's roles in shaping e-learning attitudes and behaviors. Ultimately, this understanding can guide de-signing more effective e-learning interventions and support strategies suited to students' needs and preferences.

In summary, constructivism and self-regulated learning theories work together and help students learn better in digital environments. They encourage active participation, critical thinking, and skills to manage one's learning, which is vital for success in online courses. Students take a more active role in their education, analyzing information and regulating their progress. This approach supports effective learning in digital settings.

3. Methodology

This study employed a quantitative research design utilizing descriptive methods and an online cross-sectional survey to enable the researchers to identify the readiness of students to embrace online learning by determining the available gadgets, Internet connection source, Internet speed, and learning modality preference of students in the three campuses of Quirino State University, Philippines. This also helped the researchers determine the technology efficacy and willingness of students to embrace online learning, which is becoming the trend in higher education institutions during this pandemic, not only in the country but also in the entire world. A sample of 2,121 college students from the three University campuses selected through systematic random sampling were treated as respondents. The total number of students treated as respondents was great for grasping the current situation in the university better, as results became a basis for updating the Learning Continuity Plan (LCP) for the 2nd semester, AY 2020 - 2021. About one-fourth of the respondents were from Cabarroguis, more than three-fifths were from Diffun, and more than one-tenth were from Maddela Campus. Of this number, about 70% were female, while the remaining percentage were male students. The majority of the respondents were enrolled in the first or third year.

A survey questionnaire was used as the primary data gathering instrument and developed through an extensive literature review to ensure the study's objectives were met. Experts' validation was done to ensure that items included in the instrument were error-free and fit the research. After this, it was piloted to several students (non-respondents) to test whether they fully understood the items. Responses were analyzed; results revealed a Cronbach's Alpha value of 0.792 (technology efficacy) and 0.814 (willingness to embrace online learning), which implied and suggested that the items have relatively high internal consistency and can be used as instruments for the research. Quantitative data were extracted and imported into statistical software, which assisted in data analysis. The normality of the data was also tested to ensure that proper statistical tests were used to analyze results. Frequency counts and mean were used to describe. Shapiro Wilk test was used to determine the normality of data. Correlations between the key variables were also identified through the quantitative responses of students.

The study's findings at Quirino State University provide valuable insights into students' readiness to embrace online learning within the setting of a specific higher education institution in the Philippines. The study was conducted at QSU, which may have distinct factors, such as infrastructure, demography, and educational regulations, that influence students' preparation for online learning. These contextual elements may not apply to academic institutions in other locations or nations.

4. Result and discussion

4.1. Availability of gadgets, Internet connection source, Internet speed, and learning modality preference

Table 1 shows the distribution of higher education students by gadgets available or used. Respondents were asked about the gadgets available at home, and were readily available for use. Through this, the University was given a bird's eye view of how the LCP can be updated based on the students' responses.

Table 1

Distribution of Respondents by Gadgets Available/Used

Gadgets Available	Total	
	f	%
Android/IOS Phone alone	1,549	73.03
Desktop Computer alone	8	0.38
Laptop alone	75	3.54
Tablet/iPad alone	14	0.66
Android/IOS Phone with other gadgets (Laptop/Desktop Computer, Tablet/iPad, etc.)	475	22.40
Total	2,121	100.00

Note. The data are from "Prevalence and impact of the use of electronic gadgets on the health of children in secondary schools in Bangladesh: A cross-sectional study" by S. M. M. Rashid, J. Mawah, E. Banik, Y. Akter, J. I. Deen, A. Jahan, N. M. Khan, M. M. Rahman, N. Lipi, F. Akter, A. Paul, and A. Mannan (2021), *Health Science Reports, 4*(4), Article e388 (https://doi.org/10.1002/hsr2.388)

Based on the findings, fewer students utilize laptops, desktop computers, or numerous devices for online learning. In contrast, most students on all university campuses predominantly rely on Android or iOS phones. This could mean that gadgets have become an indispensable aid for students in learning, particularly during the pandemic. They offer many features, such as massive storage capacity, flexibility, and portability, making it easier for students to access learning resources (Restela & Putri, 2023).

Moreover, students' use of electronic gadgets has substantially grown due to the transition to virtual learning (Gladshiya & Sharmila, 2022). Smartphones are now standard e-learning tools, especially for online education. They offer access to online learning resources and flexibility in delivering courses. Students have used smartphones for online study in various nations, including the Philippines and India. Students in the Indian state of Jharkhand borrowed iPhones from relatives to attend online classes, even though they preferred in-person instruction (Manzoor, 2023). For e-learning, students in Batangas, Philippines, frequently use laptops, cellphones, mobile apps, the Internet, and video tutorials (Caraig et al., 2021). A study conducted at the University of Ghana revealed that students found it easier to use smartphones for distance learning since they performed remarkable roles in the student's academic activities (Darko-Adjei, 2019). These can be used to access teaching materials available online, serve as learning aids for students, and can be a helpful communication tool for both teachers and learners (Anshari et al., 2017).

Further, the dominance of mobile use in the university could imply that online classes need learning stuff that is easy to use on phones. Mobile learning, or m-learning, means using phones for education. Studies say mobile learning makes it easier to access lessons and learn anytime. It also helps students get more involved with class activities (Sharples et al., 2019). Meanwhile, the scarcity of desktop or laptop computers raises the possibility of differences in students' access to and ownership of digital devices. This emphasizes how crucial it is to deal with the digital divide to guarantee fair access to online learning materials.

Table 2 reveals that the source of Internet connection is necessary when delivering instruction through the Internet, and the sources of Internet connection of students in the three campuses are shown in the table. Sources were classified into cable, cellular, dial-up, DSL, satellite, or wireless.

Table 2

Distribution of Respondents by Source of Internet Connection

Source of Internet Connection	Total	
	f	**%**
Cable (through cable modem and operates cable TV lines)	47	2.22
Cellular (data from phone)	1,591	75.01
Dial-up (uses a telephone line connection)	4	0.19
DSL (Digital Subscriber Line copper wires)	3	0.14
Fiber (coaxial cables or copper wires)	32	1.51
Satellite	8	0.38
Wireless (WiFi)	436	20.56
Total	2,121	100.00

Note. The data are from "Types of Internet connection" by J. Vaner, 2018, Missipi State University Extension (https://extension.msstate.edu/sites/default/files/publications/publications/p3275.pdf)

With the data gathered, 75% of students depended on cellular data, which equates to the data on the availability of gadgets, revealing that most used Android/IOS phones. This means that students buy a certain amount of load from providers to avail themselves of Internet service for their cellular phones. Only 20.56% have wireless connections, while only a few have other sources of Internet connections. This corroborates with the study of Asio et al. (2021) that the majority, or more than 60% of the students have mobile data connections. Students must have an Internet connection to access learning resources, communicate with classmates and teachers, and support the teaching and learning process (Kasim et al., 2022).

The Internet has a lot to contribute to the educational process. It provides various online tools that can improve education, including interactive exercise creation, the development of instructional materials, and group communication support. Internet technology is a valuable tool for parents, instructors, and students since it enables people to learn new things and improve their existing ones (Ranjith & Kulkarni, 2019). Higher levels of accomplishment can be attained by intentionally and methodically enriching the educational process through online learning (Antonijevic, 2018). It has been demonstrated that online learning resources and platforms like YouTube, Zoom Meet, Google Classroom, and WhatsApp can help people with their learning challenges (Pahlevi & Sinaga, 2022). Regarding accessibility, communication, and interaction, the Internet has completely changed education, making it more convenient and inclusive (Haowen, 2020).

The connectivism theory (Siemens, 2005) posits that knowledge is stored in networks of people and digital resources, and learning creates connections within a network of information sources. This theory emphasizes the value of utilizing social media, online networks, and digital resources to support knowledge development, information sharing, and collaborative learning in the context of Internet use in education. This could imply that the Internet could foster digital literacy abilities, networking, collaborating online, and lifelong learning. Thus, every educational institution must make explicit priority objectives in educational policies to improve the delivery of instruction, especially when face-to-face classes are not possible.

Internet speed is tantamount to the success of online or blended learning as this defines the list of possible activities that can be catered to or implemented towards the delivery of instruction. The respondents' distribution regarding Internet speed is tackled in Table 3.

Table 3

Distribution of Respondents by Internet Speed

Internet Speed	f	%
Very Fast (40+ Mbps: Hardcore streaming, gaming, and downloading with an extreme number of connected devices)	48	2.26
Fast (25 - 40Mbps: Heavy HD streaming, online gaming, and downloading with a lot of connected devices)	168	7.92
Moderate (10 - 25Mbps: Moderate HD streaming, online gaming, and downloading with a moderate number of connected devices)	908	42.81
Slow (05 - 10Mbps: Web surfing, email, occasional streaming, and online gaming with few connected devices)	605	28.52
Very Slow (5Mbps or less: Basic web surfing and Email)	392	18.48
Total	2,121	100.00

Note. The data are from "Broadband speed guide" by Federal Communications Commission, 2022 (https://www.fcc.gov/consumers/guides/broadband-speed-guide)

About 43% of the respondents claimed that they have moderate Internet speed, which can cater to moderate high-definition video/live streaming and downloading of various files on the Internet having 10 - 25mbps. However, about 29% have slow connections with only 05 - 10mbps; these students can surf the web, open and send emails, and occasionally be involved in video/live streaming. Further, 18.48% have very slow connections, and these students can only do basic web surfing and opening/sending emails as they only have 05Mbps or less.

It will be difficult to implement online learning when the problem of the availability of technology devices and Internet connectivity is not resolved. Students demand a reliable Internet when adopting e-learning (Aboagye et al., 2021). Further, reliable Internet access is essential for educational institutions in the current era of digital learning. While teachers use technology to create engaging classes, students cannot succeed academically without access to Internet resources. The Department for Education (DfE) in England has set minimum Internet speed criteria for schools to guarantee the best digital learning environments. Primary schools must keep their upload and download speeds at at least 30Mbps and 100Mbps, respectively. In the meantime, connections with a maximum download and upload speed of 01Gbps are required for secondary schools, all-through schools, and higher education colleges (DB Comms, 2023).

Meanwhile, Asio et al. (2021) found that 70% of students have access to the Internet at home, which could indicate an Internet-based choice for learning. However, this contradicts the findings of this study and the conclusion of Chung et al. (2020) and Fabito et al. (2021) that a strong Internet connection is the biggest obstacle to students learning online. Further, the result is similar to a study (Chirwa, 2018), which revealed that slow Internet speed seemed to be a common problem in public colleges in Tanzania, which could be attributed to having small bandwidth, especially during peak hours.

Internet connection speed may be a significant obstacle when utilizing online virtual platforms because it sets a benchmark for adopting blended or online learning in educational institutions.

Table 4 shows the distribution of respondents by learning modality preferences: fully modular, entirely online, or mixed learning.

Table 4

Distribution of Respondents by Learning Modality Preference

Learning Modality Preference	Total	
	f	%
Fully modular	985	46.44
Fully online	59	2.78
Blended (meaning online learning and modular)	1,077	50.78
Total	2,121	100.00

Note. The data are from "The use of modular and blended learning modalities: Basis for the development of learning activity sheets" by D. Ompoco, 2022, *International Journal of Multidisciplinary Research and Publications (IJMRAP), 4*(8), pp. 13-19

From their responses, more than 50% preferred blended learning, a combination of modular and online learning. About 47% preferred fully modular or preferred learning through printed self-learning modules. Results disagree with the findings of Baloran (2020), which show how reluctant students are to participate in online blended learning. Further, students' mindset towards Internet usage in education revealed unfavorable findings (Serhan, 2020) since migrating from traditional face-to-face classes to entirely online, fully modular, or blended (combination of modular and online learning) will not happen overnight as many challenges are attached to it (Crawford et al., 2020). In the study of Gonzalez (2023), students favored in-person instruction the most (37%), followed by hybrid (30%) and online (33%), as they were least satisfied with the quality of instruction during the pandemic when online classes were implemented.

The emergence of Covid-19 in the country brought many changes in the educational landscape and a crisis in the implementation of learning strategies (Organisation for Economic Co-operation and Development, 2020). Some schools have shifted from face-to-face classes to modular instruction, which is believed to be more operative than usual teaching approaches since students learn at their own pace (Ambayon, 2020). Further, online learning is practical and flexible; this could have been the most common learning strategy among higher education institutions during the pandemic in various places in the world (Crawford et al., 2020).

The results could imply the need to vary the learning modalities to address the varied needs, preferences, and intelligences for better and improved learning results and student engagement (Armstrong, 2009). Teachers can establish inclusive and productive learning environments that support the development of students' varied abilities and strengths by utilizing various intelligences and learning modalities (Gardner, 1999).

4.2. Technology self-efficacy and willingness of students to use online learning

The efficacy of students' self-perceived technology was assessed through various statements, and the results are presented in Table 5.

Table 5

Self-Efficacy in the Use of Technology

Statements	Mean	Description
1. I believe I am technology savvy since I can use computers/laptops/gadgets without difficulty and much assistance.	2.76	Agree
2. I can quickly adapt to new software/application versions/updates.	2.71	Agree
3. When encountering a problem with using a computer/laptop/gadget, I try to solve it myself before asking for help.	2.90	Agree
4. When faced with a problem I did not solve on the first attempt, I tried again.	3.09	Agree
5. I can use word processors in computers/laptops/gadgets to create, edit, and format documents for specific purposes (e.g., Microsoft Word, WPS).	2.98	Agree
6. I can use presentation software (e.g., Microsoft PowerPoint, WPS) on computers, laptops, and gadgets for classroom delivery.	2.92	Agree
7. I can use spreadsheets (e.g., Microsoft Excel, WPS) in computers/laptops/gadgets to record data, compute simple calculations, and represent data in tables and graphs.	2.70	Agree
8. I can use email (e.g., Hotmail, Outlook, Yahoo, Gmail, and MyEdumail) for communication.	2.99	Agree
9. I can use the Internet to search for information and resources.	3.24	Agree
10. I can collaborate with conferencing software (e.g., Yahoo, IM, MSN Messenger, ICQ, and Skype).	2.95	Agree
11. I can use a learning management system (e.g., Blackboard, IVLE, WebCT, Moodle, Google Classroom) to support learning.	2.79	Agree
Grand Mean	2.91	Agree

Note. Data analysis result of the research

It is noted that students have some technological grasp since they are less likely to need assistance when operating laptops or other gadgets, do not find difficulty in using new applications or software, and troubleshoot computer problems on their own. In addition, they revealed that they were not struggling to use a word processor, presentation software, spreadsheets, emails, conferencing software, Internet, and LMS to support their learning. This indicates that they find ease and comfort when using technological resources, leading them to like online learning.

It is noted that self-efficacy does not relate to the skills of individuals but rather to the judgments and beliefs about how one can utilize the skills they possess (Bandura, 1986). This could also pertain to the enjoyment and ease of use of certain materials or technologies (Esterhuyse et al., 2016).

Students' self-efficacy with technology plays a significant role in how well they can use technology and function in virtual worlds (Galicia, 2023). Research indicates that students exhibiting high levels of technological self-efficacy have reduced levels of digital anxiety and are more self-assured in their computer aptitude (Iraola-Real et al., 2023). Their performance on online learning platforms and their capacity for self-directed learning are positively impacted by

their confidence in using technology (Li et al., 2022). Additionally, it has been found that students' achievement in digital reading is positively impacted by their technology self-efficacy, and this link is mediated by the usage of ICT in the classroom (Yu & Hu, 2023). In general, students' performance and engagement in virtual learning environments are greatly influenced by their level of technology self-efficacy.

The willingness among higher education students to use online learning during the pandemic was determined. The results of this are shown in Table 6.

Table 6

Willingness to Use Online Learning

Statements	Mean	Description
1. Online learning could be an alternative to the modular approach to learning.	2.91	Agree
2. I find online learning very useful, especially during this pandemic.	2.91	Agree
3. Communicating and interacting with classmates and teachers (instructors/professors) would be much easier when computers/laptops/gadgets are connected to the Internet.	3.09	Agree
4. I find online learning much more effortless than the modular approach.	2.65	Agree
5. I intend to use online learning for my education when it will be implemented.	2.78	Agree
6. I have the necessary resources to indulge myself in online learning.	2.64	Agree
7. I am willing to spend more on Internet connectivity expenses to participate in online learning.	2.75	Agree
8. I am confident that I can participate satisfactorily in an online learning environment.	2.71	Agree
Grand Mean	2.81	Agree

Note. Data analysis result of the research

Students thought online learning could be much easier than a modular approach. Devices or equipment connected to the Internet are beneficial in delivering education and maybe a better tool for student and teacher communication. Students also affirmed that they plan to utilize it for educational purposes, are prepared to pay for Internet access costs, and feel comfortable participating in an online learning environment.

Students' preference for online learning over the modular approach is supported by the study of de Ocampo (2023), which discovered that self-motivation was the most challenging component; students thought the modular distance learning strategy was acceptable. This implies that students might feel more at ease and motivated in an online learning environment. In addition, students can learn whenever it is most convenient for them (Sialana & Soumokil, 2023). It allows watching and rewatching instructional videos as needed, which can improve learning results (Suwastini et al., 2023). By removing the need for costs like transportation and food, online learning can help students save money (Oryshchyn-Buzhdyhan, 2022). It also frees students from waiting on slower-moving classmates, allowing them to work at their own pace (Sazali et al., 2022). In addition to enhancing technical proficiency, online learning offers chances for peer engagement and collaboration (Kučerová, 2023).

In 2020, some educational institutions have also moved to another phase of online learning- an era when the world becomes more dependent on online learning, which can be attributed to rapid technological developments and the sudden occurrence of Covid-19 (Ray, 2020). However, despite the benefits online learning can bring to education, it is still important to outline how this learning strategy can best fit the students. As such, fitting students' learning preferences with the learning modality should be considered since most adult learners have conflicting preferences (Koper, 2015).

4.3. Correlation of willingness to embrace online learning among higher education students to key variables

Correlations between the key variables included in this study are shown in the following table. It is noted that there were correlations that existed between Internet connection source with year level, campus, and gadgets available; Internet speed with sex, year level, campus, gadgets available, and Internet connection source; learning modality preference with campus, gadgets available and Internet speed; and technology efficacy with campus, gadgets available, Internet connection source, Internet speed and learning modality preference.

Table 7

Pearson Correlation between Key Variables

Variable		1	2	3	4	5	6	7	8	9	10
1. Sex	Pearson's r	—									
	p-value	—									
2. Year Level	Pearson's r	0.082	—								
	p-value	0.005	—								
3. Course	Pearson's r	-0.237	-0.016	—							
	p-value	< .001	0.451	—							
4. Campus	Pearson's r	-0.377	0.102	0.348	—						
	p-value	< .001	< .001	< .001	—						
5. Gadgets Available	Pearson's r	-0.017	0.028	0.024	-0.034	—					
	p-value	0.56	0.197	0.274	0.119	—					
6. Internet Connection Source	Pearson's r	0.051	-0.051	0.025	-0.114	0.194	—				
	p-value	0.085	**0.018**	0.256	**< .001**	**< .001**	—				
7. Internet Speed	Pearson's r	-0.091	-0.061	-0.028	-0.05	0.048	0.166	—			
	p-value	**0.002**	**0.005**	0.197	**0.021**	**0.028**	**< .001**	—			
8. Learning Modality Preference	Pearson's r	0.031	-0.037	0.013	0.052	-0.055	-0.03	-0.071	—		
	p-value	0.289	0.088	0.54	**0.017**	**0.012**	0.163	**0.001**	—		
9. Technology Efficacy	Pearson's r	0.043	0.02	-0.022	-0.109	0.203	0.213	0.229	-0.142	—	
	p-value	0.142	0.36	0.317	**< .001**	**< .001**	**< .001**	**< .001**	**< .001**	—	
10. Willingness to Embrace E-Learn	Pearson's r	0.051	-0.004	-0.021	-0.055	0.164	0.16	0.226	-0.232	0.596	—
	p-value	0.086	0.857	0.34	**0.011**	**< .001**	**< .001**	**< .001**	**< .001**	**< .001**	—

Note. P-values < 0.5 are significant at 0.05 level. Data analysis result of the research

Meanwhile, willingness to embrace online learning as a learning strategy during this pandemic was significantly correlated with the campus where students were enrolled, the availability of gadgets, Internet connection sources, Internet speed, learning modality preference, and technology efficacy. Among these variables, the students' technology efficacy was seen to have the highest correlation value to their willingness to use online learning.

In a study by Ferdousi (2019), undergraduate students' self-efficacy and attitude toward digital technology significantly affected their intention to use digital technology in their academic learning. E-learning quality, self-efficacy, user satisfaction, performance expectancy, facilitating conditions, social influence, teacher characteristics, learning content, playfulness, perceived usefulness, perceived ease of use, computer self-efficacy, user attitudes, system quality, and previous e-learning experience are among the variables that affect students' intention to use e-learning (Marasinghe et al., 2023; Karyaningsih &Narmaditya, 2022).

Meanwhile, the advent of digital technology in educational institutions has improved the learning process because students' learning skills can further be developed when these technologies are utilized (Wong & Fong, 2014). Higher education institutions emphasize using digital technology to remain competitive and effective in learning (Ferdousi, 2019).

5. Conclusions & recommendations

The pandemic presented a global danger in many facets of people's lives. The educational system has also been tested and challenged to adapt new learning methodologies without sacrificing instruction quality. Findings revealed that students in the University extensively utilized Android or IOS phones and mobile data, which they may use if online learning is adopted. Students can use a moderate Internet connection to watch films or live streams and download various things from the Internet at a rapid pace. In this pandemic, they have also favored hybrid learning, a modular and online learning blend.

Furthermore, students demonstrated some level of technological understanding since they found it easy to use new technologies and various programs that may be used for online learning. They wanted to use online learning if the University implemented it. Students demonstrated a willingness to pay for Internet access and confidence in participating in an online learning environment. Students' technology efficacy was seen to have the highest correlation to their desire to use online learning, indicating that one's efficacy of using technologies contributes to their willingness to utilize online learning as a learning modality.

Online learning is very promising because it can be the easiest platform for educational institutions to use to deliver instruction in these difficult times; however, using it entails persistent obstacles and challenges among teachers, students, and even administration because it requires stable technology infrastructure for all users and implementers. As a result, higher education institutions must be flexible in using the numerous resources available to adopt the most effective learning plan that meets virtually all student demands. If online learning is used, students must be able to handle self-disciplined and self-directed active learning, and instructors must get additional professional development, particularly in using such a medium. It is also advised that online learning be pilot-tested before being widely employed.

This research has several limitations. Even though many students took part, the study was limited to one university in one nation. Future research should involve a more significant and varied sample of students from different backgrounds to improve the findings' validity and reliability. Additionally, using a more prominent and more representative sample of students, more research is required to examine the unsupported postulated links found in this study.

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NO CONFLICT OF INTEREST STATEMENT

All authors declare that they have no conflict of interest.

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