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Perceptions and self-efficacy in online learning: Do students' characteristics and access to technology matter?

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ABSTRACT

While online learning has become the delivery mode of choice to facilitate flexible or distance learning amid the COVID-19 pandemic, this alternative approach to instruction has challenged the entire educational system in the Philippines. Survey data from 2027 students from a private college were analyzed using nonparametric statistical tests to examine how perceptions and self-efficacy in online learning are affected by students' characteristics and access to technology. Findings suggest that, in general, college students have moderate to high perceptions and self-efficacy when it comes to online learning. When students' characteristics were compared, gender, academic track, and prior online learning experience showed significant differences in the two scales. Year level and the number of units enrolled in by students did not have any significant effect. Factors related to technology access, namely, device ownership, device sharing, Internet connectivity, and type of subscription, were also investigated. Both Internet connectivity and the type of subscription were significant factors that impact how learners view online learning and how competent they are in accomplishing online tasks. When online learning perceptions and online learning self-efficacy were correlated, highly significant positive associations among the subscales were obtained.

Keywords: Online Learning Perceptions, Online Learning Self-Efficacy, Students' Characteristics, Technology Access

INTRODUCTION

Online learning has consistently gained traction in higher education over the years (Nortvig et al., 2018). The COVID-19 pandemic, however, has accelerated the shift to online education by colleges and universities in an emergency attempt to ensure the continuity of learning (Almazova et al., 2020; Bozkurt & Sharma, 2020; Hafeez et al., 2022; Iglesias-Pradas et al., 2021; Naji et al., 2020). In the Philippines, the Commission on Higher Education (CHED) recommended that higher education institutions (HEIs) apply flexible delivery means to limit further disruptions in the academic calendar (Pelmin, 2020). While flexible learning does not necessarily require Internet connectivity, several HEIs in the country have opted to employ online learning instructional formats to address learners' educational needs (Joaquin et al., 2020).

According to Ali (2020), online learning is a suitable approach to help students carry on with their academics without exposing them to COVID-19. Online sessions, either synchronous or asynchronous, will take the place of conventional face-to-face (F2F) classes to the point of making physical presence dispensable (Ní Shé et al., 2019). As a novel and abrupt experience for many of the 3.5 million Filipino tertiary students (Joaquin et al., 2020), examining students' perceptions of online learning and online learning self-efficacy is essential.

Online learning perceptions describe learners' attitudes toward computers, which affect how they utilize web-based resources, whether they find such materials worthwhile, and how the process benefits their learning (Wei & Chou, 2020). There is also a link between students' perceptions and their level of motivation as a function of engagement, which may either positively or negatively affect the achievement of desired outcomes (Zapata-Cuervo et al., 2021). Several studies suggest an association between human variables namely, age,

gender, learning style, and personality traits, and factors related to online learning (Borun et al., 2010; Bhagat et al., 2019; Wongwatkit et al., 2020) such as acceptance of e-learning (Tarhini et al., 2014), student satisfaction (Harvey et al., 2017) and online learning readiness (Fearnley & Malay, 2021; Örs, 2018). In the study of Daniels, et al. (2019), female students rated the implementation of online learning more favorably than male students; the authors attributed this significant difference to respondents' self-reports attesting to male students' proclivity toward online gaming when provided with Internet access and female students' greater effort in doing online coursework. On the contrary, male students of a Malaysian public university reported more positive perceptions of online learning regarding teacher performance, content, and infrastructure (Eng et al., 2015). Related research was also found to link students' perceptions with their prior online learning experiences, specifically concerning engagement strategies practiced in this environment (Martin & Bolliger, 2018). In addition to gender differences and previous exposure to online learning, other factors that have been reported to influence online learning perceptions positively include open communication between teachers and students (Aydin et al., 2013) and their peers (Kasch et al., 2021). On the other hand, another study found no significant association between online learning perceptions and academic performance (Wei & Chou, 2020).

Online learning self-efficacy refers to one's assessment of personal abilities when completing the tasks required for online learning (Zimmerman & Kulikowich, 2016). If learners feel they are incapable of achieving desired outcomes, they will not attempt to take active steps to improve (Shen et al., 2013). However, self-efficacious students view complex tasks as opportunities to enhance their skills, leading to better learning, performance, and satisfaction (Alqurashi, 2016). Many studies on self-efficacy emphasize the technology aspect of self-confidence in using a computer, an LMS, or the Internet (Alqurashi, 2016; Shen et al., 2013; Zimmerman & Kulikowich, 2016), but fail to include two other relevant areas: learning and interaction. Prior research on differences in online learning self-efficacy regarding gender, age, and previous online experience had inconclusive findings. While some studies reported female students to have higher computer self-efficacy than their male counterparts (Fletcher, 2005; Shen et al., 2013), others found no significant difference between the two groups concerning computer/Internet self-efficacy and online communication self-efficacy (Fearnley & Malay, 2021; Hung et al., 2010). Past online learning experience was observed to be associated with more positive perceptions of self-effectiveness, higher levels of motivation, and improved learning outcomes in succeeding online courses (Hachey et al., 2015; Haverila, 2011; Wang et al., 2013), but it was reported as a moderating variable in terms of students' persistence in online courses (Lakhal & Khechine, 2021). In another study, the self-efficacy beliefs of graduate and undergraduate students were reported as not statistically different despite the latter having more experience with online courses (Artino & Stephens, 2009). Existing literature has also established that self-efficacy in online learning is connected to academic success (Hodges, 2008; Shen et al., 2013; Zimmerman & Kulikowich, 2016), satisfaction in online courses (Aldahhak et al., 2021), and perceived learning (Alqurashi, 2019).

While online learning has the potential to mitigate the problems of the new normal, many private and public tertiary institutions were unprepared for the demands of this unconventional learning system (Garad et al., 2021; Toquero, 2021). As in other developing countries, students from lower-income households have limited or no access to online classes due to digital disparities and a lack of access to modern technologies (Azionya & Nhedzi, 2021). It was estimated that about 45% of Filipino citizens lack access to the Internet (Joaquin et al., 2020), posing significant challenges to faculty and students. On the other hand, some learners may derive more benefits from online learning as a function of their own characteristics.

According to Johnson (2011), understanding the attributes that students who participate in online learning possess is fundamental to establishing a link between these factors and attaining learning outcomes. This research undertaking aims to contribute to the existing body of knowledge in online learning by answering the main research question: How do college students' characteristics and access to technology affect their online learning perceptions and online learning self-efficacy?

A thoughtful appreciation of the factors that impact learners' attitudes and actions in an online learning environment is an increasingly important element in enhancing student experiences (Sivo & K 2018). Thus, the following sub-questions were formulated: (1) What are college students' online learning and online learning self-efficacy skills? (2) How do students' characteristics, namely, gender, year level, number of units enrolled in, academic track, and prior experience with online learning, affect their online learning perceptions and online learning self-efficacy? (3) How do factors related to technology access, such as device ownership, device sharing, type of subscription, and Internet connectivity, affect their online learning perceptions and online learning self-efficacy? (4) What is the relationship between students' online learning perceptions and their online learning self-efficacy?

METHODS OF RESEARCH

Research Design

This cross-sectional survey examined how student characteristics and technology access affect online learning perceptions and self-efficacy. As a descriptive type of research, its goal is to describe the current state of the phenomenon without manipulation on the part of the researcher (Mertler, 2016). In light of existing limitations during the pandemic, using an online survey was deemed the most feasible means to collect data.

Sampling and Participants

Convenience sampling, a non-probability sampling technique, was employed to recruit the survey respondents. The study sample included college students enrolled in online classes at a private college in Manila, Philippines, during the second term of SY 2020-2021 (i.e., January to April 2021). Of the 8,447 confirmed enrollees within that period, a total of 2,144 responses were collected. Of these, only 2,027 responses were included after removing duplications, erroneous entries, invalid responses, and those that ticked 'no' in the informed consent item. Approximately 24% (2,027 out of 8,447) of the population comprised the study sample.

Instrumentation

There were two research instruments utilized in this study: (1) the 23-item Online Learning Perceptions Scale (OLPS) by Wei and Chou (2020), and (2) the 22-item Online Learning Self-Efficacy Scale (OLSES) by Zimmerman & Kulikowich (2016).

In this study, online learning perceptions are measured using five dimensions, namely, accessibility (4 items), interactivity (6 items), adaptability (4 items), knowledge acquisition (5 items), and ease of loading (4 items). The response options for OLPS include a 5-point Likert-type scale in the form: I completely disagree (1), I disagree (2), I am undecided (3), I agree (4), and I completely agree (5). Accessibility refers to students' views of having limitless and unrestricted access to online resources, while interactivity describes how learners perceive their interactions with teachers and classmates, such as exchanging ideas and asking questions. Adaptability examines students' opinions of their ability to regulate their learning (e.g., deciding where and when to learn, controlling their learning, which manifests as repeating or skipping some learning content). Students' opinions of their capacity to learn the course

content to broaden their horizons are part of knowledge acquisition. Ease of loading elicits students' views of decreased learning stress or burden in online learning settings. The reliability of the 23-item scale was .90 ($N = 356$), and the Cronbach alpha coefficients of each factor were recorded as follows: accessibility, .88; interactivity, .79; adaptability, .86; knowledge acquisition, .80; and ease of loading, .80.

On the other hand, online learning self-efficacy was assessed using the three subscales of the OLSES: learning in the online environment (10 items), time management (5 items), and technology use (7 items). The OLSES was originally constructed using a 6-point Likert scale, but a 5-point scale similar to the work of Yavuzalp and Bahcivan (2020) was employed for uniformity and practicality. Cronbach's alpha was also used as a measure of internal consistency with the following values: .890 ($N = 325$), .855 ($N = 328$), and .843 ($N = 331$) for learning in the online environment, time management, and technology use, respectively.

Students' characteristics (i.e., sex, year level, number of units enrolled in, prior experience with online learning, and academic track) and factors related to technology access (i.e., device ownership, Internet connectivity, and type of subscription) were also collected. Relevant information about the nature and purpose of the study, including informed consent and respondents' rights and options, was also included in the survey.

Data Collection

An online version of the survey was created in Google Forms and disseminated through the college's online learning platform for five weeks (between the 10th and 14th week of the academic term). Additionally, an animated video with closed captions explaining the purpose of the study and the rights of the respondents was incorporated into the form.

While participation in the study was voluntary, survey respondents were allowed to enter a raffle draw for supplies useful for online learning. This project underwent technical and ethical review as part of the funding selection process.

Data Analysis

Descriptive statistics about the independent variables (i.e., student characteristics and access to technology) and their associated components were computed. Means were interpreted as 'very low' (1.00–1.80), 'low' (1.81–2.60), 'moderate' (2.61–3.40), 'high' (3.41–4.20), and 'very high' (4.21–5.00) based on the work of Fearnley and Malay (2021).

The internal consistency of the two scales and their sub-components for the dependent variables was obtained by calculating Cronbach's alpha (CA). For the OLPS, the overall CA was .948, with its component values ranging from .730 to .869. On the other hand, the OLSES had an overall CA of .951, and its subscales generated values between .736 and .858. According to Fornell and Larcker (1981), as cited in Fearnley & Amora (2020), values equivalent to 0.70 or higher are within the range of acceptable values.

A Shapiro-Wilk test revealed that the study data do not follow a normal distribution. Thus, nonparametric statistical analyses were performed. To test whether online learning perceptions and online learning self-efficacy vary among respondents concerning factors related to student characteristics and technology access, Mann-Whitney U and Kruskal-Wallis H tests were employed. Effect sizes (ES) were also obtained to determine how strong the relationships are between variables and enable more sound comparisons with future studies (Aarts et al., 2014). In addition to the tests for global effects, post hoc analyses were performed whenever applicable. When interpreting ES, the categories recommended by Rea and Parker (1992), as cited in Kotrlik et al. (2011) were used: negligible ($0.00 < 0.01$), weak ($0.01 < 0.04$), moderate ($0.04 < 0.16$), relatively strong ($0.16 < 0.36$), strong ($0.36 < 0.64$), and very strong ($0.64 < 1.00$). A correlation analysis was conducted to determine the relationship between OLP

and OLSE. All statistical tests pertinent to this investigation were performed using SPSS version 23.

RESULTS AND DISCUSSION

Results

Overall, OLP and OLSE

Overall, the respondents have moderate to high OLP and OLSE. Table 1 shows that of the five OLPS dimensions, the lowest mean was recorded for ease of loading, and the highest mean score was obtained for the accessibility subscale. This suggests that students do not perceive the online learning environment as stress-free. On the other hand, learners expressed that they have little difficulty retrieving and exchanging online learning resources. The respondents reported the greatest confidence in using technology for online learning self-efficacy.

Table 1 Descriptive Statistics and Interpretation of OLPS and OLSES

Scales	Mean	SD	Interpretation
OLPS			
Accessibility	3.741	.791	High
Interactivity	3.013	.941	Moderate
Adaptability	3.592	.898	High
Knowledge	3.198	.937	Moderate
Ease of loading	2.799	1.067	Moderate
OLSES			
Time management	3.286	.917	Moderate
Technology	3.799	.770	High
Environment	3.483	.777	High

Student Characteristics

Gender. Highly significant differences in all five OLPS dimensions were obtained concerning gender, such that male students perceive online learning more positively than their female counterparts (Table 2). With it comes to OLSES, self-males' self-efficacy in terms of time management higher than in females. A Mann-Whitney test showed that this difference was statistically significant, $U(N_{\text{males}} = 825, N_{\text{females}} = 1,202) = 469,173.000$, $z = 12.063$, $p = .039$. This means that male and female students are significantly different from each other when spending their time in online learning, with males recording a higher mean.

Table 2 Descriptive Statistics and Mann-Whitney U Test on Gender

Scales	Male (n = 825)		Female (n = 1202)		Z value	p	ES (η^2)
	Mean	SD	Mean	SD			
OLPS							
Accessibility	3.800	.804	3.700	.782	-3.032	.002**	.004
Interactivity	3.140	.958	2.926	.920	-4.913	.000**	.012
Adaptability	3.665	.896	3.542	.897	-3.056	.002**	.005
Knowledge	3.300	.964	3.128	.912	-4.114	.000**	.008
Ease of loading	2.982	1.079	2.674	1.041	-6.357	.000**	.020
OLSES							
Time management	3.334	.929	3.250	.908	-2.063	.039 *	.002
Technology	3.804	.765	3.796	.774	-0.023	.981	.000
Environment	3.525	.818	3.455	.746	-1.962	.050	.002

* $p < .05$, significant; ** $p < .01$, highly significant

Year Level. Regarding year level, no significant difference was observed for both scales (Table 3). This means that freshmen, sophomores, juniors, seniors, and other students have comparable perceptions and self-efficacy in online learning.

Table 3 Descriptive Statistics and Kruskal-Wallis H Test on Year Level

Scales	First (n=524) Mean (SD)	Second (n=569) Mean (SD)	Third (n=537) Mean (SD)	Fourth (n=117) Mean (SD)	Others (n=180) Mean (SD)	χ^2	p	ES (ϵ^2)
OLPS								
Accessibility	3.739 (.821)	3.721 (.769)	3.748 (.786)	3.784 (.754)	3.763 (.795)	1.779	.776	.001
Interactivity	3.008 (.969)	3.007 (.939)	2.974 (.936)	3.071 (.930)	3.130 (.872)	4.980	.289	.002
Adaptability	3.604 (.932)	3.575 (.873)	3.578 (.914)	3.626 (.885)	3.629 (.827)	1.519	.823	.001
Knowledge	3.207 (.954)	3.171 (.943)	3.179 (.931)	3.232 (.955)	3.280 (.866)	2.895	.576	.001
Ease of loading	2.799 (1.040)	2.777 (1.070)	2.786 (1.105)	2.827 (1.124)	2.886 (1.004)	2.088	.720	.001
OLSES								
Time management	3.318 (.906)	3.266 (.926)	3.243 (.937)	3.265 (.960)	3.374 (.837)	4.298	.367	.002
Technology	3.822 (.758)	3.767 (.765)	3.785 (.798)	3.816 (.808)	3.852 (.716)	1.956	.744	.001
Environment	3.482 (.776)	3.470 (.781)	3.473 (.795)	3.442 (.778)	3.588 (.710)	3.826	.430	.002

Number of Units. On average, the students were enrolled in 16.42 units during the academic term. Table 4 shows that students who take fewer units (i.e., nine and below) reported more positive perceptions except in the interactivity subscale. A similar pattern is observed in two dimensions of the OLSES namely, technology and environment. Nevertheless, this factor did significantly affect OLP and OLSE.

Table 4 Descriptive Statistics and Kruskal-Wallis H Test on Number of Units

Scales	9 units or less (n=306) Mean (SD)	10-18 units (n=969) Mean (SD)	19 ≥ units (n= 52) Mean (SD)	χ^2	p	ES (ϵ^2)
OLPS						
Accessibility	3.778 (.796)	3.744 (.773)	3.722 (.812)	.976	.614	.000
Interactivity	3.019 (.919)	3.021 (.943)	3.000 (.950)	.314	.855	.000
Adaptability	3.626 (.854)	3.579 (.904)	3.596 (.909)	.365	.833	.000
Knowledge	3.207 (.919)	3.197 (.942)	3.194 (.939)	.080	.961	.000
Ease of loading	2.835 (1.056)	2.795 (1.095)	2.790 (1.037)	.433	.806	.000
OLSES						
Time management	3.273 (.881)	3.288 (.932)	3.289 (.914)	.127	.938	.000
Technology	3.834 (.736)	3.807 (.777)	3.775 (.774)	1.815	.404	.001
Environment	3.505 (.747)	3.501 (.771)	3.451 (.796)	2.075	.354	.001

Academic Track. Regarding academic track (Table 5), most respondents belong to DAA (882 or 43.5%). Tests of Kruskal-Wallis H showed highly significant differences in all subscales, with DES (i.e., the group with deaf learners) recording the highest mean scores. Post hoc analysis confirmed that DES significantly differs on all other academic tracks in all subscales except technology. Specifically, pairwise tests in the technology dimension revealed that DES differed substantially from DAA and MIT but not from DAG and CHT. Effect sizes were found to be within negligible to moderate limits.

Table 5 Descriptive Statistics and Kruskal-Wallis H Test on Academic Track

Scales	DAA (n=882)	MIT (n=527)	DAG (n=134)	CHT (n=361)	DES (n=123)	χ^2	p	ES (ϵ^2)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)			
OLPS								
Accessibility	3.605 (.796)	3.840 (.777)	3.733 (.788)	3.854 (.722)	3.965 (.851)	57.326	.000**	.028
Interactivity	2.752 (.869)	3.095 (.891)	2.935 (.941)	3.231 (.922)	3.978 (.876)	216.581	.000**	.107
Adaptability	3.443 (.904)	3.658 (.882)	3.565 (.899)	3.735 (.846)	3.994 (.869)	70.063	.000**	.035
Knowledge	2.986 (.893)	3.310 (.896)	3.112 (.991)	3.318 (.925)	3.976 (.858)	162.143	.000**	.080
Ease of loading	2.603 (1.033)	2.950 (1.045)	2.582 (1.071)	2.8788 (1.065)	3.559 (.941)	111.074	.000**	.055
OLSES								
Time management	3.100 (.894)	3.419 (.881)	3.210 (.968)	3.3446 (.917)	3.953 (.751)	117.997	.000**	.058
Technology	3.738 (.738)	3.853 (.743)	3.848 (.812)	3.7998 (.864)	3.949 (.737)	16.983	.000**	.008
Environment	3.390 (.729)	3.547 (.787)	3.522 (.820)	3.4801 (.824)	3.847 (.746)	48.021	.000**	.024

**p < .01, highly significant

Prior Online Learning Experience. More than half (1,035 or 51.1%) of the students have experienced two terms of online learning. As reflected in Table 6, students with no online learning experience have more agreeable views. They believe themselves to be highly efficacious than those with one or two terms of online learning experience. A test of Kruskal-Wallis H indicated that past online experience significantly affects students' perceptions in only one dimension - knowledge, $\chi^2(2) = 8.594$, $p = .014$. Pairwise comparisons revealed that the two-terms group differed significantly from the one-term group. In terms of OLSE, significant differences were detected in all subscales: time management $\chi^2(2) = 7.398$, $p = .025$, technology $\chi^2(2) = 6.364$, $p = .042$, and environment $\chi^2(2) = 10.802$, $p = .005$. After post hoc analysis, the two-term and one-term groups were significantly different in only two subscales, namely time management and environment.

Table 6 Descriptive Statistics and Kruskal-Wallis H Test on Prior Online Learning Experience

Scales	No experience (n=79)		One term (n=93)		Two terms (n=1,035)		χ^2	p	ES (ϵ^2)
	Mean	SD	Mean	SD	Mean	SD			
OLPS									
Accessibility	3.790	.892	3.734	.785	3.743	.789	1.641	.440	.001
Interactivity	3.076	.975	2.981	.941	3.036	.940	2.270	.321	.001
Adaptability	3.665	.963	3.558	.894	3.617	.897	3.806	.149	.002
Knowledge	3.337	.982	3.138	.934	3.234	.933	8.594	.014*	.004
Ease of loading	2.842	1.110	2.764	1.060	2.826	1.071	1.472	.479	.001
OLSES									
Time management	3.395	.759	3.225	.915	3.331	.928	7.398	.025*	.004
Technology	3.953	.691	3.756	.783	3.825	.762	6.364	.042*	.003
Environment	3.568	.837	3.423	.766	3.530	.779	10.802	.005**	.005

*p < .05, significant; **p < .01, highly significant

Access to Technology

Device Ownership. The primary device used by more than 75% (1,555 out of 2027) of the respondents is a laptop (Table 7). All respondents appear to have an online learning device, which is why they were able to access and complete the online survey. The group who reported using more than one device expressed the most positive views on the accessibility scale. Likewise, they recorded the highest means in all OLSES subscales. The smartphone cohort obtained the highest means in three dimensions of the OLPS, namely, interactivity, knowledge, and ease of loading. The desktop group scored highest in the adaptability subscale. Despite these, significant differences were detected in only two subscales: OLPS-ease of loading, $\chi^2(4) = 13.086$, $p = .011$ and OLSES-technology, $\chi^2(4) = 16.093$, $p = .003$.

Table 7 Descriptive Statistics and Kruskal-Wallis H Test on Device Ownership

Scales	Desktop (n=257)	Laptop (n=1,555)	Smart- phone (n=138)	Tablet/ iPad (n=68)	>1 device (n=9)	χ^2	p	ES (ϵ^2)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)			
OLPS								
Accessibility	3.764 (.755)	3.747 (.781)	3.741 (.947)	3.485 (.813)	3.944 (.447)	8.890	.064	.004
Interactivity	3.069 (.915)	2.997 (.930)	3.130 (1.104)	2.926 (.991)	3.019 (.467)	3.951	.413	.002
Adaptability	3.647 (.893)	3.598 (.886)	3.569 (1.036)	3.346 (.912)	3.333 (.545)	7.461	.113	.004
Knowledge	3.212 (.920)	3.194 (.925)	3.294 (1.110)	3.029 (.908)	3.133 (.894)	4.311	.366	.002
Ease of loading	2.962 (1.093)	2.764 (1.054)	2.969 (1.199)	2.680 (.968)	2.417 (.559)	13.086	.011*	.006
OLSES								
Time management	3.261 (.908)	3.305 (.903)	3.136 (1.079)	3.232 (.925)	3.400 (.877)	3.710	.447	.002
Technology	3.731 (.743)	3.840 (.741)	3.527 (1.013)	3.672 (.828)	3.762 (.773)	16.093	.003*	.008
Environment	3.488 (.740)	3.505 (.759)	3.271 (.973)	3.387 (.819)	3.644 (.783)	8.180	.085	.004

* $p < .05$, significant

Device Sharing. About 70.7% (1,433 out of 2,027) of students responded that they do not share their devices with other family members (Table 8). When this variable was considered, a significant difference was noted only in the interactivity subscale of the OLPS, $U(N_{no} = 1,433, N_{yes} = 594) = 400,988.500$, $z = 12.0551$, $p = .040$. Respondents who replied 'no' device sharing recorded higher self-efficacy beliefs in all three OLSES dimensions. Tests of Mann-Whitney U on this variable revealed significant differences in time management, technology, and environment.

Table 8 Descriptive Statistics and Mann-Whitney U Test on Device Sharing

Scales	No (n=1,433)		Yes (n=594)		Z value	p	ES (η2)
	Mean	SD	Mean	SD			
OLPS							
Accessibility	3.759	.780	3.698	.814	-1.700	.089	.001
Interactivity	2.986	.925	3.078	.979	-2.055	.040*	.002
Adaptability	3.610	.893	3.548	.911	-1.454	.146	.001
Knowledge	3.196	.920	3.201	.978	-0.264	.792	.000
Ease of loading	2.793	1.079	2.812	1.040	-0.405	.685	0.000
OLSES							
Time management	3.322	.893	3.197	.969	-2.388	.017*	.003
Technology	3.862	.731	3.646	.838	-5.173	.000**	.013
Environment	3.539	.746	3.348	.832	-4.686	.000**	.011

*p < .05, significant; **p < .01, highly significant

Internet Connectivity. The majority (1,062 or 52.4%) of respondents described their Internet connectivity as stable and steady (Table 9). The cohort with weak and unreliable Internet obtained the lowest mean responses across all dimensions of the OLPS and OLSES. In contrast, the group with strong and reliable connectivity recorded the highest mean responses. Findings from this study suggest that Internet connectivity significantly affects all subscales of OLPS and OLSES. A Kruskal-Wallis H test showed that OLPS-accessibility, for instance, substantially influences how learners perceive their online learning experience, $\chi^2(2) = 39.236$, $p = .000$. Post hoc tests revealed that all three groups are significantly different from each other in all subscales. Although moderate in strength, the largest effect size was recorded for OLSES-environment.

Table 9 Descriptive Statistics and Kruskal-Wallis H Test of Internet Connectivity

Scales	Weak and unpredictable (n=789)	Stable and steady (n=1062)	Strong and reliable (n=176)	χ^2	p	ES (ϵ^2)
	Mean (SD)	Mean (SD)	Mean (SD)			
OLPS						
Accessibility	3.652 (.811)	3.760 (.766)	4.020 (.774)	39.236	.000**	.019
Interactivity	2.901 (.942)	3.045 (.905)	3.326 (1.069)	30.541	.000**	.015
Adaptability	3.493 (.913)	3.606 (.879)	3.956 (.853)	43.030	.000**	.021
Knowledge	3.063 (.965)	3.237 (.893)	3.565 (.957)	44.540	.000**	.022
Ease of loading	2.669 (1.061)	2.809 (1.044)	3.320 (1.079)	51.655	.000**	.025
OLSES						
Time management	3.084 (.928)	3.361 (.863)	3.736 (.965)	83.591	.000**	.041
Technology	3.624 (.823)	3.863 (.709)	4.198 (.664)	92.587	.000**	.046
Environment	3.275 (.805)	3.556 (.711)	3.978 (.729)	135.783	.000**	.067

**p < .01, highly significant

Type of Subscription. Table 10 shows the distribution of respondents by type of Internet subscription. Except for adaptability, the prepaid with data cap group expressed the most positive views on OLPS. On the other hand, respondents from the postpaid without data cap cohort reported the highest mean responses in OLSES; they can manage their time more efficiently, navigate the online learning system more effectively, and have less anxiety when

learning without instructors and peers being present in the same environment. The type of subscription was found to have a significant effect on all subscales except time management. Specifically, a Kruskal-Wallis H test revealed that this factor has a very significant impact on the following: OLPS-knowledge, $\chi^2(2) = 17.879$, $p = .000$; OLSES-technology, $\chi^2(2) = 34.909$, $p = .000$; and OLSES-environment, $\chi^2(2) = 28.540$, $p = .000$.

Table 10 Descriptive Statistics and Kruskal-Wallis H Test of Type of Subscription

Scales	Prepaid with data cap (n=392)		Postpaid with data cap (n=395)		Postpaid without data cap (n=1240)		χ^2	p	ES (ϵ^2)
	Mean	SD	Mean	SD	Mean	SD			
OLPS									
Accessibility	3.774	.831	3.668	.768	3.754	.784	6.580	.037 *	.003
Interactivity	3.186	.995	2.976	.959	2.970	.913	15.070	.001 *	.007
Adaptability	3.618	.951	3.483	.861	3.619	.891	9.235	.010 *	.005
Knowledge	3.354	1.004	3.119	.906	3.173	.920	17.879	.000**	.009
Ease of loading	2.910	1.124	2.654	1.023	2.810	1.059	11.258	.004 *	.006
OLSES									
Time management	3.274	.996	3.214	.889	3.312	.899	3.646	.162	.002
Technology	3.669	.877	3.669	.739	3.881	.732	34.909	.000**	.017
Environment	3.386	.857	3.356	.763	3.555	.746	28.540	.000**	.014

* $p < .05$, significant; ** $p < .01$, highly significant

Relationship between OLPS and OLSES

Correlation analysis revealed highly significant associations among all subscales of OLPS and OLSES (Table 11). This suggests that students with more positive OLP are likely to demonstrate higher OLSE. The strongest correlations were observed between accessibility and environment ($r_s = .567$; $p < .01$) and knowledge and environment ($r_s = .567$; $p < .01$). This means that at a low p-value ($p < .01$), the association between the variables are strong 99.99% of the time at r values of .774 and .843, respectively. The weakest association was found between ease of loading and technology ($r_s = .348$; $p < .01$).

Table 11 Correlation Statistics between OLPS and OLSES

Scales	OLPS					OLSES		
	Accessib ility	Interacti vity	Adaptabi lity	Knowle dge	Ease of loadi ng	Time manage ment	Technol ogy	Environ ment
OLPS								
Accessib ility	---							
Interacti vity	.625**	---						
Adaptabi lity	.620**	.605**	---					
Knowled ge	.686**	.774**	.720**	---				
Ease of loading	.529**	.587**	.667**	.694**	---			
OLSES								
Time manage ment	.465**	.485**	.557**	.556**	.495*	---		
Technol ogy	.522**	.388**	.504**	.451**	.348*	.669**	---	

Environ	.567**	.505**	.554**	.567**	.455*	.721**	.843**	---
Int					*			

**Correlation is significant at the .01 level (2-tailed).

Discussion

Overall, findings from this study suggest that college students have moderate to high perceptions and self-efficacy in online learning, with mean responses ranging from 2.799 to 3.799 across all dimensions. These positive self-reports among respondents may be attributed to the mandated utilization of the college's LMS. In OLPS, the highest mean responses were recorded for accessibility and adaptability. For OLSE, the respondents reported the greatest confidence in using technology. Students feel highly self-efficacious when navigating the online learning platform, which may be attributed partly to its system quality. System quality positively affects users' attitudes such that an online learning system with desirable characteristics will be perceived as easy to use (Fearnley & Amora, 2020).

Student characteristics relate to learners' attributes that may influence how they view online learning and self-assess their abilities to perform in this environment. Examining these factors is worthwhile because different approaches to instruction (e.g., online learning) may not appeal to all learners (Borun et al., 2010). The respondents were compared in terms of gender, year level, number of units enrolled, academic track, and prior online learning experience. Neither the year level nor the number of units showed any significant difference. These results reinforce the findings of Artino and Stephens (2009), that detected no significant difference between undergraduate and graduate students concerning self-efficacy for learning and performance as a function of motivational beliefs. Furthermore, students enrolled in 9 units or fewer reported low interactivity in OLPS. This result is anticipated because students enrolled in fewer courses do not have as many opportunities to interact with their instructors and peers as those who take more online courses.

On the other hand, many studies reported equivocal findings when gender differences were examined against online learning behaviors and experiences (Ching & Hsu, 2015). Results from this investigation support earlier findings that found males to perceive online learning more favorably than females (Ashong & Commander, 2012). For OLSES, the study data only partially confirm the findings of Yukselturk and Bulut (2009) on gender differences in this scale. The academic track of respondents was found to be a strong determinant of differences in perceptions and self-efficacy in online learning. For deaf learners, the use of sign language leads to greater interactions, thus affecting OLP and OLSE more favorably. A more recent investigation involving first-year students from the same college found significant differences in computer/Internet self-efficacy and online communication self-efficacy among student groups pursuing different academic programs. However, no gender differences were noted (Fearnley & Malay, 2021).

Respondents with no online experience have more agreeable views and believe themselves to be highly efficacious than their counterparts who have experienced one or two terms of online learning. While this finding does not seem to conform to what is logically expected, it is likely that the lack of online experience among the respondents did not allow for an accurate self-assessment of online learning and its associated self-efficacy beliefs. According to Muilenburg and Berge (2005), this might be because students perceive fewer hurdles before enrolling in any online classes. It is worth noting that prior experience with online learning is positively linked to online learning readiness (Suhandiah et al., 2022), which can effectively predict self-efficacy in an online learning environment (Fearnley & Malay, 2021).

Technology use is the hallmark of online learning. In an online setting, several affordances are required to promote successful learning. This study examined the effect of device ownership, device sharing, Internet connectivity, and type of subscription on OLPS and OLSES. Device ownership among the respondents, where 89% of the students own either a desktop or a laptop computer, clearly differs from the reported one-in-five computer ownership among medical students in the investigation conducted by Baticulon et al. (2021). Expectedly, the group who reported using more than one device for online learning expressed the most optimistic views about accessibility and all three OLSES subscales. This is hardly surprising because students with more than one device have more opportunities to access online learning materials. A noteworthy revelation from this study is that smartphone users reported more positive perceptions of interacting with instructors and peers, acquiring knowledge via online means, and feeling stressed about online learning. According to Al-Emran et al., (2016), mobile devices like smartphones and other similar handheld devices can improve student learning because they expand classroom learning and support learners with disabilities.

The lack of a working and reliable device for online learning has been identified as an obstacle in the learning process (Gonçalves et al., 2020). This factor is worth examining in the context of the Philippines, where the acquisition of a suitable device may be costly and beyond the reach of families earning average incomes (Joaquin et al., 2020; Malindog-Uy, 2020). A significant difference was noted only in the interactivity subscale of the OLPS, suggesting that learners who replied 'yes' to device sharing take advantage of communicating with their instructors and peers when they have their devices on hand.

Findings from this study suggest that Internet connectivity significantly affects both **online learning perceptions and online learning self-efficacy** skills. In the Philippines, Internet services are sluggish and extremely costly compared to other nations in the region (Baticulon et al., 2021; Malindog-Uy, 2020; Wenceslao & Felisa, 2021). Learners with strong and reliable connectivity have more positive views and less anxiety when it comes to learning in an online setting. Similarly, highly positive online learning perceptions were expressed by respondents from the group with limited prepaid subscriptions. One possible explanation could be that these learners tend to optimize their Internet access (i.e., accessibility). This also translates to maximizing their online interactions (i.e., interactivity) and looking up as many online resources (i.e., knowledge) as they can because it reduces their online learning burden (i.e., ease of loading). Meanwhile, the group with unlimited Internet access was found to have the highest online learning self-efficacy. When Internet accessibility is not an impediment, learners have ample opportunities to interact with the LMS and enhance their confidence towards its use.

Barriers to effective online learning, such as a lack of suitable devices and poor Internet connectivity, widen the inequalities among learners (Ferri et al., 2020; Garad et al., 2021), decreasing the inclusive capacity of college classrooms. These technological challenges are likewise experienced by countries like Ghana, Malaysia (Ferri et al., 2020), South Africa (Azionya & Nhedzi, 2021), and Indonesia (Garad et al., 2021).

Finally, students' satisfaction in the online learning environment is influenced by their level of self-efficacy (Bates & Khasawneh, 2007; Seiver & Troja, 2014; Shen et al., 2013). Correlation analysis showed highly significant positive associations between the subscales of OLPS and OLSES. This means that students with more positive views about online learning are more likely to possess greater confidence in their abilities to perform their tasks when engaged in online learning. Negative perceptions and low self-efficacy can result in undesirable learning outcomes in an online setting, such as reduced motivation and perseverance, and diminished

satisfaction and perceived learning (Kauffman, 2015; Tsai et al., 2020). As such, it is imperative to understand how students perceive their online experiences in the new normal and how much confidence they have in their abilities to become successful online learners.

CONCLUSIONS

This research explored how students' characteristics and access to technology affect their perceptions and self-efficacy when COVID-19 has made online learning a necessity instead of an option among learners who desire to continue with their education amid challenging circumstances. Findings from this study suggest that college students have moderate to high online learning perceptions and self-efficacy. When students' characteristics were compared, only their academic track and prior online learning experience showed significant differences in the OLPS and OLSES dimensions. In terms of technology access, both connectivity and the type of Internet subscription were significant factors that impact how learners view online learning and how competent they believe themselves to be in accomplishing online requirements. Finally, correlation analysis confirms that online learning perceptions strongly correlate with online learning self-efficacy.

While faculty have little to no influence on students' choice of academic track, their pedagogical decisions influence how the students will access the learning materials from their online devices and how many synchronous sessions will be conducted for the duration of the course. They can assist students in improving their online learning self-efficacy by taking active steps to foster online engagement. Colleges and universities may look into optimizing asynchronous delivery modes and exploring Internet-independent means to carry out distance learning initiatives (e.g., correspondence courses), both of which may relieve students and parents of the financial burden related to the above-mentioned technological challenges. Partnerships with private organizations (i.e., educational technology providers) may be fortified to improve access to technology. These strategies can aid in developing more agreeable views and promoting positive learning outcomes among online learners.

As a web-based survey, findings from this investigation have limited generalizability due to under-coverage and self-selection. If data are gathered online, only those with an Internet connection can respond to the survey, and the researcher does not choose the respondents. As such, the results may not apply to a subset of the target population without access to the Internet. An expanded sample size will allow for a more sophisticated statistical analysis that can explore causal relationships among the factors under investigation. In addition, qualitative data will offer deeper insights into understanding students' experiences in an online learning environment.

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