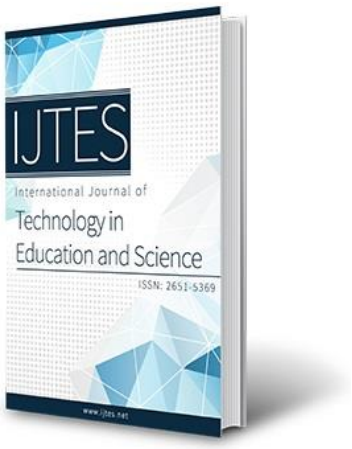

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Edson B. Bilocura
Surigao del Norte State University, Philippines

Mauricio S. Adlaon
Surigao del Norte State University, Philippines

Rhea Mae O. Cuyag
Surigao del Norte State University, Philippines

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E-Learning Engagements of Pre-Service Education Students

Edson B. Bilocura, Mauricio S. Adlaon, Rhea Mae O. Cuyag

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Abstract

This study aimed to ascertain the e-learning engagements of selected Pre-service Education students in online distance learning and determined whether the e-learning engagements vary based on the student's profile variables. The study group of the survey comprised 275 first to third-year students of BSED-Sciences, BTVTED and BSED-Mathematics enrolled at Surigao State College of Technology (SSCT), City Campus. A researchers-made questionnaire was used, validated and tested for reliability using Cronbach Alpha internal consistency coefficient with (α=0.85) for the entire scale (20 items). Distribution of web-based questionnaires through Google Forms followed. The data collected were treated using frequency, percentage count, mean, standard deviation, and analysis of variance (ANOVA). A descriptive survey research design was also employed. Study results indicated that the behavioral, social, cognitive, and technological engagements of the students were generally positive. Particularly, social engagement rated very high with a mean score of 2.97 (SD=0.53) meanwhile, technological engagement rated a lowest mean value of 2.71 (SD=0.55) signifying that students' e-learning engagement is lesser as unstable internet connection was found to be the main technological problem which caused students to get frequent absences during online classes. Additionally, mobile phone devices revealed to be the most useful ICT tool to assist students' in managing the online learning system. Moreover, the e-learning engagements were found not to vary based on students' sex and family income. However, students' age, year level, program and specialization and gadgets used in modular and online classes made a significant difference which shows that the profile differences of Pre-service education students contribute a direct effect towards their online learning engagement. Implications from the results recommend a need to sustain social interaction between stakeholders, increased students' online resources and community support by provision of learners' online learning demands.

Introduction

Due to the threat of the COVID-19 pandemic, distance education has become popular, and the need to continue learning in the Philippines has caused higher educational institutions (HEIs) to adopt online classes or e-learning classrooms to deliver the content of their curriculum on various platforms (Chua et al., 2020). With the full adoption of e-learning, challenges and issues, more specifically in students' engagements, have surfaced. By

definition, student engagement is described in a general perspective by Kuh (2009) as "*the engagement premise is straightforward and easily understood: the more students study a subject, the more they know about it, and the more students practice and get feedback from faculty and staff members on their writing and collaborative problem solving, the deeper they come to understand what they are learning*" (p. 5), as cited by Kokoc (2019a), while Briggs (2015) described student engagement as the extent of the learner's interest, including their motivation in learning the topic. Furthermore, in an e-learning context, Yang et.al., (2019) refer to this as a student's attitude, value or interest, learning strategies, and their devotion of time to learning.

On the other hand, other studies suggest that student engagement is defined as a single dimension of the behavioral aspect (Lee et. al., 2019a), in which learning management emphasizes behavioral engagement where learners manage their own learning during active learning participation in online courses. Similarly, Parkes et al. (2013) claimed that engagement in the e-learning environment can appear as behavior characteristics, such as eliminating distractions in the environment during the online class, managing learning using the online system, and managing the learning schedule by taking a lecture plan when taking the online class. With these in mind, this emphasized that student engagement is considerably multifaceted concept and may be used in different contexts (Kokoc, 2019b).

In fact, researchers have divided student engagement into three dimensions, which are behavioral engagement, cognitive engagement, and emotional engagement (Fredricks et al., 2004a). Behavioral engagement emphasizes learners' efforts put into task completion, while cognitive engagement describes students' mental skills needed in learning the content, and emotional engagement covers their emotions and feelings towards learning activities, peers, and teachers (Fredricks et al., 2004b). In the same line, Reading (2008) discussed some student engagement indicators grouped by behavioral, emotional, and cognitive engagement in ICT-rich learning environments. The same basis of indicators for measuring e-learning engagements used by Lee et al., (2019b) are composed of behavioral, cognitive, and emotional factors.

However, the fact that students made adjustments in the online learning system, students' engagement is affected as the abrupt change from face-to-face to online learning reveals difficulty with accessing technological resources of faculty members and students (Chua et al., 2020a). In fact, similar findings from the study led by Jibrin et al., (2017) that 21% of the respondents reported that they encountered the problem of slow internet speed which results to low academic engagement and which hindered students' online learning. Thus, a change in instruction has also changed student engagement, as online learning is a very challenging environment for developing self-regulated capacities (Dabbagh and Kitsantas, 2004). This underscored that behavioral, cognitive, and emotional indicators did not fully gauge or reflect the total learner engagement in the e-learning environment (Lee et al., 2019c).

To fill in this gap, the researcher adopted technological engagement to completely describe the student engagement in managing the online learning system. Hence, this paper has identified four e-learning engagements, which are the behavioral, social, cognitive, and technological. Furthermore, it sought to determine the significant difference between the engagement's indicators and the learners' profile variables.

In view of that, the cited engagement indicators were adopted from various student engagement researches. Specifically, behavioral and cognitive engagement were determined from the study led by Lee et al., (2019). Also, social engagement was anchored from the study conducted by Elumala et al., (2020) and technological engagement was identified from the research study of Gunuc & Kuzu (2014) on the factors influencing student engagement and the role of technology in student engagement in Higher Education: Campus-Class-Technology Theory.

In this paper, engagement indicators such as behavioral, cognitive, social, and technological were defined. Behavioral engagement is referred to as the preparedness, efforts, and positive qualities exhibited by students in learning. Meanwhile, cognitive learning entails students' acquisition of knowledge, application of learning, and how they are able to generate further knowledge based on what they have learned in online discussions. Furthermore, social engagement refers to the sustained interaction of students with significant others. Finally, technological engagement points out the student's ability to have full access to e-learning materials, have the necessary technological resources, and also encompasses their ability to manipulate technologies used in their e-learning. Hence, identification of engagements' indicators may help determine whether students' total involvement in the online learning system is positive or negative.

Literature Review

When combined, education and technology can build dynamic teaching and learning experiences that are tailored to developing and transforming the educators and learners needed to power the digital economy. The e-learning classroom has been used and implemented in higher educational institutions in the country amidst the COVID-19 crisis. The professors utilized mostly free platforms such as Google Classroom, Edmodo, Zoom, Facebook Messenger, Google Meet, We Chat, Schoology, and Moodle. The professors and the students could easily adapt to these new changes to align themselves with 21st-century skills of learning (Chua et al. 2020b; Ozturk, 2023).

E-learning is defined as digitally permitted and technology-facilitated learning devices that use a digital camera, personal computers (PCs), digital videos, tablets, projectors, OHP, software, and operating systems that aid in the interaction of students and teachers (Eze et al., 2018; Samyan & St Flour, 2021; Silvero et al., 2020). E-learning has moved from the conventional method to a contemporary-driven, synergistic, customized, and adaptable learning method involving learners', facilitators, and instructors (Falana, 2015; Ozturk, Kinik, & Ozturk, 2023; Ozturk & Ozturk, 2022). In fact, Gunuc and Kuzu (2014) cited that the majority of the students reported that technology use helped increase engagement if effectively used in class, while it could decrease engagement when not appropriately integrated into the class. In this respect, the role and influence of technology contribute to participatory behavior and students' motivation in their classes when it is used appropriately. Hence, students feel motivated through the use of specific technology, whether it be for pedagogical purposes or for accommodations (Cakir, Ozturk, Unal, 2019; Francis, 2017).

Additionally, Darko (2019) claimed that smartphones have a positive usefulness in students learning activities such as easy sharing and accessing of lecture materials online, easy communication with colleagues and course

masters, etc. Moreover, mobile gadgets have been found to improve maximum proficiency levels and have been a significant factor in education (Fauzi, n.d.). Thus, e-learning leads to positive learning outcomes, such as a high level of learning achievement and higher-order thinking abilities, because it allows for learners to actively engage in learning anytime and anywhere, and e-learning also helps create and develop human capabilities (Loogma et al., 2012).

However, e-learning also poses difficulties to manage, especially for some students who lack experience and confidence in using technology. Some researchers also underlined the technical factors that affect e-learning adoption in educational and training institutions in Africa, such as weak information and communication technologies (Gunga and Ricketts, 2007), laptop problems and Internet outages (Millham and Thakur, 2014), a lack of consistent technical support (Mosha and Bea, 2014), and a lack of educational management mechanisms to support the e-learning initiatives (Rhema and Miliszewska, 2010). Thus, not all students have the required skills to participate in and succeed in e-learning. Arabasz et al. (2003) asserted that a student's technical limitations, including hardware and bandwidth issues, must be considered by instructors when designing online courses.

From another angle, students may also find it very difficult to comprehend the course contents online. In e-learning, students are more independent and responsible for their own learning process due to the lack of face-to-face contact with instructors and other students (Hatcher & Yen, 2005). This independence can require students to change their ways of thinking, behavior, and habits to successfully manage the ICT-rich environment.

This has encouraged students to socially link with peers and instructors. In fact, Kolloff (2011) emphasized that student-to-student interaction is vital to building community in an online environment, which supports productive and satisfying learning and helps students develop problem-solving and critical thinking skills. Meanwhile, Jung and Lee (2018) posited that in the e-learning environment, the level of engagement is higher when the learners sense a teaching presence that they feel in the actual learning field with the professor. Thus, interactions with the instructors seem to be the main factor in increasing learner engagement. Moreover, Borup et al.'s (2015) investigation of parental engagement in online instruction found parents working with the child to help develop perseverance, locus of control, organizational and time management skills, and overall parental guidance through online learning activities. Support behaviors and academic help also motivate learners and enhance their engagement in learning (Stefanou et. al., 2004).

Significantly, learners' profile variables have played a role in their academic engagement. In fact, in terms of cognitive engagement, younger or older students may vary in their cognitive approach to becoming academically engaged in online discussions. This finding was supported by Al-Mutairi (2011), who found that younger students had a tendency to perform better than mature students in a college setting. As learning strategies and mental investments are particularly what students employ to be cognitively engaged, experts have found out that learning preferences online have a relationship to students age, where younger students preferred interactive online learning activities while older students preferred to learn from recorded tapes (Simonds & Brock, 2014a). Additionally, Simonds and Brock (2014b) claimed that age, experience, and exposure to different online activities have a significant influence on students' participation and choices of activities. Similar results were revealed from

the study of Dibiase and Kidwai (2010) on adult professionals (ages 22–65) and undergraduate students (ages 19–30) taking an online geography course: the adult professionals, on average, scored much higher on quizzes than the undergraduate students.

On the other hand, learners with varying educational levels also display different behavioral approaches online. In fact, Yu (2021) posited that postgraduates and undergraduates reported varying preferences for online learning approaches as they thought e-learning could provide freedom for their self-regulated capacities in learning. Similarly, Evans (2014) proved that postgraduates have stronger self-regulation and could keep their learning behaviors under control than those of undergraduates.

Method

Research Design

A descriptive survey research design was utilized in this study to describe the significant difference between the indicators and the students' profile variables. The identified indicators of this research which includes the behavioral, social, cognitive and technological were adopted from various student engagement researches. Specifically, behavioral and cognitive indicators were determined from the study led by Lee et al., (2019). Also, social engagement was anchored from the study conducted by Elumala et al., (2020) and technological engagement was identified from the research study of Gunuc & Kuzu (2014) on the factors influencing student engagement and the role of technology in student engagement in Higher Education: Campus-Class-Technology Theory.

Respondents

The research respondents were drawn from three specializations under Teacher Education Program namely the Bachelor of Technical-Vocational Teacher Education (BTVTED), Bachelor of Secondary Education Major in Sciences (BSED-Sciences) and Bachelor of Secondary Education Major in Mathematics (BSED-Mathematics) students who were officially enrolled for the school year 2020-2021 at Surigao State College of Technology, City Campus.

There were 363 total populations across all year levels and specializations. Computing the representatives of the population, Krejcie and Morgan's (1970) sample size calculation was utilized and determined 275 students to partake in the study. Moreover, random sampling method was applied to accurately determine the respondents' chances of being selected in the sample.

In terms of age, it can be gleaned that out of 275 individuals, the majority (219, or 79.6%) were in the age group of 18–21 years old, while the age brackets of 26–29 years old and 30 years old and older had the least number of respondents, at 3 and 2 (1.1% and 0.7%), respectively. As to the year level, there were more students coming from the third-year level, which comprises 121 (44.0%) of the total respondents, compared to the second- and first-year

levels, which had only 78 and 76 (28.4% and 27.6%), respectively.

The same table shows that the BTVTED program outnumbered the other programs across year levels, where 106 respondents corresponded to 38.6% of the total population. Meanwhile, the remaining 33.8% and 27.6% were covered by the BSED-Mathematics and BSED-Sciences, respectively. Furthermore, on the basis of sex, out of 275 respondents, 186 (67.6%) were females and 89 (32.4%) were males (see Table 1).

Table 1. Respondent's Demographics

Profile		**Frequency (N=275)**	**Percentage (%)**
Age	18-21	219	79.6
	22-25	51	18.6
	26-29	3	1.1
	30 above	2	0.7
Year Level	1st Year	76	27.6
	2nd Year	78	28.4
	3rd Year	121	44.0
Program	BSED-Sci	76	27.6
	BSED-Math	93	33.8
	BTVTED	106	38.6
Sex	Male	89	32.4
	Female	196	67.6
Family Income	3,000 below	107	38.9
	3,001-7,000	93	33.8
	7,001-10,000	44	16.0
	10,001 above	31	11.3
Gadgets Used	Phone	247	89.8
	Laptop	24	8.7
	PC	1	0.4
	IPad	1	0.4
	Phone & Laptop	2	0.7

With respect to family income, the majority of the respondents (107, or 38.9%) belonged to the range of 3,000 and below, indicating that most of the students came from low-income households. The reason for this may have been that Surigao State College of Technology is a public tertiary institution offering tuition-free education, which may help students from low-income families continue their higher education despite the pandemic. Perna et al. (2017) supported the result that free college helps improve affordability, increase educational attainment, and support student financial aid.

Lastly, as to gadgets used in modular and online classes, 247 (89.8%) respondents out of 275 used mobile phones,

which implies that the majority of the population utilized this ICT learning tool in their e-learning engagements and indicates that this type of gadget was the most useful device to assist them in their online learning. This finding was supported by Ally and Wark (2018), who found that mobile devices can enhance learning with clear benefits such as affordability and portability. Moreover, one of their research findings showed that 539 respondents out of 695 indicated that they used mobile devices for learning. Meanwhile, laptops were the second most used by the respondents, accounting for 8.7%, and usage of personal computers (PCs) and iPads scored the same frequency count of 1 (0.4%), which entailed that these gadgets were not likely used by the students.

Research Instrument

The researchers-made questionnaire consisted of the demographic profile of the respondents (Part I) and the four e-learning engagements (Part II) which were composed of five items per indicator. Prior to distribution, the survey questionnaire was validated by research experts and tested for reliability. Using Cronbach Alpha internal consistency coefficient with (α=0.85) for the entire scale (20 items) suggests that the items in the survey instrument have high internal consistency values and are highly correlated.

Data Gathering Procedure

The researchers asked permission from the Vice-President of Academic Affairs to conduct the said study (Appendix B). Moreover, the researchers wrote a letter addressed to the Dean of Teacher Education to ask for a soft copy of the officially enrolled BTVTED, BSED-Sciences, and BSED-Mathematics students from the first to third year in this academic year 2020-2021 (Appendix C). Upon the approval of the person in authority, the researchers administered the web-based survey questionnaires over social media in particular Facebook and contacted respondents to answer the Google Forms.

Data Analysis

The data collected from the students' responses in the Google forms was tallied and analyzed by the researchers using frequency count and percent distribution to describe the respondents' profile as to sex, program and specialization, year level, family income, and gadgets used in modular and online classes; weighted mean and standard deviation were used to describe the e-learning engagements of the students; analysis of variance (ANOVA) was utilized to treat the significant difference on the engagement indicators as to the learners' profile variables.

Results and Discussion

Student's E-Learning Engagements

Table 2 indicates the students' e-learning engagements in terms of behavioral, social, cognitive and technological. As shown in Table 2, all of the items expressing the behavioral aspect of students obtained a uniform response, which was verbally interpreted as agreeing, indicating that the students' behavior in online distance learning is

positive. The behavioral engagement drew an average mean value of 2.81 (SD = 0.50) and was verbally described as agreeing.

Table 2. Respondent's E-Learning Engagements

Statements	Mean	SD	VI
BEHAVIORAL	**2.81**	**0.50**	**A**
1. I show up confidently to every class on time.	2.70	0.62	A
2. I attend both synchronous and asynchronous classes with motivation and preparedness.	2.78	0.61	A
3. I plan ahead and manage my time to meet school-related deadlines.	2.88	0.69	A
4. I approach new learning tasks with confidence and a positive attitude.	2.85	0.62	A
5. I demonstrate interest in learning and participate in class discussions.	2.90	0.60	A
SOCIAL	**2.97**	**0.53**	**A**
1. I contribute to the team effort by sharing information, resources, and expertise.	3.09	0.60	A
2. I work well with classmates on online projects or assignments.	3.03	0.69	A
3. I interact with my instructors during the online learning engagements and ask clarification on difficult lessons.	2.83	0.68	A
4. I ask classmates for help when I can't understand a concept taught.	3.09	0.72	A
5. I communicate openly with parents or relatives on all academic-related concerns.	2.81	0.82	A
COGNITIVE	**2.89**	**0.50**	**A**
1. I deeply analyze thoughts, experiences and theories about the knowledge I have learned in my online classes.	2.87	0.54	A
2. I derive new interpretations and ideas from the knowledge I have learned in courses discussions.	2.91	0.58	A
3. I evaluate the value of information related to the knowledge learned in my online classes.	2.93	0.57	A
4. I apply the knowledge gained from online discussions to real problems or new situations.	2.90	0.66	A
5. I answer religiously all activities by studying the concepts and generating further knowledge.	2.88	0.62	A
TECHNOLOGICAL	**2.71**	**0.55**	**A**
1. I am able to manipulate e-learning platforms such as Google Meet, zoom, Edmodo, Google Classroom, etc.	3.00	0.65	A
2. I can access any technological learning resources such as mobile phones, laptops, tablets, Wi-Fi, etc.	2.83	0.7	A
3. I can manage my own learning using the online system.	2.66	0.69	A
4. I can take online classes with a stable internet connection.	2.27	0.78	D
5. I can complete the tasks creatively using ICT gadgets such as laptops, tablets, etc.	2.78	0.72	A

Legend: 3.50-4.00 Strongly Agree (SA), 2.50-3.49 Agree (A), 1.50-2.49 Disagree (D), 1.00-1.49 Strongly Disagree (SD)

The statement "*I demonstrate interest in learning and participate in class discussions*" got the highest mean value of 2.81 (SD = 0.60) with a verbal interpretation of agree, which means that students displayed a willingness to be engaged in e-learning course discussions and established a positive level of effort that is dedicated to learning and invested energy for task completion. On the other hand, both statements "*I attend both synchronous and asynchronous classes with motivation and preparedness*" and "*I show up confidently to every class on time*" scored lower, obtaining a mean value of 2.78 (SD=0.61) and 2.70 (SD=0.61), respectively, and were verbally described as agreeing. This implies that students still elicit persistence, participatory behavior, and attitudes that result in a positive demonstration towards learning in an ICT-rich environment despite scoring low. This result was supported by Lee et al. (2019), who found that learning management emphasizes behavioral engagement, in which learners manage their own learning through active participation in online courses. Similarly, Parkes et al. (2013) claimed that engagement in the e-learning environment can appear as behavior characteristics, such as eliminating distractions in the environment during the online class, managing learning using the online system, and managing the learning schedule by taking a lecture plan when taking the online class.

It can be gleaned from the same table, where the social engagement obtained an average mean value of 2.97 (SD = 0.93) and was verbally described as agreeing. Particularly, each item under such an indicator was verbally interpreted as agreeing. This result implies that social interaction encourages greater e-learning engagement among students. Both statements, "*I ask my classmate for help when I can't understand a concept taught*" and "*I contribute to the team effort by sharing information, resources, and expertise*," got the highest mean value of 3.09 (SD = 0.72 and SD = 0.60), respectively, and were verbally interpreted as agreeing. These indicated that fostering interaction with classmates, such as requesting extra help and communicating openly, can be considered an important predictor of student engagement in e-learning. The same results were revealed from the study of Kolloff (2011) that student-to-student interaction is vital to building community in an online environment, which supports productive and satisfying learning and helps students develop problem-solving and critical thinking skills.

On the other hand, items "*I can communicate openly with parents or relatives on all academic-related concerns*" and "*I interact with the instructors during the online learning engagements and ask clarifications in difficult lessons*" obtained a respective mean value of 2.81 (SD=0.82) and 2.83 (SD=0.68) with verbal interpretation, respectively. Despite scoring low among all items of social engagement, it still proved that communicating with the instructors and family members helped learners be motivated in their academic endeavors. This result was supported by Jung and Lee (2018), who found that in the e-learning environment, the level of engagement is higher when the learners sense a teaching presence that they feel in the actual learning field with the professor. Additionally, Borup et al., (2015) investigation of parental engagement in online instruction found parents working with the child to help develop perseverance, locus of control, organizational and time management skills, and overall parental guidance through online learning activities.

As to the cognitive indicator, it obtained an average mean value of 2.89 (SD = 0.50) and was verbally interpreted as agreeing. This result delineated that learners' cognitive skills are an important indicator that affects students' learning engagement as they represent the process of acquiring, evaluating, and utilizing knowledge. Both statements, "*I can evaluate the value of information related to the knowledge learned in my online classes*" and

"*I can derive new interpretations and ideas from the knowledge I have learned in course discussions,*" have closer mean values of 2.93 (SD = 0.57) and 2.91 (SD = 0.58) and were described as agreeing. These can be attributed to the fact that the respondents were determined to learn and try to put into practice what they had learned in their online classes.

Finally, the technological engagement obtained an average mean value of 2.71 (SD = 0.55) and was verbally described as agreeable. Specifically, the item "*I can manipulate e-learning platforms such as Google Meet, Zoom, Edmodo, Goggle Classroom, etc*." got the highest mean value of 3.00 (SD = 0.65), indicating that students have the knowledge to utilize such platforms recommended by the administration, and instructors may have enough experience to use such tools since they have been using the technology since last semester as the institution gradually adopts the e-learning system. However, the statement "*I can take online classes with a stable internet connection*" scored the lowest mean value of 2.27 (SD = 0.78) and was verbally described as disagreeing. This result implies that most of the students have difficulty attending online classes, both synchronous and asynchronous, due to weak internet reception, especially those learners who are situated in far-flung areas. Also, students who own mobile devices and other ICT gadgets have no internet connection due to the high cost and the unavailability of Internet services at their homes. In fact, similar findings from the study led by Jibrin et al. (2017) show that 21% of the respondents reported that they encountered the problem of slow internet speed, which results in low academic engagement and hinders students' online learning. Similarly, slow Internet connections or limited access from homes in rural areas can contribute to students falling behind academically, according to a new report from Michigan State University's Quello Center.

Difference in Student's E-Learning Engagements by Profile Variables

Table 3 reveals the difference between behavioral engagement according to students' profile variables. As shown from the results in Table 3, when students were clustered in terms of age, analyses showed that there was no significant difference between the e-learning engagements, namely behavioral, social, and technological, where the p-values obtained were greater than the 0.05 level of significance, which were strong predictors that the null hypothesis was accepted and thus qualitatively described as "not rejected.".

Table 3. Difference in E-Learning Engagements by Respondent's Age

Engagement	F-value	p-value	Decision to H_o	Interpretation
Behavioral	0.83	0.477	Not Rejected	Not Significant
Social	2.08	0.103	Not Rejected	Not Significant
Cognitive	3.04	0.029	Rejected	Significant
Technological	0.53	0.664	Not Rejected	Not Significant

Legend: $\alpha < 0.05$ Significant; $\alpha > 0.05$ Not Significant

On the contrary, students' age revealed a significant difference in cognitive engagement ($p < 0.05$) along with an F-value of 3.04. This implies that the age variable has a main effect on the cognitive aspect of the students' engagement in e-learning. This can be attributed to the fact that younger or older students may vary in their

cognitive approach to becoming academically engaged in online discussions. This finding was supported by Al-Mutairi (2011), who found that younger students had a tendency to perform better than mature students in a college setting. As learning strategies and mental investments are particularly what students employ to be cognitively engaged, experts have found out that learning preferences online have a relationship to students age, where younger students preferred interactive online learning activities while older students preferred to learn from recorded tapes (Simonds & Brock, 2014a). Additionally, Simonds and Brock (2014b) claimed that age, experience and exposure toward different online activities have a significant influence on students' participation and choices of activities. Similar results were revealed from the study of Dibiase and Kidwai (2010) on adult professionals (ages 22–65) and undergraduate students (ages 19–30) taking an online geography course: the adult professionals, on average, scored much higher on quizzes than the undergraduate students. These were strong indicators that students in certain age brackets differ in how they use self-regulating strategies, a metacognitive approach to content, and learning tasks, particularly in achieving desired learning goals and outcomes.

Table 4 shows the difference between the four engagement indicators of the students' e-learning engagements and their grade level. The analysis revealed that learners' year level did not cause a difference in social, cognitive, and technological indicators ($p > 0.05$), while a significant difference was found between pre-service education students' year level and behavioral engagement ($p < 0.05$). This implies that educational level has had a direct effect on the behavioral aspect of the students' academic engagement in e-learning. This can be attributed to the fact that learners with varying educational levels display different behavioral approaches, which draw on the ideas of participation, self-regulation, online academic involvement, and a positive level of effort.

Table 4. Difference in E-Learning Engagements by Respondent's Year Level

Engagement	F-value	p-value	Decision to H_o	Interpretation
Behavioral	5.80	0.003	Rejected	Significant
Social	0.17	0.843	Not Rejected	Not Significant
Cognitive	2.14	0.120	Not Rejected	Not Significant
Technological	0.22	0.805	Not Rejected	Not Significant

Legend: $\alpha < 0.05$ Significant; $\alpha > 0.05$ Not Significant

This was supported by the findings of Yu (2021) that postgraduates and undergraduates reported varying preferences for online learning approaches as they thought e-learning could provide freedom for their self-regulated capacities in learning. Similarly, Evans (2014) proved that postgraduates have stronger self-regulation and could keep their learning behaviors under control than those of undergraduates.

Table 5 shows the difference between e-learning engagements and students' family income. It can be seen that there were no significant differences between behavioral, social, cognitive, and technological indicators and financial status when students were clustered ($p > 0.05$). It was also described as "not rejected," indicating that the null hypothesis is accepted, which also showed that the ranges of household income of students had equal levels of perceived engagement in digital learning.

Moreover, it can be suggested that it did not influence the total student engagement in the online learning system. This determined that students elicit involvement in online discussions, communicate with significant people when facing learning difficulties, incorporate a willingness to exert effort in mastering concepts or developing skills, be able to use online platforms, improve technical skills, and manage online learning systems without the direct influence of students' financial income backgrounds. It can be supported that, as student engagement positively predicts academic achievement (Lei & Cui, 2018), Adzido et al. (2015) posited that though family income affects students' performance to some extent, it is not an essential predictor of higher academic performance. In one of their findings, a good number of student respondents indicated that low family income does not necessarily lower their academic achievement for responsible and serious students; low family income must not be an excuse for poor performance.

Table 5. Difference in E-Learning Engagements by Respondent's Family Income

Engagement	F-value	p-value	Decision to H_o	Interpretation
Behavioral	1.12	0.342	Not Rejected	Not Significant
Social	0.72	0.540	Not Rejected	Not Significant
Cognitive	0.55	0.649	Not Rejected	Not Significant
Technological	0.54	0.658	Not Rejected	Not Significant

Legend: $\alpha < 0.05$ Significant; $\alpha > 0.05$ Not Significant

It can be gleaned from Table 6 that there is a difference between the four indicators of e-learning engagements and student sex as a profile variable. Findings revealed that there were no significant differences between variables (p >0005) which is indicative that males and females showed equal e-learning engagements when grouped according to sex. This result was supported by Korlat et al. (2021), where boys and girls in competencies and beliefs showed no differences, indicating equal levels of perceived abilities towards digital learning. Similarly, Vekiri and Chronaki (2008) showed equality between boys and girls with respect to managing digital learning, using technologies and technical equipment to complete school-related tasks performed in a digital learning format. Research findings by Nistor (2013) suggested that there were no significant gender differences in learning outcomes because males were more stable in attitudes while females performed well in engagement. Furthermore, no significant gender differences in learning outcomes were found based on learning styles. There were also no significant gender differences in the learning satisfaction of online millennial learners (Harvey et al., 2017).

Table 6. Difference in E-Learning Engagements by Respondent's Sex

Engagement	F-value	p-value	Decision to H_o	Interpretation
Behavioral	0.09	0.33	Not Rejected	Not Significant
Social	0.41	0.523	Not Rejected	Not Significant
Cognitive	0.03	0.874	Not Rejected	Not Significant
Technological	1.01	0.315	Not Rejected	Not Significant

Legend: $\alpha < 0.05$ Significant; $\alpha > 0.05$ Not Significant

Table 7 reveals the difference between e-learning engagements and students' gadgets used in modular and online

classes. ANOVA results indicated that there were significant differences found when students were grouped according to what gadgets they used in managing the digital system for each engagement ($p > 0.05$). However, social engagement highly differed significantly (p-value = 0.06) among other factors, and the cognitive component received the lowest difference score of 0.000. This implies that gadgets used have an effect on the e-learning engagements of students. The use of mobile phones, laptops, and other ICT tools impacts how students elicit academic involvement in the online setting, which includes the means to use them for activities and engagements.

Table 7. Difference in E-Learning Engagements by Respondent's Gadgets Used

Engagement	F-value	p-value	Decision to H_o	Interpretation
Behavioral	3.93	0.004	Rejected	Significant
Social	3.74	0.006	Rejected	Significant
Cognitive	5.66	0.000	Rejected	Significant
Technological	4.33	0.002	Rejected	Significant

Legend: $\alpha < 0.05$ Significant; $\alpha > 0.05$ Not Significant

This result was supported by Gunuc and Kuzu (2014), who found that the majority of the students reported that technology use helped increase engagement if effectively used in class, while it could decrease engagement when not appropriately integrated into the class. In this respect, the role and influence of technology contribute to participatory behavior and students' motivation in their classes when it is used appropriately. Hence, students feel motivated through the use of specific technology, whether it be for pedagogical purposes or for accommodations (Francis, 2017). Additionally, Darko (2019) claimed that smartphones have a positive usefulness in students learning activities such as easy sharing and accessing of lecture materials online, easy communication with colleagues and course masters, etc. Moreover, mobile gadgets have been found to improve maximum proficiency levels and have been a significant factor in education (Fauzi, 2018).

Conclusion

Based on the findings, it was indicated that with the adoption of online learning systems, mobile phone devices were revealed to be the most useful ICT tool to assist students' in managing the online learning system. The e-learning engagements of pre-service education students, which include behavioral, social, cognitive, and technological engagements, were positive, particularly social engagement, which was rated very highly, which shows that the student interaction among stakeholders helped establish good e-learning engagements in the new normal learning system. However, technological issues pertaining to unstable internet connections were found to negatively affect the students, which may cause them to get absent during online classes, and learners' dropouts are foreseeable with this outcome.

Last but not least, there were significant differences found between the e-learning engagement indicators and the students' profile variables, specifically in students' age, year level, sex, program and specialization, and gadgets used in modular and online classes. This result indicates that the profile differences of pre-service education students contribute an effect to their e-learning engagements. However, no significant differences existed between

the factors and the students' sex and family income, signifying that they display similar e-learning engagements without getting affected by their gender differences or financial status when grouped.

Recommendations

In this study, it is recommended that the students' parents, instructors, and classmates continue to establish social interaction so that the learner may get motivated and could rightly seek help from significant people when facing learning difficulties. Furthermore, the government, the institution, and the community should partner in establishing learning avenues where students have full access to quality internet connectivity and have the basic tools in e-learning that could motivate the students to become academically engaged, lowering the probability of frequent absences that may lead to students' dropping out. Maximizing student engagement would be extremely helpful in providing meaningful online learning experiences among the students.

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Author Information

Edson B. Bilocura
https://orcid.org/0009-0002-2158-1177
Surigao del Norte State University
Surigao City
Philippines
Contact e-mail: *ebilocura@ssct.edu.ph*

Dr. Mauricio S. Adlaon
https://orcid.org/0000-0002-3546-0774
Associate Professor V
Surigao del Norte State University
Surigao City
Philippines

Rhea Mae O. Cuyag
https://orcid.org/0009-0000-1162-2399
Surigao del Norte State University
Surigao City
Philippines