

Readiness of First Year Engineering Students for Online Learning

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Abstract — The educational landscape today shifted from the traditional face-to-face classes to flexible learning due to Covid-19 pandemic. This study aimed to determine the level of readiness for online learning of the first year Engineering students of Sorsogon State University for school year 2020-2021. The descriptive-correlational method was utilized with 220 respondents involved in the said study. The findings showed that more than half of the students are male. Also, the majority of them have STEM academic strand and BSCE was the predominant program pursued. Similarly, the students agree that they have the computer skills, can learn independently, and have the academic skills. However, it was concluded that the profile of the students is independent of the level of readiness for online learning along computer skills, independent learning, dependent learning, need for online learning, and academic skills. This study recommends that the school administrators may consider training the faculty for flexible instruction and develop a learning management system to address the students' readiness for online learning.

Keywords — Engineering, first year students, online learning.

I. INTRODUCTION

The lives of people all over the world was disrupted unprecedentedly by the emergence of COVID-19. The World Economic Forum (2020) opines that with the emergence of Covid 19 has caught everyone unprepared especially the schools all over the world. It made an unexpected impact to the society in which unexpectedly no one is ready enough to face its consequence. In addition, it was mentioned that more than 1.2 billion children are displaced in their classroom and with this event, the distance learning modality has been dramatically utilized to replace the usual face-to-face classes. Also, it was suggested based on research results that the use of digital platforms might increase since distance education may be done remotely and have to stay until the pandemic ends

In the Philippines with its Commission on Higher Education (CHED, 2020) has ordered that higher education institutions need to immediately suspend the conduct of classes because of the implementation of community quarantine and avoid the risks of infection in the academic community which resulted as an immediate concern of everyone. Hence, it was observed that with the paradigm shift there is a need to hasten the collaboration among stakeholders in order to strengthen the culture of sharing of knowledge, instructional resources, and best practices.

Moreover, there are three aspects of the concept of readiness by Warner, Christie & Choy (1998) which are mentioned in the study of Hung, Chou, Chen & Own (2010) and these are the students' preferences for the form of delivery as opposed to face-to-face classroom instruction, student's confidence in using electronic

communication for learning, and the student's ability to engage in independent learning. Similarly, the study of Doe, Castillo and Musyoka (2020) concluded that Interventions and/or institutional support would then be provided to students who are unreadiness for online learning. This, in turn, could lead to an enhancement in online course attrition rates thus enhancing meaningful learning experiences and online education as a whole.

In addition, Brooks and Grajek (2020) of EDUCAUSE opine that the COVID-19 pandemic is prompting many colleges and universities to abruptly and comprehensively adopt online learning in place of face-to-face classes, in an effort to limit transmission of the virus. Faculty, students, and support staff are all working to accommodate this massive change. Further, the conduct of research on the readiness for online learning of the students, faculty, and the institution as well, which is similar to this, may somehow assess the perspectives and status of the academic community in order to help them in better understanding the Covid-19 pandemic response.

Likewise, the study of Kusel, Martin & Markic (2020) revealed that the students' readiness and their beliefs on online learning have to be considered by the institutions planning to adopt the online learning. Through this, the required technical infrastructure will be incorporated in the crafted plan once it is put into implementation.

In the same manner, the study of Mallillin et al. (2020) showed that online learning suits the various pedagogy of leaning tools, resources, course materials in the access to digital work. Also, it transforms the responsibility of the students and learn new opportunities of acquiring knowledge. Likewise, they

are empowered on the use of technology so as they will be more creative and connected in their online learning and activities.

In the advent of the pandemic, the suspension of face-to-face classes in all levels was ordered by the Inter-Agency Task Force (IATF) last January 21, 2021 in which this was covered in the omnibus guideline following those areas placed under the General Community Quarantine (GCQ) and Modified General Community Quarantine (MGCQ). Also, the institutions will be allowed to conduct limited face-to-face classes provided the minimum health protocols are strictly followed in consonance with the approval of the local government units and in compliance with the CHED guidelines. Likewise, with a calibrated response, Gov. Escudero has issued several Executive Orders, including E.O. 13-2020 which provides the Guidelines on the Management of COVID-19, and E.O. 14-2020 suspending classes in all levels.

Similarly, the province of Sorsogon with its governor responded to the directives of the IATF by issuing a number of Executive Orders that include Executive Order no. 13-2020 providing the Guidelines on the management of Covid-19 pandemic and Executive Order no. 14-2020 that suspends face-to-face classes in all levels. Then, the president of Sorsogon State College issued a memorandum following the executive order of the governor which instructs the academic community to shift to online learning using the Learning Management System (LMS) and other online learning platforms.

This study determined the level of readiness for online learning of the first year Engineering students of Sorsogon State University for school year 2020-2021. Specifically, it aimed to (1) identify the profile of the first year engineering students in terms of sex, academic strand during senior high school, and program pursued; (2) find out the level of readiness along computer skills, independent learning, dependent learning, need for online learning, and academic skills; and (3) know whether there is significant relationship between the profile and level of readiness of the students.

II. METHODOLOGY

This study used the descriptive-correlational survey design. This design was appropriate because the study aimed to come up with the factual description of some characteristics of the study population using a questionnaire. Also, the study was conducted at Sorsogon State University which was participated by 220 freshman Engineering students through a purposive sampling.

The study used demographic questions and the level of readiness scale to gather data from the participants. Questions about the student's profile included sex, academic strand during senior high school and program pursued. The level of readiness scale was adapted from the Gnomon School of Visual Effects. It has five subscales, namely, computer skills (11 items), independent learning (10 items), dependent learning (6 items), need for online learning (4 items), and academic skills (11 items). The items were measured using a 5-point Likert scale (1=strongly disagree, 5 = strongly agree). Each item measures the readiness of the student to online learning.

The sampling frame was obtained from the Dean's office with the assistance of the Office of Information Communication and Technology through purposive sampling. The questionnaire was encoded in the Google form since face-to-face classes were already prohibited. Then, the form was sent through the students' email and after almost two weeks, 220 students accomplished the questionnaire online.

Descriptive statistics were employed to analyze the students' profile and the degree of their readiness for online learning. The Chi-square test was used to test the relationship between profile and level of readiness of the students. All hypothesis tests were done at 0.05 level of significance.

III. RESULTS AND DISCUSSION

The results were presented in three sections such as profile of the respondents, level of readiness for online learning, and relationship between profile and level of readiness of the students. Tables were used in presenting the results of the data analysis.

1. Profile of the Students.

This section presents the profile of the students in terms of sex, academic track during senior high school, and program pursued. The frequency and percentage of each profile are contained in Table 1.

Table 1: Profile of the Students

Profile	f	%
Sex		
Male	124	56
Female	96	44
Total	220	100
Academic strand during senior high school		
STEM	132	60
Non-STEM	88	40

Total	220	100
Program pursued		
BSCE	87	40
BSEE	67	30
BSME	66	30
Total	220	100

The data revealed that based on the profile of the students that out of 220 respondents, there were 124 (56%) male students and 96 (44%) students who are female. Also, 132 or 60% students have taken Science, Technology, Engineering and Mathematics (STEM) during their senior high school whereas 88 or 40% students are non-STEM senior high school graduates. Similarly, 87 (40%) students pursued Civil Engineering program, 67 (30%) students took Electrical Engineering program, and 66 (30%) students got Mechanical Engineering program.

This means that the Engineering programs are dominated by male. Then, more than one-third of the students are not STEM graduates such as GAS, HUMMS, ABM, TVL, Pre-Maritime and ALS. Also, it can be noticed that almost one-third of the students are enrolled in Civil Engineering program. It implies that engineering that pursuing engineering is popular among female senior high school graduate and even to non-STEM entrants as reflected by the numbers. Likewise, the BS Civil Engineering program remains the most patronized program by the freshmen students.

2. Level of Readiness for Online Learning

This section encompasses the level of readiness of students for online learning along computer skills, independent learning, dependent learning, need for online learning, and academic skills. The weighted mean was used to analyze the data.

Computer Skills. The weighted mean and its interpretation of the level of readiness of the students along computer skills are contained in Table 2A.

Table 2A: Computer Skills

Indicators	Weighted Mean	Description
I can browse the Internet.	3.56	Agree
I can attach files to an e-mail message.	4.05	Agree
I can learn new technologies.	4.00	Agree
I can manage files on a computer.	3.77	Agree
I can send and receive e-mail.	4.07	Agree

I can use chat rooms online.	3.84	Agree
I can use online discussion boards.	3.31	Neutral
I can use standard word processing software.	3.68	Agree
I can copy and paste text using a computer.	4.09	Agree
I can download new software when necessary.	3.34	Neutral
I can install new software when necessary.	3.32	Neutral
Overall Weighted Mean	3.73	Agree

From the table, it can be inferred that generally the students agree that they are ready for online learning as reflected in their computer skills. Similarly, the students agree that they are capable of copying and pasting text using a computer with weighted mean of 4.09 and they can send and receive e-mail with weighted mean of 4.07. Likewise, the attachment of files to an e-mail message has a weighted mean of 4.05 which is described as agree. Meanwhile, the students are neutral with downloading new software, installing new software, and using online discussion boards with weighted means of 3.34, 3.32, and 3.31, respectively.

This means that the students are knowledgeable with copying and pasting the information from the computer because this gave the highest weighted mean. Also, they are skilled with sending and receiving electronic mails and attaching files to an e-mail message. It can be implied that the students have the readiness for online class since most of the communication is done through electronic mail and the submission of the requirements is in the form of attaching the files. Hence, the students have the minimum requirements in attending the online classes. However, they still have to be improved on downloading and installing new software. Then, the need for them to be equipped with online discussion boards.

The result is supported by Sharma (2019) which emphasized that computer skills are important for online learning since it can interact with the computer and learn from their teachers. Also, the notes can be downloaded and uploaded then collaboration with the teachers and other classmates can be done. Likewise, the student can write and send emails with documents attached to it. In

the same manner, Newman (2008) and Rosenberg (2009) corroborate these results that basic computer skills in e-learning must have sufficient level of skills and knowledge on how to use modern ICT and computers. Those tasks should include the web navigation, emailing, file downloading and uploading, and posting messages to a discussion board.

Independent learning. Table 2B presents the weighted mean and description of the level of readiness of students along independent learning.

Table 2B: Independent Learning

Indicators	Weighted Mean	Description
I am a good time manager.	2.93	Neutral
I am a procrastinator.	3.43	Neutral
I can balance many tasks at one time.	3.05	Neutral
I can think critically.	3.49	Neutral
I can make time for my coursework.	3.63	Agree
I can prioritize my responsibilities.	3.69	Agree
I am goal-oriented.	3.80	Agree
I am self-disciplined when it comes to my studies.	3.55	Agree
I am self-motivated.	3.70	Agree
I take responsibility for my learning.	3.89	Agree
Overall Weighted Mean	3.52	Agree

The data show that relative to independent learning, the students agree that they take responsible for their learning with weighted mean of 3.89 and they are goal-oriented with weighted mean of 3.80. Also, the students agree that they are self-motivated with weighted mean of 3.70. On the other hand, they are neutral with being a procrastinator, balancing many tasks at one time, and a good time manager with weighted means of 3.43, 3.05, and 2.93, respectively. Generally, the students agree that they are ready for online learning in terms of independent learning.

It meant that the students are responsible with their learning which is requisite for an online teaching-learning process.

This skill is needed for the asynchronous mode in delivering the lessons which is being used in the learning management system of the school. Similarly, they are goal-oriented and self-motivated in carrying out the

online learning. This would imply that the students are ready for online learning having these attributes for independent learning as reflected in the results.

Dependent learning. The weighted mean and description of the level of readiness of the students along dependent learning are listed in Table 2C.

Table 2C: Dependent learning

Indicators	Weighted Mean	Description
I have trouble comprehending what I read.	3.05	Neutral
I need faculty to remind me of assignment due dates.	3.33	Neutral
I need incentives/rewards to motivate me to complete a task.	2.73	Neutral
I often leave tasks unfinished.	2.72	Neutral
I require help to understand written instructions.	3.22	Neutral
I wait until the last minute to work on assignments.	2.80	Neutral
Overall Weighted Mean	2.98	Neutral

It can be asserted from the table that in terms of dependent learning, the students are neutral about the need for faculty to remind them of assignment due dates with weighted mean of 3.33.

Likewise, the assistance required to understand written instructions with weighted mean of 3.22, and the difficulty in understanding what is read with weighted mean of 3.05.

The other three indicators were assessed as neutral by the students such as working on the assignment until the last minute, need of rewards to complete the task, and leave tasks unfinished with weighted means of 2.80, 2.73, and 2.72, respectively.

This indicates that the students have reservations about their need for dependency for the physical presence of the faculty in doing their paper works and other requirements for submission.

It implies that they are prepared for online learning since there is no physical presence of the teachers during

classes and they can be reached asynchronously through e-mail or social media platforms.

Need for Online Learning. Table 2D presents the weighted mean and description of the level of readiness of the students along need for online learning.

Table 2D: Need for Online learning

Indicators	Weighted Mean	Description
Because of my personal schedule, I need online courses.	2.75	Neutral
I need online courses because of my geographical distance from the college.	2.62	Neutral
I need online courses because of my work schedule.	2.84	Neutral
It is difficult for me to go to campus to complete course requirements.	2.60	Neutral
Overall Weighted Mean	2.70	Neutral

The data revealed that generally the students are neutral with the need for online learning with an overall weighted mean of 2.70. the students are neutral with the need for online courses due to work and personal schedule with weighted means of 2.84 and 2.75, respectively.

Also, they are neutral with the need for online courses due to graphical distance and the difficulty to go the campus to complete the requirements with weighted means of 2.62 and 2.60, correspondingly.

This finding is complemented by Anglia (2021) that online learning provides opportunity for students flexible learning hours, considers individual learning patters, allows them to create their own learning environment, and provides them with more control over their learning. Academic Skills.

Table 2E includes the weighted mean and description of the level of readiness of students for online learning along academic skills.

Generally, the students agree that they have the readiness for this delivery modality since the overall weighted mean is 3.66.

Table 2E: Academic skills

Indicators	Weighted Mean	Description
I am a good reader.	3.51	Agree
I am a good writer.	3.30	Neutral
I can ask for help when I have a problem.	3.80	Agree
I can convey my ideas in writing.	3.55	Agree
I can follow written instructions.	3.85	Agree
I can solve problems alone.	3.38	Neutral
I am comfortable learning new skills.	4.00	Agree
I am self-directed in my learning.	3.57	Agree
I can learn by working independently.	3.31	Neutral
I need face-to-face interaction to learn.	4.15	Agree
I read carefully.	3.82	Agree
Overall Weighted Mean	3.66	Agree

From the table, it can be inferred that relative to academic skills, the students agree that they need to face-to-face interaction to learn with the highest weighted mean of 4.15.

Similarly, they agree that they are comfortable learning new skills and can follow written instructions with weighted means of 4.00 and 3.85, correspondingly.

However, the students are neutral that they are good reader, can solve problems alone, and can learn by working independently with the lowest weighted means of 3.51, 3.38, and 3.31, respectively. It means that the students

3. Relationship between profile and level of readiness of the students

This portion presents the relationship between the profile and the level of readiness of the students. The Chi-square test was used in the data analysis.

Sex and Level of readiness. Table 3A contains the statistical bases and statistical analyses of the relationship between sex and the level of readiness of the students.

Table 3A: Relationship between sex and level of readiness of the students

Statistical Bases	Statistical Analyses				
	Computer skills	Independent learning	Dependent learning	Need for online learning	Academic skills
Degrees of freedom	2	2	2	2	2
Level of significance	0.05	0.05	0.05	0.05	0.05
χ^2 critical value	5.99	5.99	5.99	5.99	5.99
χ^2 computed value	3.33	1.56	0.88	1.45	0.73
Decision on Ho	Do not reject	Do not reject	Do not reject	Do not reject	Do not reject
Conclusion	Not significant	Not significant	Not significant	Not significant	Not significant

It can be inferred from the table that relative to sex of the students, the χ^2 computed values for computer skills, independent learning, and dependent learning of 3.33, 1.56, and 0.88, respectively, are less than the χ^2 critical value of 5.99 at 0.05 level of significant with degrees of freedom of 2. Therefore, the hypothesis which is stated in null form could not be rejected. This means that there is no significant relationship between the sex of the students and their level of readiness on online learning. Similarly, the χ^2 computed values of 1.45 and 0.73 for need for online learning and academic skills, respectively, do not exceed the χ^2 critical value of 5.99 with degrees of freedom of 2 at 0.05 level of significance. Hence, the null hypothesis is not rejected which implies that the level of readiness of students to online learning is independent of their sex. This result is supported by the study of Link and Marz (2006) which revealed that age, computer use, and previous exposure to computers are more important than gender as to the attitude of students towards e-learning.

It can be inferred from the table that relative to sex of the students, the χ^2 computed values for computer skills, independent learning, and dependent learning of 3.33, 1.56, and 0.88, respectively, are less than the χ^2 critical value of 5.99 at 0.05 level of significant with degrees of freedom of 2. Therefore, the hypothesis which is stated in null form could not be rejected. This means that there is no significant relationship between the sex of the students and their level of readiness on online learning. Similarly, the χ^2 computed values of 1.45 and 0.73 for need for online learning and academic skills, respectively, do not exceed the χ^2 critical value of 5.99 with degrees of freedom of 2 at 0.05 level of significance. Hence, the null hypothesis is not rejected which implies that the level of readiness of students to online learning is independent of their sex. This result is supported by the study of Link and Marz (2006) which revealed that age, computer use, and previous exposure to computers are more important than gender as to the attitude of students towards e-learning.

Table 3B: Relationship between academic strand and level of readiness of the students

Statistical Bases	Statistical Analyses				
	Computer skills	Independent learning	Dependent learning	Need for online learning	Academic skills
Degrees of freedom	2	2	2	2	2
Level of significance	0.05	0.05	0.05	0.05	0.05
χ^2 critical value	5.99	5.99	5.99	5.99	5.99
χ^2 computed value	0.30	0.90	0.38	0.95	2.39
Decision on Ho	Do not reject	Do not reject	Do not reject	Do not reject	Do not reject
Conclusion	Not significant	Not significant	Not significant	Not significant	Not significant

The data revealed that generally the academic strands taken by the students during their senior high school are not significantly related to the level of readiness for online learning. In addition, the χ^2 computed values of 0.30, 0.90, and 0.38 for computer skills, independent learning, and dependent learning, respectively, are less than the χ^2 critical value of 5.99 at 0.05 level of significance with degrees of freedom of 2. Thus, it can be concluded that there is no significant relationship between the academic strands of the students and computer skills, independent and dependent learning.

Similarly, the χ^2 computed values of 0.95 and 2.39 for need for online learning and academic skills, correspondingly, did not exceed the χ^2 critical value of 5.99 with degrees of freedom of 2 at 0.05 level of significance. Hence, the non-rejection of the null hypothesis which means that the academic strands of the students do not affect their level of readiness.

Program pursued and Level of readiness. Table 3A contains the statistical bases and statistical analyses of the relationship between program pursued and the level of readiness of the students.

Table 3C: Relationship between program pursued and level of readiness of the students

Statistical Bases	Statistical Analyses				
	Computer skills	Independent learning	Dependent learning	Need for online learning	Academic skills
Degrees of freedom	4	4	4	4	4
Level of significance	0.05	0.05	0.05	0.05	0.05
χ^2 critical value	9.49	9.49	9.49	9.49	9.49
χ^2 computed value	4.08	1.72	6.56	1.01	1.20
Decision on Ho	Do not reject	Do not reject	Do not reject	Do not reject	Do not reject
Conclusion	Not significant	Not significant	Not significant	Not significant	Not significant

It can be observed from the table that in relation to the program pursued by the students, this is significantly independent with the computer skills, independent learning, and dependent learning because the χ^2 computed values of 4.08, 1.72, and 6.56, respectively are less than the χ^2 critical value of 9.49 at 0.05 level of significance with degree of freedom of 4. Similarly, the need for online learning and academic skills of the students are not significantly related to programs pursued since the χ^2 computed values of 1.01 and 1.20, correspondingly, do not exceed the χ^2 critical value of 9.49 (df=4; $\alpha=0.05$).

learning. This study recommends that the school administrators may provide to faculty for flexible learning and adopt a learning management system to cater to the students' readiness. Then, the school may provide technical support to students so as to improve the level of readiness for the delivery modality. Likewise, some inventories may be administered to students on access to technology and digital devices owned at the beginning of the course. Finally, further study may be conducted that will include assessment of teacher-institution readiness for online learning and profiling the least ready students.

IV. CONCLUSIONS AND RECOMMENDATIONS

From the results, it can be concluded that majority of the students are male. The STEM was the academic track taken during their senior high school and BSCE was the predominant program pursued. Relative to the level of readiness for online learning, the students agree that they have the computer skills, they can learn independently, and they have the academic skills. However, they are neutral with dependent learning and need for online learning. In the same manner, the profile of the students in terms of sex, academic strands and program pursued is independent of the level of readiness for online

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