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Research Article

Synchronous and Asynchronous Learning Amidst the Pandemic: Student's Level of Satisfaction and Academic Achievement in Science, Technology and Society

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Abstract: The 2020–2021 academic year has presented challenges to students and instructors alike. In this study, we investigated the relationships among key the domains that influence student satisfaction and academic achievement in synchronous and asynchronous online learning. Consequently, this study aims to assess the students' level of satisfaction and academic achievement using synchronous and asynchronous learning Bachelor of Secondary Education 1-1 in GEC 6 Science, Technology and Society (STS), particularly to: 1) Assess the three domains of level of satisfaction of students in their class; 2) Determine the academic achievement of students in their subject; and 3) Determine the significant relationship between the satisfaction level of students in their synchronous and asynchronous class and their academic achievement. Descriptive statistics (mean and standard deviation), frequency and percentage count, and Pearson-R will be used to evaluate the significant relationship between the level of satisfaction of students and their academic achievement. The findings of this study implies that the online learning and teaching required improvement to be done, especially in terms of quality of the interaction and instruction delivered during the pandemic and instructor availability and consistent communication are also essential elements of instructional support. The results from this study may provide useful information for online course designers and instructors on how to improve the existing online courses to be more effective and it should also include design characteristics that enhance students' positive satisfaction which then will lead to greater students' academic achievement.

Keywords: Synchronous, Asynchronous, Satisfaction, Academic Achievement, Science, Technology and Society.

Introduction

With the coronavirus spreading rapidly across Asia, Europe, the Middle East, and the United States, countries have taken swift and decisive actions to mitigate the development of a full-blown pandemic. In the past two weeks, there have been multiple announcements suspending attendance at schools and universities. As of March 13, the OECD estimated that over 421 million children are affected due to school closures announced or implemented in 39 countries. In addition, another 22 countries have announced partial "localized" closures [1].

Over the past 10 days, the number of students affected by school and university closures in 138 countries has nearly quadrupled to 1.37 billion, representing more than 3 out of 4 children and youth worldwide. In addition, nearly 60.2 million teachers are no longer in the classroom [2].

Education systems around the world are facing an unprecedented challenge in the wake of massive school closures mandated as part of public health efforts to contain the spread of COVID-19.

Governmental agencies are working with international organizations, private sector partners and civil society to deliver education remotely through a mix of technologies in order to ensure continuity of curriculum-based study and learning for all [3].

Establishing or scaling up distance learning strategies are a sector-wide response to sudden interruption of educational processes as a result of unexpected COVID-19 school closures. These strategies are guided by a concern for equity and inclusion and the need to ensure the design and delivery of distance learning do not exacerbate existing educational and social inequalities. The planning of more comprehensive distance learning strategies should, however, be guided by both immediate mitigation needs and long-term goals. Beyond the response to the current crisis, the efforts to deploy distance learning at scale across all levels of education provides valuable lessons and may lay the foundation for longer-term goals of building more open, inclusive and flexible education systems after the COVID-19 pandemic has passed [4].

By mid-April 2020, almost every country in the world had implemented nationwide closures of schools and other educational institutions in response to the COVID-19 pandemic, affecting over 1.57 billion learners, representing over 90% of the world's total enrolled student population. These actions, while essential to contain the spread of the disease and protecting public health, could precipitate a global learning crisis at all levels of the education system. During the crisis, the focus of the educational response has been on ensuring learning continuity through the mobilization of a range of no-, low-, and high-tech resources and modalities, to bring learning content from school settings into learners' homes. What is sometimes overlooked is that at the heart of these responses are millions of teachers, principals, and other education personnel who are the frontline workers for the education sector during any crisis, and who have demonstrated high levels of commitment and creativity in the face of COVID-19. At least 63 million primary and secondary teachers alone have been affected by the pandemic to date. Further, disruption to regular learning has impacted students at teacher training institutions, threatening to exacerbate the existing global shortage of qualified teachers in the future. UNESCO therefore advocates for the protection and support of teachers, principals, and other education personnel, and for recognition of their efforts in the response to the current health crisis and beyond [5].

The Covid–19 pandemic brought interruption in all sectors of the society causing a chain reaction of economic and psycho-social impacts affecting every Filipino citizens. For the Philippine higher education sector, the learning environment has been severely disrupted campuses were closed and face-to-face classes were suspended to protect the health and safety of students. But despite these interruptions, CHED ensured the continuity of learning by enjoining higher education institutions (HEIs) to implement flexible learning modalities [6].

The CHED Memo Order have led millions of students into temporary 'home-schooling' situations, especially in some of the most heavily impacted our country. These changes have certainly caused a degree of inconvenience, but they have also prompted new examples of educational innovation. Although it is too early to judge how reactions to COVID-19 will affect education systems around the world, there are signs suggesting that it could have a lasting impact on the trajectory of learning innovation and digitization [7].

Most schools in affected areas are finding stop-gap solutions to continue teaching, but the quality of learning is heavily dependent on the level and quality of digital access. After all, only around 60% of the globe's population is online. Moreover, the less affluent and digitally savvy individual families are, the further their students are left behind. When classes transition online, these children lose out because of the cost of digital devices, data plans and poor signals [1].

Pursuant to the CMO No. 08 series of 2021, the Isabela State University implemented the Flexible Teaching and Learning Modalities (FTLM) which brings to our students to experience a combination

of online and offline learning. Flexible Teaching and Learning Modalities (FTLM) should be the norm of our teaching minimizing in-campus presence of students and face-to-face learning.

Blended Learning is a combination of both online and offline learning methodologies with the use of technology. Synchronous or online is when the students study with their teacher and classmates through an application that uses a webcam while asynchronous or offline is when the teacher provides the students with the lesson, seatwork or assignment in the module that they can finish at their own pace, within the deadline. All works are submitted and graded via online [8].

The faculty is setting up their Group Chat, Video Conference via zoom, Google Meet, Microsoft meeting, and LMS Platforms such Edmodo, Google Classroom, etc. as needed and necessary. The faculty set initial meeting (video conferences) with their students based on their synchronized schedules issued by the Registrar or any convenient LMS platforms, to discuss with them the following: a) contents of the syllabus, course guide, policies and guidelines to be followed both online and offline classes, b) requirements and grading system, c) how and where to pick up assignments and drop off location for the submission of outputs, and d) affix signature in the distribution list found in the designated drop off point [9].

Consequently, this study aims to assess the students' level of satisfaction and academic achievement using synchronous and asynchronous learning Bachelor of Secondary Education 1-1 in GEC 6 Science, Technology and Society (STS), particularly to:

1) Assess the three domains of level of satisfaction of students in their class;
2) Determine the academic achievement of students in their subject; and
3) Determine the significant relationship between the satisfaction level of students in their synchronous and asynchronous class and their academic achievement.

Methodology

a) Research Design

The Descriptive-correlational research will be used for this study to find the students' level of satisfaction and its relationship in their academic achievement in their GEC 6 Science, Technology and Society (STS) class.

b) Respondents of the Study

The subjects of the study were the Bachelor of Secondary Education 1-1 students who were enrolled in GEC 6 Science, Technology and Society (STS) subject for the Second Semester School year 2020-2021 of the Isabela State University of Cauayan City Isabela. Out of 50 students in the class there were only 47 students were responded in the study.

c) Methods of Data Collection

The questionnaire was distributed using Google Forms and was piloted among 50 Bachelor of Secondary Education 1–1 students from College of Education. The instrument was adapted from the study of Shaid *et al.,* [10]. According to the researchers, Cronbach's alpha was calculated using the pilot study data to verify the reliability of the instrument. The Cronbach's alpha for the instrument was 0.973 indicating that the tool has a strong reliability level. Two items were removed because of its' poor mean value in the domain. The questionnaire is then finalized after minor changes required after pilot survey for the assessment of feasibility of the survey.

The questionnaire consisted of two sections. Section A comprises of personal information of the respondents, while Section B is divided into three domains which are Domain 1: Learner's dimension; Domain 2: Technological Characteristics; and Domain 3: Instructors' Characteristics. Each item of the domains was rated in 5-point Likert scale: (1) Strong Disagree; (2) Disagree; (3) Uncertain; (4) Agree; and (5) Strong Agree. The range below was utilized to interpret the describe results of the Students' Level of Satisfaction.

Range	Descriptive Interpretation
4.20—5.00	Strongly Agree
3.40—4.19	Agree
2.60—2.39	Uncertain
1.80—2.59	Disagree
1.00—1.79	Strongly Disagree

Academic Achievement
Final grade were obtained by the researchers to measure the academic achievements of students.

Methods of Data Analysis
Descriptive statistics (mean and standard deviation) will be used to determine the level of satisfaction of students in synchronous and asynchronous class and their academic achievement in GEC 6 Science, Technology and Society (STS) subject. Frequency and percentage count will be used to determine the final grade of the students. Pearson-R will be used to evaluate the significant relationship between the level of satisfaction of students and their academic achievement in GEC 6 Science, Technology and Society (STS) subject.

Results and Discussion
This table discussed on the students' level of satisfaction. The following tables below discuss the three domains of the level of satisfaction which are Domain 1: Learner's dimension; Domain 2: Technological Characteristics; and Domain 3: Instructors' Characteristics. These levels of satisfaction is an underlying indicator of success in various learning environments, especially online modalities. Satisfied students appear to be engaged, motivated and responsive; contribute to an effective learning climate; and achieve at higher levels.

Table 1a. Domain 1: Learners' Dimension

Domain 1 Learners' Dimension	Mean	Standard Deviation	Descriptive Interpretation
I am open to learn about new things regarding online learning.	3.96	1.103	Agree
I am able to spend significant time and energy to engage in online learning class.	3.83	0.985	Agree
I am confident while using online learning system.	3.72	0.800	Agree
I enjoy using the online platform applications.	3.72	1.015	Agree
I feel students need to be trained before undergoing online learning activities.	3.85	1.021	Agree
I feel that online learning and enhances my soft skills.	3.77	0.937	Agree
I feel online learning is comfortable.	3.74	0.896	Agree
Online learning would improve my learning process.	3.89	0.961	Agree
Online learning reduces the time I spend on unproductive activities.	3.45	0.904	Agree
Online learning saves me money I spend on printed learning materials and transportation cost.	3.87	0.992	Agree
Online learning improves my written communication and analytical thinking skills.	3.72	1.015	Agree
I feel online learning orients my study plan.	3.72	0.926	Agree
I am able to organize my time well so that work and tasks do not build up.	3.81	1.076	Agree
I try to interact with other students and instructors during the courses.	3.87	1.055	Agree
I was satisfied with the quality of this training during COVID-19 pandemic.	3.70	0.954	Agree
Grand Mean	**3.65**		**Agree**

As can be gleaned from the table, the item number 1 that displayed highest mean score which were "I am open to learn about new things regarding online learning" (M=3.96). From these value, it can be concluded that the students have positive attitude to adapt themselves the online mode of teaching learning process throughout the classes during pandemic. However, all items from this domain shown agree on level of satisfaction. This is in line with the findings of Khan *et al.,* [11] that the preferences of students for e-learning as it provides them much freedom to connect with their teachers, fellow students and engage with their study materials at the comfort and flexibility of space and time [11]. Same as through with the study of Mishra *et al.,* [12] which reported that students react negatively to online learning because they can't maintain good behavior throughout the online learning as they are unable to maintain their learning abilities due to instructors' quickness towards online teaching [12]. Overall mean scores obtained for this domain was ranked agree (M=3.65). From this finding, it can be concluded that the students were not really satisfied with online learning.

Table 1b. Domain 2: Technology Characteristics

Domain 2 Technology Characteristics	Mean	Standard Deviation	Descriptive Interpretation
I have access to a stable internet connection at home.	3.60	1.014	Agree
I am updated with the latest technology.	3.79	1.041	Agree
Instructions about student participation are clearly presented.	3.68	0.935	Agree
I repeated the online instructional materials based on my needs.	3.89	0.983	Agree
I feel internet connection strength determines our effective learning opportunity.	3.94	0.919	Agree
I feel the course materials are accessible after the completion of each class.	3.74	1.073	Agree
I am able to complete my work even when there were distraction.	3.85	0.884	Agree
I am satisfied with the content of topic covered during the classes.	3.89	0.983	Agree
Online class is effective in bridging the gap of missed academic period.	3.83	0.916	Agree
Grand Mean	**3.80**		**Agree**

The second domain discussed in this table is Technological characteristics domain, which consists of 9 items (see Table 1b). The items that received the highest mean scores were "I feel internet connection strength determines our effective learning opportunity" (M = 3.94). This is a positive response towards the technology utilized during the online learning but in order to meet the optimum success of online learning, the greatest factor still is the internet connection so that the classes run smoothly without interruption.

Overall, the study reported the students' satisfaction toward technology characteristics describe as agree with the mean score (M=3.80), which can be concluded that the students have high satisfaction in terms of technology characteristics towards online learning. By having these attitude, it may help the students to always be ready to engage in online learning.

This finding in line with the study by Olayemi, *et al.,* [13] which stated that the students' skills and competencies in the use and handling the technology play a vital factor in the success of online learning. It also stressed out in the study of Khan, *et al.,* [11] that in the absence of face-to-face interaction, digital technology has also been well accepted by the students for the purpose of learning [11].

Table 1c. Domain 3: Instructor Characteristics

Domain 3 Instructor Characteristics	Mean	Standard Deviation	Descriptive Interpretation
I feel that my lecturers have good content knowledge	4.36	0.965	Strongly Agree
I feel that my lecturers provide opportunities to ask questions	4.40	0.993	Strongly Agree
I feel that my lecturers treated me with respect	4.36	0.965	Strongly Agree
I feel that my lecturers understood my learning needs	4.36	0.987	Strongly Agree
I feel that my lecturers made the subject as interesting as possible	4.36	0.987	Strongly Agree
I feel the response time from lecturers is quicker in online courses	4.28	0.994	Strongly Agree
I am satisfied with lecturers in providing clear instructions	4.43	0.972	Strongly Agree
I am satisfied with the lecturers' accessibility during the class	4.30	0.976	Strongly Agree
I am satisfied with the lecturers' pace of punctuality	4.26	1.010	Strongly Agree
I am satisfied with the lecturers in reviewing the topic covered in the previous sessions	4.40	0.993	Strongly Agree
I am satisfied with the lecturers' supportiveness towards my questions	4.34	0.962	Strongly Agree
I am satisfied with the lecturers' responsiveness towards my questions	4.36	0.987	Strongly Agree
I am satisfied with the quality of graphic aids such as sound and picture (ppt) being displayed by lecturers	4.40	0.970	Strongly Agree
Grand Mean	**4.36**		**Strongly Agree**

Table shows the third domain which is the Instructor Characteristics which consisted of 13 items. All of 13 items obtained the descriptive interpretation of strongly agree. Thus, the findings of the study suggest that in order to make students satisfy, the highest level of quality in e-learning has to be maintained by the instructors, administrators as well as institutions (Kumar, *et al.*, [14]).

In the study of Foerderer, *et al.*, [15] agrees that perhaps faculty who struggle to respond to student emails could use a communication app like Facebook messenger to help them respond to student queries in a faster and more informal way. Prompt communication takes on greater relevance when students have additional demands on their time [15].

Table 2. Frequency and Percentage Distribution of Students' Academic Achievement (Final Grade) (n = 47)

Final Grade	Frequency	Percentage
1.00	0	0.00
1.25	6	12.77
1.50	15	31.91
1.75	9	19.15
2.00	8	17.02
2.25	8	17.02
2.50	1	2.13
2.75	0	0.00
3.00	0	0.00
Total	**47**	**100**

The table shows that majority of the students received a final grade of 1.50 (31.91%) and only 1 student (2.13%) received the lowest grade (2.50). In utilizing online platforms regarding students' academic achievements, which is due to the fact that academic achievement towards online learning platforms requires a certain set of skills and knowledge as mentioned in the above sections in order to make such technology a success. This agrees with the findings of Abuhassnar, *et al.,* [15] that a positive and significant relationship between student's academic achievements with online learning platforms, which indicates the key main role of online platform with students' academic achievements [15].

Table 3. Test of Relationship between Academic Achievement (Final Grade) and Students' Level of Satisfaction

Variables	r-value	p-value
Academic Achievement (Final Grade) and Domain 1 (Learners' Dimension)	-0.308*	0.035
Academic Achievement (Final Grade) and Domain 2 (Technology Characteristics)	-0.370*	0.010
Academic Achievement (Final Grade) and Domain 3 (Instructor Characteristics)	-0.424*	0.003
*significant at 0.05 level		

The table illustrated the relationship of the academic achievement (final grade) and the three (3) domains of students' level of satisfaction namely–learners' dimension, technology characteristics, and instructor characteristics.

As can be gleaned from the table, all correlations (r =-0.308, r=-0.370, r=-0.424), in consideration of the p-values (p=0.35, p=0.10, p=0.003), revealed a significant relationship between the variables. Moreover, the r-values (r=-0.308, r=-0.370, r=-0.424) indicates the existence of an inverse correlation. These results imply that as students' level of satisfaction on the three domains increases, the value of their final grade (academic achievement) decreases (a decrease in their final grade is a good thing in 3-point grading system because lower grades have higher equivalents). It only means that the higher the students' satisfaction on learners' dimension, technology and instructor characteristics, the higher their academic achievement will be. In particular, domain 3 (instructor characteristics) has the strongest correlation (r=-0.424, p= 0.003) among the domains. Therefore, if students are more satisfied with their instructor, they are most likely to obtain a high grade. However, the strength of these relationships (r=-0.308, r=-0.370, r=-0.424) is moderately low which means that there exists only a slightly positive influence on their academic achievement. This have been validated in the educational context, providing further understanding towards the students' prospective perceptions on using online learning platforms to improve students' academic achievement and satisfaction. This finding in line with the study by Basith and Rosmayadi [17] that the results showed that online learning satisfaction was at a high level, meaning that students were satisfied with the online learning that had been implemented [17].

Conclusion

The 2020–2021 academic year has presented challenges to students and instructors alike. In this study, we investigated the relationships among key the domains that influence student satisfaction and academic achievement in synchronous and asynchronous online courses. The findings of this study reveal that students prefer to use synchronous and asynchronous teaching methods using different platforms like Google meet, Facebook messenger, Edmodo and Zoom. Attending online classes are the most preferred mode of delivery as perceived by the respondents. Also, the results of this study found that the internet, platform, class time, loss of interest, motivation and self-motivation and use of online exams as an assessment can be considered as the factors that significantly affect students' satisfaction with online learning.

Instructor availability and consistent communication are also essential elements of instructional support. During times when so many are things changing, keeping the syllabus and course website updated is critical.

The findings of this study imply that the online learning and teaching required improvement to be done, especially in terms of quality of the interaction and instruction delivered during the GEC 6 Science, Technology and Society subject. Even though the respondents are very satisfied with the instructor, also online platforms and the technology dimension, some improvements should be implemented to enhance the delivery of online teaching and learning. Overall, the students are coping with the work from the home period.

The results from this study may provide useful information for online course designers and instructors on how to improve the existing online courses to be more effective. It should also include design characteristics that enhance students' positive satisfaction which then will lead to greater students' academic achievement.

Recommendation

Based on the study findings, the first recommendation would be for administrators of higher institution. In order to implement online learning, there must be more interest and support given to the faculty and students during these trying times. Moreover, workshops and training sessions must be given for both instructors and students to make them more familiar in order to take the most advantages of the online learning management system. There are free software for creating an online learning environment that is suitable for students and instructors. Training and assessing the class instructor and making modifications to the software could result in a good environment for the instructor and a quality education for the student. Both students' satisfaction and academic achievements depends on their prior knowledge and experience in relation to online learning. This current research intended to investigate student satisfaction and academic achievements in relation to online learning platforms in the higher education.

This research certainly needs further development, especially in expanding the research area. Then additional researchers can also investigate the relationship between online learning satisfaction with various other variables that can improve student academic achievement. For stakeholders, research can be used as a benchmark in developing quality online learning so that it can provide satisfaction for students.

Conflicts of interest: There is no conflict of interest of any kind.

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