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## Learning Behind the Screen: Learning Performance of Students in Microbiology and Parasitology Subject

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### ABSTRACT

Learning behind the screen was implemented here in the Philippines since Covid-19 hit all over the world. For almost two years that people are suffering and struggling with what happened these days. Due to this pandemic, Notre Dame of Midsayap College implemented learning behind the screen. This paper is all about the effects of learning behind the screen on the learning performance of students in Microbiology and Parasitology subjects. The researchers used pre-test – post-test and interview research design. The researchers wanted to find out the learning performance through standardized pre-test and post-test which were administered in asynchronous and synchronous classes. An in-depth interview was also performed which involved both direct questioning and probing questions. Findings have revealed that the mean score of the students increased from asynchronous to synchronous class which was a teacher factor because there was communication between the teacher and students. Results also showed that the respondents had difficulties in answering the pre-test and post-test in asynchronous class, while, it is easy for them to answer the post-test during synchronous class. After a careful analysis of the responses of the respondents, the researchers concluded that the students taking Microbiology and Parasitology subjects could learn more during synchronous class or with the guidance of the subject teacher.

### INTRODUCTION

Learning behind the screen has suddenly become a mode of learning due to the COVID-19 pandemic restriction on physical distancing. As a versatile platform for learning and teaching processes, the learning behind the screen framework has been increasing the use of technology. Learning behind the screen is defined as a new paradigm of online learning based on information technology. Only by analyzing students' satisfaction and their performance can the answer be sought (Alawamleh et al., 2019).

According to (Dayagbil et al., 2021), educational institutions among many others had responded to the challenges brought by the Covid-19 pandemic from the traditional way of teachers and learning. Most educational institutions shifted to teaching and learning behind the screen. With the rising Covid-19 cases and restrictions on physical distancing from the public, face-to-face learning is not an option now, thus, many students opted either al with learning behind the screen or modular learning depending on the school they are enrolled in. The change of learning modality has certain effects on the learning performance of students who are learning behind the screen as their learning modality. Learning performance is one of the many things that learning institutions need to consider in learning behind the screen.

In the Philippines, to respond to the needs of learners, De La Salle University has turned learning behind the screen, which incorporates both synchronous and asynchronous components. There are flexible methods for fulfilling course requirements during the academic year for students who cannot participate in learning behind the screen (Cristopher et al., 2020).

Due to the continuing growth of Covid-19 cases, the Notre Dame of Midsayap College also shifted from face-to-face classes to learning behind the screen. It is one of the private schools in Midsayap, North Cotabato which implemented learning behind the screen in order to continue giving quality education to all the students. However, learning behind the screen is insufficient especially for students who have laboratory subjects.

Chou & Chang (2010) defined active engagement in learning behind the screen activities as the interaction between the learner and himself, the learner and another learner, the learner and the instructor, the learner and the content, and the learner interface. Student-content, student-instructor, and student-student interaction are all examples of learning activities in the course (Gradel & Edson, 2010). Popular LMS systems now include vital tools for interactive activities in the classroom, such as forums, message boards, online forms of assignments, wiki-based exercises, virtual classrooms, and so on.

In addition, teachers can use these tools to measure and monitor their student's learning progress, such as status reports on submitted assignments, access statistics, and activity logs on the system. Many studies have proposed strategies for making interactive activities successfully help students' learning processes. Evans and colleagues (Evans & Sabry, 2003) used three interactive activities: pace control, self-assessment, interactive simulation of his research, and time spent using the system.

The findings of their study revealed that students who interact more with the system achieve higher results and require less time to learn. However, no other interactive forms were used in the study. According to research

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findings (Damianov & Calafiore, 2009), there is a favorable correlation between time spent behind the screen and results estimated by student scores, particularly among students in the above-average category.

According to a preliminary study (Carstens et al., 2021), interactive behind-the-screen activities in learning behind the screen have an impact on student learning results. The impact of interactive forms of student-teacher engagement, student-student interaction, student-content interaction, and student-technology interaction on learning outcomes is investigated in this study. There are several reasons for these. There is a range of interactive activities. However, they may be classified into four classes based on the participants.

LMS systems provide tools and methods for implementing the aforementioned operational consequences. Determining the influence of interactive forms on student performance, based on past research that has indicated that the types of interactions mentioned above can alter student learning outcomes (Bradley, 2021).

According to (Feng, Xiang, and Xu 2022) teaching has been increasingly employed in medical education. Many studies have shown this “study-centered” pedagogical model improves students’ overall achievement in the course, with students showing more motivation and better self-directed learning skills when compared to traditional classroom teaching. However, most of the previous studies have been evaluating the short-term effects of FC teaching conducted upon completion of the course. The retention of the promotion and the long-term effects on learning of students’ subsequent courses deserve further attention and evaluation. By adopting and running FC teaching in the whole course of physiology, this study aimed to determine the short-term impact of FC teaching on students’ learning of physiology course and also the long-term influences on students’ learning of follow-up medical curriculums within 18 months after the completion of physiology course.

According to (Nsa et al., 2012; Ogbonna et al., 2019) students, learning experience, positive outcomes, and the type of performance matter: They acquire practical skills better when they are taught in a synchronous online setting, whereas cognitive achievement, such as producing meaningful and thoughtful contributions, is greater in asynchronous settings (Hrastinski, 2008). Also, synchronous learning positively impacts learners’ commitment and their task motivation (Hrastinski, 2008). At the same time, similar to face-to-face settings, the danger of disengaged participation in class (e.g., passive listening or watching the teacher’s lecture, silently reading peer statements in the chat) has to be considered (Smith and Smith, 2014). Research findings regarding the impact of synchronous and asynchronous teaching settings on student performance are not without ambiguity. Nieuwoudt (2020) found that it did not make a difference in student achievement whether students attended synchronous virtual classes or watched the recordings of the virtual classes. However, the sheer time

students participated in and interacted with the online learning system did significantly affect their academic success. Also, active participation in both synchronous and asynchronous online learning opportunities has been found to result in higher engagement and better academic outcomes than attending face-to-face classes only (Northey et al., 2015). In order to scrutinize the impacts of synchronous and asynchronous online teaching and learning on student variables, it is necessary to consider the role of specific teaching methods and the underlying pedagogy of the online courses (Fabrız et al., 2001). Synchronous and asynchronous settings differ in the choice of tools used and their pedagogical objectives. Xie et al. (2018) identified five variables to differentiate between synchronous and asynchronous settings: communication tools, feedback types, input methods, collaboration modes, and the skills targeted. The researchers find that while students are more satisfied with asynchronous communication tools (such as discussion forums or email communication), they also appreciate the possibility of direct instructor feedback in synchronous settings. Also, both the quality of learner-content interaction (i.e., reading interactive texts, watching videos, and completing assignments), and learner-teacher interaction (i.e., providing feedback, providing summative and formative assessments, and documenting students’ progress) have a strong effect on satisfaction with learning and perceived learning, especially in asynchronous formats (Kuo et al., 2014). Activities, such as online discussions, are perceived as more individualistic and less cooperative by students in asynchronous compared to synchronous settings and are also associated with greater negative effects and a decreased sense of belonging (Peterson et al., 2018). In contrast, learners characterize participation in online synchronous discussions as more focused, having a stronger sense of contribution, increasing motivation, and supporting better course performance than asynchronous discussions (Malik et al., 2017, Fabrız et al., 2021, Luce, 2016, LeShea, 2013). Discussing teaching and learning methods to facilitate communication within synchronous and asynchronous educational settings, researchers stress the necessity to differentiate between various types of activation and interaction and ways how students are engaged in the learning process as more crucial for study success compared to the form of course delivery (Nieuwoudt, 2020; Rapanta et al., 2020).

Improving learning outcomes is one of the most straightforward consequences of learning behind the screen education on children’s recovery. Students can learn at their own pace and at their own location using online learning. Students are less likely to miss lessons when they attend behind-the-screen courses from the comfort of their own home or a location of their choice.

### Research Design

The study used a pre-test - post-test and interview research design in the conduct of the study. It determined the effect of learning behind the screen on the

learning performance of students in Microbiology and Parasitology subjects. The study is also pre-test – post-test and interview research design because it determined the experiences of the respondents in answering the pre-test and post-test in asynchronous class as well as in synchronous class.

**Instrumentation**

The instruments that were used in this study were pre-test, post-test and interview guide. The study was used pre-test and post-test with the respondents in order to find out the effects of learning behind the screen on the learning performance of college students in Microbiology and Parasitology subject. It also used an interview guide to determine the experiences of the respondents in answering the pre-test and post-test in asynchronous and synchronous classes.

**Validity and Reliability of Instrument**

The researchers made the same set of pre-test and post-test that was submitted to the research adviser and Biology teachers for correction and validation. The draft of the interview guide for in-depth interview was also forwarded to the research adviser for the purpose of checking the content. Feedbacks were obtained from the research adviser and Biology teachers for the purpose of improving the instrument and ensuring clarity of the instruction.

The 10-item each topic with the total of 30-item test is valid with the greater value of Cronbach’s alpha 0.98 with excellent reliability.

**Data Gathering Procedure**

In this study, the researchers collected the data following these steps: First, the researchers made a pre-test and post-test questionnaire about the topics Bacterial Diseases of the Lower Gastrointestinal Tract, Sexual Transmitted Diseases and Urinary Tract Infection as well as an interview guide questions. Second, the researchers submitted a letter to the Dean’s office of the College of Education to ask permission in conducting the study. Third, the researchers forwarded the pre-test and post-test questionnaire and the interview guide to the research adviser and to the Biology teachers for correction and validation. Next, the researchers also forwarded the informed consent to the respondents asking for their participation in the study.

Upon approval, the researchers conducted a validated pre-test of the three topics through Google form. After an hour the Microbiology and Parasitology subject teacher uploaded the reading materials. After a two-hour reading activity, the researchers conducted a validated post-test of the three topics through Google form. Once the respondents have finished answering their scores were recorded.

Then, the Microbiology and Parasitology subject teacher conducted a synchronous class through ClassIn discussing the three topics which are the Bacterial Diseases of

the Lower Gastrointestinal Tract, Sexual Transmitted Diseases and Urinary Tract Infection. After the discussion, the researchers conducted another validated post-test through Google form. Once the respondents have finished answering their scores were also recorded. Finally, the researchers conducted a ten-minute face-to-face in-depth interview with the respondents in support to the result of the study. Once the in-depth interview was done the researchers kept the recorded answer of the respondents. The acquired data were subjected for statistical computation, tabulation, analysis and interpretation.

**Statistical Tools and Treatment of Data**

The data was analysed using appropriate statistical tools. For the first research problem, it used descriptive analysis such as frequency and percentage. For the second and third research problem, it used descriptive statistics such as mean. For the fourth research problem, it also used descriptive statistics such as mean, and standard deviation. For the fifth and sixth research problem, it used in-depth interview.

**RESULTS**

This chapter presents, analyses, and interprets the statistical results of the study. Tabular presentations are used in order to aid in providing data analysis and implications. The discussion of the finding includes the demographic profile of the respondents, pre-test mean score of the respondents before utilizing learning behind the screen, post-test mean score of the respondents after utilizing learning behind the screen, significant difference between the pre-test and post-test mean scores of the respondents, experiences of the respondents in answering the pre-test and post-test in asynchronous class, and experiences of the respondents in answering

Table 1: Profile of the respondents

Variable	f	Percentage
<b>Course</b>		
BSEd – General Science	12.00	100.00
Total	12.00	100.00
<b>Year Level</b>		
Third year	11.00	91.67
Fourth year	1.00	8.33
Total	12.00	100.00
<b>Age</b>		
20 years old	1.00	8.33
21	7.00	58.33
22	2.00	16.67
23	1.00	8.33
24	0.00	0.00
25	0.00	0.00
26	1.00	8.33
Total	12.00	100.00
<b>Sex</b>		
Male	3.00	25.00
Female	9.00	75.00
Total	12.00	100.00

the post-test in synchronous class.

Table 1 shows the demographic profile of the respondents in terms of course, year, age and sex. Twelve or 100.00 percent of the respondents are currently taking Bachelor of Secondary Education major in General Science.

In terms of year level, 11 or 91.67 percent are from third year college students while only 1 or 8.33 percent is a fourth year college student.

In terms of age, 7 or 58.33 percent ages 21 years old, 2 or 16.67 percent ages 22 years old, and 1 or 8.33 percent ages 20, 23, and 26 years old. Out of 12 respondents, 9 or 75.00 percent are female while 3.00 or 25.00 percent are male.

Table 2 shows the mean scores of the respondents before utilizing learning behind the screen in the three topics during the asynchronous class. It also shows the pre-test mean score of the first topic which is (M=4.08), the pre-test mean score of the second topic which is (M=4.92), and the pre-test mean score of the third topic which is (M=4.17). It also shows the post-test mean score of the first topic which is (M=6.58), the post-test mean score of the second topic which is (M=5.25), and the post-test mean score of the third topic which is (M=5.50). This table also shows that the second topic which is the Sexual Transmitted Diseases got the highest pre-test mean score of (M=4.92) and first topic Bacterial Diseases of the

Lower Gastrointestinal Tract got the highest post-test mean score of (M=6.58), while the first topic which is the Bacterial Diseases of the Lower Gastrointestinal Tract got the lowest pre-test mean score of (M=4.17) and the second topic Sexual Transmitted Diseases got the lowest post-test mean score of (M=5.25).

Table 3 shows the mean scores of the respondents after utilizing learning behind the screen in the three topics during the synchronous class. It also shows the pre-test mean score of the first topic which is (M=4.08), the pre-test mean score of the second topic which is (M=4.92), and the pre-test mean score of the third topic which is (M=4.17). It also shows the post-test mean score of the first topic which is (M=6.83), the post-test mean score of the second topic which is (M=5.25), and the post-test mean score of the third topic which is (M=6.83). This table also shows that the second topic which is the Sexual Transmitted Diseases got the highest pre-test mean score of (M=4.92) and both the first topic Bacterial Diseases of the Lower Gastrointestinal Tract and third topic Urinary Tract Infection got the highest post-test mean score of (M=6.83), while the first topic Bacterial Diseases of the Lower Gastrointestinal Tract got the lowest pre-test mean score of (M= 4.08) and the second topic Sexual Transmitted Diseases got the lowest post-test mean score of (M= 5.25).

**Table 2:** Mean Scores of the Respondents before Utilizing Learning behind the Screen

Topic	Pre-test Mean	Post-test Mean
1. Bacterial Diseases of the Lower Gastrointestinal Tract	4.08	6.58
2. Sexual Transmitted Diseases	4.92	5.25
3. Urinary Tract Infection	4.17	5.50

**Table 3:** Mean Scores of the Respondents in after Utilizing Learning behind the Screen

Topic	Pre-test Mean	Post-test Mean
1. Bacterial Diseases of the Lower Gastrointestinal Tract	4.08	6.83
2. Sexual Transmitted Diseases	4.92	5.25
3. Urinary Tract Infection	4.17	6.83

**Table 4-A:** Difference between the Pre-test and Post-test Mean Scores of the Respondents

Test	N	Mean	SD	df	p – value	Decision
Pre-test	12	4.39	1.00	22	.03	NS
Post-test 1	12	5.78	1.77			

NS – Not Significant at 0.05 level of significance

**Table 4-B:** Difference between the Pre-test and Post-test Mean Scores of the Respondents

Test	N	Mean	SD	df	p – value	Decision
Pre-test	12	4.39	1.00	22	.0004	S
Post-test 2	12	6.31	1.26			

Table 4-A shows the pre-test mean score of 4.39 (SD=1.00) and post-test mean score of 5.78 (SD=1.77) in asynchronous class. It also shows that there is no significant difference in the pre-test and post-test mean scores of the respondents in asynchronous class with 0.05 level of significance.

Tables 4-B shows the pre-test mean score of 4.39 (SD=1.00) and post-test mean score of 6.31 (SD=1.26) in synchronous class. It also shows that there is a significant difference between the pre-test and post-test mean scores of the respondents.

This presents the responses given by the respondents on the fifth research question: What are the experiences of the respondents in answering the pre-test and post-test in asynchronous class? And the sixth research question: What are the experiences of the respondents in answering the post-test in synchronous class?

Considering that not all Microbiology and Parasitology students who are currently enrolled in the A.Y. 2021-2022 at Notre Dame of Midsayap College are available to be our respondents, the researchers only gathered data from those students taking Microbiology and Parasitology

subject whom are available and agreed to be interviewed. To determine the experiences of the respondents in answering the pre-test and post-test during asynchronous and synchronous classes, an in-depth interview was used in gathering data.

### Experiences in Answering Pre-test and Post-test in Asynchronous Class

The respondents experienced difficulty in answering the pre-test and post-test during asynchronous class as the respondents had stated.

**R1** said,

*“For me it is hard because I have no idea about the topic. I find difficult to answer without the teacher’s discussion kase ... napakabirap intindihin pag walang teacher na mag ga-guide sayo.”*  
(For me it is hard because I have no idea about the topic. I find it difficult to answer without the discussion of the teacher because it hard to understand without the guidance of the teacher.)

**R2** also said,

*“Abhmmm ... parang nabirapan ako kung unsa sa pag klase natin kasi wala pa nag conduct si Ma’am ng synchronous class.”*  
(I feel like I am having a hard time in dealing with the topics because the teacher has not conducted a synchronous class yet.)

**R3** also said,

*“Of course na co-confuse ako kasi hindi pa naming ito napag-aralan ... hindi pana discuss ng teacher namin so karamihan talaga sa topic na yun is hindi pa ... wala kaming stock knowledge about that.”*

*(Of course I got confused because we have not tackled these topics yet ... Our teacher has not discuss yet the topics and we have no stock knowledge on most of the topics given.)*

**R4** also said,

*“For me, it is ano lang difficult because even though there are learning materials there is still some words that I can’t understand it is also difficult to search in google.”*

*(For me, it is difficult. Although learning materials are provided there are still some words that I cannot understand and it is also difficult to look for its definition using the google application.)*

**R5** also said,

*“Medjo kinakahaban kasi hindi kopa nabasa yung mga questions or wala pa kong stock knowledge about dun. Kumbaga... hindi sya ma search sa google, bebebe karamihan sa questions yun.”*

*(I felt a little nervous because I have not read those questions or I do not have stock knowledge about it and most of those questions could not be researched on google.)*

**R6** also said,

*“For sure it is quite differ ... difficult but I am quite use to studying in myself so for me ahmm... Na ansveran ko din naman sya I don’t know lang if it is ahmm... My answer is correct or ano mali so that’s it.”*

*(For me it is quite difficult since I used to study on my own. Then I was able to answer it, I just don’t know if my answers were right or wrong.)*

**R7** also said,

*“It is hard. It is difficult”*

*(It is difficult.)*

**R8** also said,

*“I find it difficult because ... because ... I find it difficult to answer*

*without the teacher because some of the ... idea ... wait lang ... or some of the idea ... Abhh ... HEHEHEHE ... some of the ideas are unfamiliar for me.”*

*(I found it difficult to answer without the discussion of the teacher because some of the ideas were not familiar to me.)*

**R9** also said,

*“Difficult kasi kay kuan ... kay wala gynd syay teacher’s discussion kay lisod gynd sya kay dili ka makasabot kung unsay kuan ato.”*  
(It is difficult because the teacher did not discuss it yet and I can’t understand if what those topics all about are.)

**R10** also said,

*“The topic is not familiar to me so, I find it harder and have difficulties answering those, because even if I search in Google there is no results in the topic.”*

*(I found it harder and experienced difficulties in answering those questions since the topics are not familiar to me. I also tried looking for it on Google but there are no results given.)*

In general, the respondents experienced difficulties in answering the pre-test and post-test in asynchronous class.

### Experiences in Answering Post-test in Synchronous Class

In answering the post-test in synchronous class, most of the respondents found it easy because the topics were discussed by the teacher as stated by the respondent.

**R1** said,

*“Para sa akin madali nalang intindihin kasi na discuss nang teacher ang topic na ibinigay niya samin.”*

*(For me it was easy to understand because the teacher discussed the topics given to us.)*

**R2** also said,

*“I find easy to answer after the following discussion of the teacher.”*  
(I found it easy to answer after the discussion of the teacher.)

**R3** also said,

*“For me, it is easy na rin kasi ... kasi nga na discuss na ng teacher naming and then nadagdagan narin yung knowledge naming about sa topic nayun kaya medjo madali narin samin na sagutan yung mga question na yun.”*

*(For me it is already easy because the topics were discussed by our teacher and from that we gained knowledge which leads us to answer the questions easily.)*

**R4** also said,

*“Easy. Yun na tapos na.”*

*(It was easy for me.)*

**R5** also said,

*“Yes of course it is easy after the discussion of Ma’am.”*

*(It is easy after the discussion of the teacher.)*

**R6** also said,

*“Actually hindi na mahirap kasi na discuss na sya ng teacher or I am also, also familiar abb... Familiar na sa mga questions... And but I still don’t know kung abb... Tama ba yung mga, mgaa... Answers ko kasi diko parin sya na check during discussion kasi ahmm... I admit hindi ko din, Hindi din ako naka focus duon sa synchronous na yun.”*

*(Actually it is no longer difficult because it was already discussed by the teacher or I am also familiar with the questions but I still don’t know if I answered it right because I was not able to focus on the*

synchronous class.)

**R7** also said,

*"It is easy because it was being discussed by the teacher."*

*(It is easy because the topics were being discussed by the teacher.)*

**R8** also said,

*"I find it easy because the teacher already discusses the topics."*

*(I found it easy because the teacher already discussed the topics.)*

**R9** also said,

*"Kuan ... dili na kaayo siya as in lisod medyo easy na siya kay na discuss naman."*

*(It is no longer that difficult. It is quite easy because it was already discussed.)*

**R10** also said,

*"Yes, I still have difficulties in answering because Uhhh.. the.. there is a poor signal and I cannot able to really understand the topic in the discussion because of the choppy problem."*

*(I still experienced difficulties in answering the post-test because the internet connection was poor and I cannot understand the discussion of the topics.)*

In synchronous class, the respondents found it easy to answer the post-test after the discussion of the teacher.

## DISCUSSIONS

The mean scores of the respondents before utilizing learning behind the screen. Based on the results, the pre-test total mean score of the respondents in asynchronous class is (M=4.39). The topic Sexual Transmitted Diseases (STD) has the highest mean score (M=4.92) which means that among the three topics, the respondents have more prior knowledge in STD than the other topics. While the topic that has the lowest mean score (M=4.08) is the Bacterial Diseases of the Lower Gastrointestinal Tract which means that students do not have prior knowledge about the topic. Based on the results, the post-test total mean score of the respondents in asynchronous class is (M=5.78). The topic Bacterial Diseases of the Lower Gastrointestinal Tract has the highest mean score (M=6.58) which means that among the three topics, the respondents have learned a lot in reading the materials about the topic. While the topic that has the lowest mean score (M=5.25) is the topic Sexual Transmitted Diseases which means that the respondents does not understand clearly the given materials.

The mean scores of the respondents after utilizing learning behind the screen. Based on the results, the post-test total mean score of the respondents in synchronous class is (M=6.31). The topic Bacterial Diseases of the Lower Gastrointestinal Tract and the topic Urinary Tract Infection have equal mean score (M=6.83) which means that among the three topics, the respondents have learned a lot in these topics with the guidance of the teacher during the discussion via ClassIn application.

The difference between the Pre-test and Post-test Mean Scores of the Respondents. Based on the results, the pre-test and post-test mean scores of the respondents in asynchronous class are (M=4.39) and (M=5.78), respectively in which the mean increased which means that the students learned from the given materials on

their own. However, their scores does not increased that high and it means that there is no significant difference between the pre-test and post-test mean scores of the respondents in asynchronous class. In contrary to the study of (Nieuwoudt 2020; Northey et al., 2015) in which the impact of synchronous and asynchronous teaching settings on student performance are not without ambiguity. Nieuwoudt (2020) found that it did not make a difference for student achievement whether students attended synchronous virtual classes or watched the recordings of the virtual classes. However, the sheer time students participated in and interacted with the online learning system did significantly affect their academic success. Also, active participation in both synchronous and asynchronous online learning opportunities has been found to result in higher engagement and better academic outcomes than attending face-to-face classes only (Northey et al., 2015).

Moreover, it supports the idea of (Evans & Sabry, 2002) which revealed that students who interact more with the system achieve higher results and require less time to learn. And the study of (Damianov & Calafiore, 2009), there is a favorable correlation between time spent behind the screen and results estimated by student scores, particularly among students in the above-average category. In contrast to what Eom (2006) believed, there was no link between various forms of engagement and student learning results.

The difference between the pre-test and post-test mean scores of the respondents. The pre-test mean score of the respondents is (M=4.39) and the post-test mean score of the respondents in synchronous class is 6.31 in which the scores of the respondents have increased after the discussion of the teacher. This means that there is a significant difference after the synchronous class was conducted. This finding was supported by the study of (Chen and You, 2007; Hrastinski, 2008, 2010; Malkin et al., 2018) discussing that learners characterize participation in online synchronous discussions as more focused, having a stronger sense of contribution, increasing motivation, and supporting better course performance than asynchronous discussions.

In addition, it is also supported by (Ji, Luo, Feng, Xiang, and Xu 2022) in which teaching has been increasingly employed in medical education. Many studies have shown this "study centered" pedagogical model improves students' overall achievement in the course, with students showing more motivation and better self-directed learning skills when compared to the traditional classroom teaching. However, most of the previous studies have been evaluating the short-term effects of FC teaching conducted upon completion of the course. The retention of the promotion and the long-term effects on learning of students' subsequent course deserve further attention and evaluation. By adopting and running FC teaching in the whole course of physiology, this study aimed to determine the short-term impact of FC teaching on students' learning of physiology course and also the long-

term influences in students' learning of follow-up medical curriculums within 18 months after the completion of physiology course.

The experiences in answering the pre-test and post-test in asynchronous class. In answering the pre-test and post-test in asynchronous class the respondents stated that they encounter difficulties because they are not familiar with the topic, they do not have enough stock knowledge to answer the test and because the teacher was not able to discuss the topics yet. The findings of the study was in contrast to the study of Kuo et al., 2014 in which they stated that students are more satisfied with asynchronous communication tools (such as discussion forums or email communication), they also appreciate the possibility of direct instructor feedback in synchronous settings. Also, both the quality of learner-content interaction (i.e., reading interactive texts, watching videos, and completing assignments), and learner-teacher interaction (i.e., providing feedback, providing summative and formative assessments, and documenting students' progress) have a strong effect on satisfaction with learning and perceived learning, especially in asynchronous formats (Kuo et al., 2014; Nandi et al., 2015; Alqurashi, 2019; Fredericksen et al., 2000).

In addition it was also supported by the study of Jacques et Al 2020, this unexpected change in the teaching format has forced engineering students to adapt the new ways of learning under the conditions of a health crisis, potentially affecting their learning development. Based on their response, learning behind the screen is not an easy way of learning, especially for those taking Microbiology and Parasitology subject because this subject needs laboratory classes it's a hard time for them to fully adapt new way and understand the topics on their own.

The findings of the study was also supported by the responses of the respondent during the interview which R9 states, "Difficult kasi kay kuan ... kay wala gyud syay teacher's discussion kay lisod gyud siya kay dili ka makasabot kung unsay kuan ato." (It is difficult because the teacher did not discuss it yet and I can't understand if what those topics all about are.)

Experiences in answering post-test in synchronous class. In terms of answering the post-test after conducting synchronous class, some of the respondents found it easy to answer the three topics because the teacher was able to discuss the three topics. This finding was supported by the study of (Nsa et al., 2012; Ogonna et al., 2019) in which students learning experience positive outcomes, and the type of performance matter: They acquired practical skills better when they are taught in a synchronous online setting. Also, synchronous learning positively impacts learners' commitment and their task motivation (Hrastinski, 2008). At the same time, similar to face-to-face settings, the danger of disengaged participation in class (e.g., passive listening or watching the teacher's lecture, silently reading peer statements in the chat) has to be considered (Smith and Smith, 2014). In addition based on the study of (Kang & Im, 2013)

in which the conventional teaching approach, where the teachers play a central role, student-teacher interaction is a vital activity. Learners take center stage in learning behind the screen setting, and teacher-student interaction becomes more flexible in a variety of ways. When implementing learning activities such as learning assistance, social intimacy, communication and instructional Q & A, instructor presence, and instructional support. They found out that interactive activities between teachers and students have an impact on students' learning outcomes. However there is still one respondent who experienced difficulty in answering the post-test after the synchronous class because of the internet connection. This study was supported with the idea of (Aristovnik et al., 2020) in which he stated that a significant percentage of college students, especially those from disadvantaged families, have had problems assessing internet services due to the unexpected situation and the rapid transition to learning behind the screen. Students did not have time to adapt their work space, which may have had an impact on their learning performance.

The findings of the study was also supported by the responses of the respondent during the interview which R9 states, "For me, it is easy na rin kasi ... kasi nga na discuss na ng teacher naming and then nadagdagan narin yung knowledge naming about sa topic nayun kaya medjo madali narin samin na sagutan yung mga question na yun." (For me it is already easy because the topics were discussed by our teacher and from that we gained knowledge which leads us to answer the questions easily.)

## CONCLUSIONS

Based from the findings of the study, the following conclusions were drawn. After the careful analysis of the responses of the respondents, the researchers concluded that the students taking Microbiology and Parasitology subject can learn more during synchronous class or with the guidance of the subject teacher. The researchers also concluded that student-teacher interaction helped increased the scores of the students in synchronous class compared to asynchronous class.

Students experienced difficulty in learning in asynchronous class because the teacher was not able to discuss the topics yet while they found synchronous classes helpful in increasing their learning performance.

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