ENGAGEMENT AND SELF-REGULATION ON LEARNING SATISFACTION OF PRE-SERVICE TEACHERS IN A FULLY ONLINE FLIPPED CLASSROOM

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Abstract: Considering the sudden shift from traditional learning to online and the closure of HEIs during the coronavirus-19 pandemic, issues associated with the adoption of online learning have emerged. A fully online flipped classroom pedagogical approach was employed to face these difficulties in teaching the Core Teacher Education Program at Central Mindanao University, College of Education. Within this context, the study aimed to investigate the factors that contribute to the learning satisfaction of pre-service teachers in a fully online flipped classroom. Specifically, the study focused on the role of engagement and self-regulation skills in predicting learning satisfaction. The descriptive-correlational technique was used in the study to provide a more in-depth grasp of the research concerns.

The study's participants were pre-service teachers enrolled at Central Mindanao University's College of Education's Core Teacher Education Program. The researcher employed a self-report questionnaire to assess student involvement, interest, and motivation in the online learning environment to quantify engagement. A similar self-report questionnaire that examined the ability to create objectives, manage time, and govern one's own learning was used to test self-regulation skills. Learning satisfaction was examined using a Likert scale questionnaire that rated pre-service teachers' overall satisfaction with the fully online flipped classroom approach. The questionnaire data was evaluated using statistical approaches such as correlation analysis and multiple regression analysis.

This study found that pre-service teachers in a fully online flipped classroom were highly engaged and demonstrated strong self-regulation skills. They were satisfied with the active learning opportunities provided by the approach. The study also revealed a significant relationship between engagement, self-regulation skills, and learning satisfaction. Specifically, learning engagement and metacognitive skills were identified as predictors of learning satisfaction. These findings suggest that the fully online flipped classroom approach can be an effective alternative to hybrid instruction and can be adapted for online learning in higher education post-COVID-19.

Keywords: fully online flipped classroom, engagement, self-regulation, learning satisfaction

Introduction

Global education has undergone fast change as a result of the COVID-19 crisis. When the pandemic was at its worst, Philippine institutions of higher learning, like Central Mindanao University, introduced flexible learning as a substitute. The quick response and approach seek to lessen the shutdown while continuing to provide high-quality education. Technology is playing a crucial role in enabling the "new normal" in education.

Many teachers and students, especially those who chose online means of instruction, experienced anxiety and stress as a result of this unexpected change. The study, in which 56.85% of the 10,077 students and 83.81% of the 420 regularly reporting staff members participated, suggests that certain students and professors may not have access to online information due to poor internet connectivity. The percentage of students without internet access is 43.15%. According to Central Mindanao University's contingency plan for the new normal for 2020, 75.57% of faculty

members have devices and internet access for online learning, but 16.19% have no access to either (Central Mindanao University, 2020). The fact that our nation is known to have the worst and slowest Internet connection speed among ASEAN countries may be the reason why students and staff are wary about entirely online training. Students' learning experiences and achievement was one of the challenges of online learning.

When compared to in-person face-to-face learning, online learning is frequently considered as a poorer choice that offers a lower quality education (Hodges et al., 2020). This might be because there isn't equal access to technology resources or Internet technologies that would enable online learning in many different contexts. According to Sampson et al. (2010), student learning satisfaction are reliable measures of the value and efficacy of online programs. Therefore, it is important for institutions to understand how satisfied their students are with their educational experiences overall (Kember and Ginns, 2012). The possibility of the COVID-19 pandemic makes full-fledged face-to-face sessions in schools a major worry, even if the vaccination distribution has just recently started. In this context, the Commission on Higher Education (CHED) recommends online learning to higher education institutions as a pedagogical strategy. As an illustration, several professors at our university simply posted their PowerPoint presentations, learning modules, or PDF files to Google Classroom and encouraged students to read them on their own. Other teachers asked their students to watch the video lectures they had recorded of their lectures at their own convenience. On the other hand, students who were at home used synchronous video platforms like Google Meet and Zoom.

Although these online methods may be an efficient method of delivering content, they are not particularly effective in promoting active learning and interest (Bates and Galloway, 2012). Indeed, without any active learning activities such as peer interaction, a fully online course will feel more like an interactive book than a classroom (Sutterlin, 2018). While the instructor spends most of the course time presenting the content, students generally take notes as passive listeners, which often leads them to have low motivation (Huang & Hong, 2016). Although there are various forms of online software, applications, and pedagogies, Biesta (2019) expressed concern that online teaching may "spell a return to more conventional ways of teaching." This raises questions about whether the crisis that we are currently facing might lead us back to conventional ways of teaching or whether new forms of teaching and practice can be more effectively woven together in teacher training.

One promising strategy for promoting active learning in an online environment is the fully online flipped classroom pedagogical approach, referred to as the online flipped classroom approach. This is a variant of the conventional flipped model. A conventional flipped classroom model consists of online learning of basic concepts before class, followed by face-to-face learning activities (Bishop and Verleger, 2013). Students are encouraged to prepare for class by completing pre-class activities (e.g., watching video lectures, listening to podcasts, reading self-learning modules, and completing quizzes). However, in online flipped classrooms, students do not meet face-to-face but online (Stohr et al., 2020). The literature on this techno-pedagogy was scarce, especially on examining its effectiveness and impact on students' engagement, self-regulation, and learning satisfaction. As the Philippines HEIs venture into a new mode of learning and the Commission on Higher Education (CHED) has adopted a policy to adapt online or distance learning in the years to come, several factors need to be considered. Thus, educators need to know whether this active learning approach can be used during prolonged school closures. Closing the knowledge gap can promote positive social change in the innovative teaching and learning approaches adopted by HEIs to increase student satisfaction.

Considering the points mentioned above, in this research, the researcher aimed to determine the predictors of pre-service teachers' learning satisfaction in a fully online flipped classroom considering their engagement and self-regulation skills. To this end, one subject in the College of Education Teacher Education Program was transformed into an online flipped classroom. This is to acquaint pre-service teachers with online learning approaches that they can use in the future. This pandemic also challenges teacher education to transfer learning in an online setting. The 2016 World Bank survey Public Education Expenditure Tracking and Quantitative Service Delivery Study (PET-QSDS) reported that knowledge of subject matter among basic education teachers in the Philippines is low in most subject areas (World Bank, 2016). Teacher quality is also reflected in students' performance in the licensure examinations. For professional teachers, for example, the Philippine Business for Education (PBS) reported that the country's overall performance in the Board Licensure Examination for Professional Teachers (BLEPT) for the past

eight years has been dismal and even further declining (Philippine Busines for Education, 2017). Therefore, the need to prepare pre-service teachers to work in complex settings seems to be more crucial than ever. Moreover, the utilization of and capacity for fully online flipped classrooms in pre-service teachers was not described before. Thus, this study was conceived.

Method

Despite the momentum of the fully online flipped classroom approach in higher education, there is insufficient empirical evidence about the effects in online learning environments. This study explored pre-service teachers' engagement, self-regulation skills, and learning satisfaction in a fully online flipped classroom in a Teacher Education Program core subject at Central Mindanao University, College of Education during the COVID-19 pandemic. The major problem of the study was to address this question: what are the predictors of learning satisfaction of pre-service teachers considering their engagement and self-regulation? In this vein, it sought to answer the following questions: (1) What level of engagement in a fully online flipped classroom do pre-service teachers have in terms of: a. engagement with course topics, b. personal motivations, c. cognitive engagement, and d. emotional engagement? (2) What level of self-regulation skills in a fully online flipped classroom do pre-service teachers possess in terms of: a. metacognitive skills, b. time management, c. environmental structuring, d. persistence, and e. help-seeking?; (3) What level of learning satisfaction do pre-service teachers have in a fully online flipped classroom?; (4) Is there a significant relationship between pre-service teachers' engagement, self-regulation skills, and learning satisfaction in a fully online flipped classroom?; and (%) What variable/s singly or in combination best predict pre-service teachers' learning satisfaction in a fully online flipped classroom?

The investigation utilized the descriptive-correlational approach to provide a more in-depth understanding of the research problems. It was descriptive because it aimed to determine the level of pre-service teachers' engagement, self-regulation skills, and learning satisfaction in a fully online flipped classroom. Data gathered was used to test the hypotheses or answer questions regarding the current status of the subjects under study. On the other hand, the study was correlational because it measured the relationship between students' engagement, self-regulation skills, and learning satisfaction in a fully online flipped classroom. The study also used multiple regression to predict variable/s singly or in combination best-predicted students' learning satisfaction in a fully online flipped classroom. This study was conducted in Central Mindanao University (CMU), an institution for higher learning in Mindanao that caters to varied learners from all walks of life. This particular institution was chosen because the researcher worked at the institution, and it was not difficult to obtain data by interviews, questionnaire survey, or observation.

Participants

To this end, one subject in the College of Education Teacher Education Program was transformed into a fully online flipped classroom. The third-year pre-service teachers, specifically those who opted for online methods of instruction and who were officially enrolled in the SY 2020-2021, were the study participants. This population was comprised of seventy (70) third-year Science major pre-service teachers pursuing Bachelor of Secondary Education major in sciences. The third-year pre-service teachers were considered participants because they are in the best position to assess themselves as they know their level of engagement, self-regulation skills, and learning satisfaction in a fully online flipped classroom. The demographic profile of the respondents was not included in the study. There was no possibility for controlling for many of the student characteristics that influenced the results.

Implementation of the study

This study was conducted in the College of Education Teacher Education Program core subject called "The Teacher and the School Curriculum." This course was a three-credit, core course about the fundamental concepts and principles in curriculum and curriculum development as a foundation to engage prospective teachers as curriculum makers. Before the application process, the pre-service teachers were asked to attend the virtual class orientation live-streamed via Facebook Live in order for them to be acquainted with how their education environment works in the new normal. They were asked to register in the course through Google Classroom Learning Management System. The following were presented during the virtual class orientation: Introduction of

the subject teacher, an overview of the course, delivery of learning modalities, grading system, educational tools to be used in class, netiquette guidelines, and frequently asked questions. It is believed that students gain their learning experiences into this system. They were oriented on using the educational tools through tutorial videos that were shown in the virtual class orientation. They were acquainted with the fully online flipped learning approach during the virtual class orientation. They have to watch the lecture videos or listen to podcasts created by the instructor, uploaded in Google Classroom, and the instructor's Facebook Page (Ms. G's Facebook Page). This allows easy access for students since most students are already familiar with how these learning spaces work. Some of the tools used to record videos are presentations (PowerPoint) with sound, Canva, Prezi Video, Filmora, Camtasia, CapCut, Animiz, Muvizu, Videoscribe, and Powtoon. Lecture videos were made simple, readable, visually appealing, understandable, and easily accessible for students.

However, the weekly preparation of the learning modules, lecture video recordings, and editing the podcasts was a challenging and exhausting task on the instructors' end. Hence, a video editing software was used to ensure the images, videos, and sound were as clear as possible before using the videos to deliver information. Audacity and Adobe Audition software applications were used to enhance the audio intelligibility, the voice of the instructor was amplified, and extraneous sounds were removed that might distract students from listening to their instructors' voice. In addition, to detect the students' previous knowledge, tools such as Mentimeter, Slido, Google Forms, and ZipGrade Online Quiz are used. They make it possible to enrich the videos and podcast with questions and allow the instructor to see the answers to the questions before the class.

The pre-service teachers were also given self-learning modules that were uploaded on Google Classroom. They were given 1-2 weeks to do the pre-class activities that allowed them with longer, student-driven tasks that may foster autonomy. For example, they were asked to watch the lecture videos or listen to podcasts and work on their learning modules independently before coming to their synchronous class (videoconferencing-assisted instruction via Google Meet). This gives them the freedom over how, when, and where they learn and lets them engage with the video/podcast/learning module content in the way that suits them best. The broad time frame for the online submission was also an attempt to mitigate the reduced access to Google Classroom online submission from students in other regions of the Philippines with intermittent internet connections.

Watching the lecture videos and listening to podcasts takes about 15-30 minutes. Ideally, the lecture videos should be kept short of engaging the students fully. In this case, more extended topics were divided into several shorter videos (i.e., segmentation). In the study, to make sure that the students watch the videos and listen to the podcasts created by the instructor, they were asked to accomplish an online quiz that consisted of open-ended questions about the content of the video. For example, students answered the Watch, React, and Reflect (WRR) assessment. For Watch, they were asked to specify the concepts of the instructional video made by the instructor. For React, they were asked to give their reactions to the instructional video. Lastly, for Reflect, students were asked to give the insights they gained that they can apply to real life.

Since the pre-service teachers are familiar with the subject matter before the class starts, the instructor can then spend the class hours collaborating with students and help them understand the topic better through more engaging, collaborative, and active learning activities. A better way to describe it is, "Less 'sit and listen' equals more 'do and learn.' The common misconception about flipped classrooms is that most people think only of videos. The collaborative interaction and learning activities occurring in an online setting are very important. Hence, synchronous lecture sessions were conducted using Google Meet. The synchronous meetings were also recorded for those students who were unable to attend the scheduled meeting and those struggling with internet connectivity. The synchronous sessions were dedicated mainly to reinforcing difficult concepts and a summary of the learning outcomes of the video lectures. Instructional activities that were employed during videoconferencing assisted instruction via Google Meet are: solving real-world problems through talk shows, scavenger hunt, draw it activity, quescussion activity/structured discussion, debates, virtual game activities ("Are you smarter than a fifth-grader?" and "Who Wants to Be a Millionaire?"), etc. Following that, the students completed the activities in their module, which the instructor created within the course period.

After completing their modules, students turned in their outputs on Google Classroom Classwork. The instructor then provided comments on their works and audio feedback through Vocaroo to improve their learning and outputs. For the third-year pre-service teachers to grapple with online flip learning, they were asked to incorporate this active learning approach during their online teaching activity for the final term. This acquainted the pre-service teachers with online learning approaches that they can use in the future. This is imperative for Teacher Education Programmes to prepare pre-service teachers to adapt to work in complex settings as the world faces the current COVID-19 global pandemic. This will also teach them resilience and a growth mindset to promote continuity of learning. Moreover, the introduction of this Online Flipped Learning model to pre-service teachers requires them to experience the advantages that this pedagogy presents, becoming the protagonist of the learning process, which was guided and supported by the instructor. They were asked to work in teams. They were assigned different tasks as designated by their leader. The pre-service teachers then instructed their classmates (as their students) to preview the instructional videos they created before their synchronous class via Google Meet. During live meetings or videoconferencing assisted instruction via Google Meet, the pre-teachers (who were the teachers in class) and students (their classmates) worked collaboratively, which allowed them to grapple with, apply and elaborate on course concepts. Pre-service teachers then employed collaborative coursework and active learning strategies during their synchronous class, such as solving real-world problems, game activities, debate, structured discussion, etc.

Results

Pre-service teachers' level of engagement in a fully online flipped classroom

This part presents the level of pre-service teachers' engagement in a fully online flipped classroom. The pre-service teachers' engagement was assessed in the following dimensions: engagement with course topics, personal motivations, personal motivations, cognitive engagement, and emotional engagement.

Table 1. Pre-service teachers' level of engagement in a fully online flipped classroom

INDICATORS	Mean	Qualitative Description	Qualitative Interpretation
Engagement with course topics			
After taking this course, my interest in this course subject is very high.	3.26	Very often	Highly engaged
Between class sessions I often think about the course topics, class activities, and/or discussions.	3.16	Very often	Highly engaged
I have discussed ideas from the course with people outside of my class.	2.81	Often	Moderately engaged
I have performed additional non-graded study (e.g. extra reading, additional homework problems) on course topics for my own learning and interest.	2.74	Often	Moderately engaged
Personal Motivations			
I attempted all assigned course work (assignments, reading, projects).	3.39	Very often	Highly engaged
For class sessions I attended, I typically focused or paid attention.	3.19	Very often	Highly engaged
I consider myself a motivated student in this course.	3.14	Very often	Highly engaged
I attended all of the class sessions.	2.84	Often	Moderately engaged
I completed the required readings and watched instructional videos prior to our Google Meet live meetings.	2.83	Often	Moderately engaged
I weekly spent around the following number of out-of-class hours working on this course (e.g., assignments, studying, reviewing notes, reading materials, and writing papers).	2.73	Often	Moderately engaged
Cognitive engagement			
This course has contributed to my acquiring knowledge and	3.47	Very often	Highly engaged

skills related to my career path.			
This course has contributed to my developing skills in using materials, tools, and/or technology central to this subject.	3.46	Very often	Highly engaged
This course has contributed to my enhancing my ability to think creatively.	3.44	Very often	Highly engaged
This course has contributed to my ability to analyze an idea in depth, and being able to understand its components	3.43	Very often	Highly engaged
This course has contributed to my learning terms and facts about the course subject.	3.36	Very often	Highly engaged
This course has contributed to improving my rational thinking, problem-solving, and decision making ability.	3.36	Very often	Highly engaged
This course has contributed to my learning concepts and theories related to the subject.	3.34	Very often	Highly engaged
Emotional Engagement			
I enjoy learning new things in this class.	3.49	Very often	Highly engaged
This class is fun.	3.44	Very often	Highly engaged
When we work on something in this class, I get involved.	3.40	Very often	Highly engaged
When I'm in this class, I feel good.	3.36	Very often	Highly engaged
When we work on something in this class, I feel interested.	3.23	Very often	Highly engaged

Table 2. Summary of pre-service teachers' level of engagement

INDICATORS	Mean	Qualitative Description	Qualitative Interpretation
1. Cognitive Engagement	3.41	Very often	Highly engaged
2. Emotional Engagement	3.38	Very often	Highly engaged
3. Personal Motivations	3.02	Very often	Highly engaged
4. Engagement with course topics	2.99	Often	Moderately engaged
OVERALL MEAN	3.20	Very often	Highly engaged

The summary of pre-service teachers' level of engagement in four categories is presented in Table 2. Among four indicators, three indicators were rated as "Very often". "Cognitive Engagement" ranked first and obtained the highest overall mean value of 3.41; followed by "Emotional Engagement" with an overall mean value of 3.38; and lastly, "Personal Motivations" with an overall mean value of (3.02). One indicator was rated "Often". This indicator was "Engagement with course topics" with an overall mean value of (2.99). This variable had an overall mean score of 3.20 with a descriptive rating of "Very often" and a qualitative interpretation of "Highly engaged".

The results of this study revealed that the pre-service teachers are highly engaged in their fully online flipped class. They take responsibility for their choices, utilize feedback, assess personal behavior, utilize feedback, assess responses to encounter, analyze opportunities and take action to improve. In this study, this may be attributed to the opportunities for interaction among the pre-service teachers themselves and interaction between students and their instructor in the fully online flipped classroom mode and the preparation of course content at the students' convenience. Students were enabled to work individually and in groups. This may have assisted their familiarity and clarification of the course, making it enjoyable to them and triggering their productivity, engagement, and motivation in the online learning environment. In the present study, the pre-service teachers were asked to complete pre-class activities like watching videos or listening to podcasts made by the instructor. They were also given self-learning modules and completed online assessments. They read the class materials asynchronously based on their time and at their own pace. Then, they use synchronous class time via Google Meet videoconferencing instruction to participate in online discussions or other collaborative learning activities like solving real-world problems, group discussions, playing virtual games, etc. They learned the content before class, and then, during

class, the instructor and the students discussed what they learned through engaging and collaborative learning activities.

The result of this study was consistent with Baepler, Walker and Driessen (2014) study, which compared the effectiveness of the traditional classroom with two active learning groups (flipped/blended) courses on students' satisfaction and their learning outcomes. Their study showed statistically significant positive results for students who were taught in both active learning courses compared to their counterparts in the traditional group. The results of the present study support previous research by Small horn (2017), which compared students' engagement and their learning outcomes after replacing lectures with flipped classroom method activities. The study results showed students' engagement increased statistically with a positive attitude towards the learning method.

Results indicate that "Cognitive Engagement" and "Emotional Engagement" obtained the two highest mean among indicators. This means that the pre-service teachers are highly cognitively and emotionally engaged in their fully online flipped class/course. In this sense, flipped learning seems to affect their cognitive and affective behavior, making them more engaged and motivated towards their education. Thus, it enabled them to promote their positive learning emotions and cognitive learning engagement, which increased their active learning, enjoyment, and accomplishment of their goals in the course. In the present study, the third-year preservice teachers were asked to incorporate this active learning approach during their online teaching activity for the final term. This enabled them to grapple with online flip learning. This acquainted the pre-service teachers with online learning approaches that they can use in the future. This is imperative for Teacher Education Programmes to prepare pre-service teachers to adapt to work in complex settings as the world faces the current COVID-19 global pandemic. This is to allow them to integrate and apply their knowledge in the course. They were asked to work in teams. They were assigned different tasks as designated by their leader. The pre-service teachers then instructed their classmates (as their students) to preview the instructional videos they created before their synchronous class. During videoconferencing assisted instruction via Google Meet, the pre-service teachers (who were the teachers in class) and students (their classmates) worked collaboratively, which allowed them to grapple with, apply and elaborate on course concepts. Pre-service teachers then employed collaborative coursework and active learning strategies during their live meetings, such as solving real-world problems, game activities, debate, structured discussion, etc.

Results of this present study indicate that fully online flipped learning promoted the pre-service teachers' positive learning emotions, which increased their active learning, enjoyment, and goals. This suggests that the pre-service teachers are highly emotionally engaged in their fully online flipped class/course. This may be because the pre-service teachers enjoy the collaborative interaction and learning activities that occur during their synchronous class via Google Meet. Since the pre-service teachers are familiar with the subject matter before the class starts, the instructor can then spend the class hours collaborating with students and help them understand the topic better through more engaging, collaborative, and active learning activities. A better way to describe it, "Less 'sit and listen' equals more 'do and learn. Instructional activities that were employed during videoconferencing assisted instruction via Google Meet are: solving real-world problems through talk shows, scavenger hunt, draw it activity, quescussion activity/structured discussion, debates, virtual game activities ("Are you smarter than a fifth-grader?" and "Who Wants to Be a Millionaire?"), etc. Following that, the students completed the activities in their module, which the instructor created within the course period. After completing their modules, students turned in their outputs on Google Classroom Classwork. The instructor then provided comments on their works and audio feedback through Vocaroo to improve their learning and outputs.

Banna et al. (2015) also stated that student engagement is a solution to various problems in online learning, such as school dropouts, retention, and student graduation rates. Moreover, the present study aimed to understand students' engagement in a fully online flipped classrooms, especially during the COVID-19 pandemic. Morgan (2020) added that providing a student-centered learning environment is critical during this COVID-19 pandemic. Teachers are encouraged to use a student-centered approach and active learning apporach to encourage learners to share ideas, collaborate with other course members, and help them continue with their online learning. This approach to education reverses students'roles from passively receiving information to actively participating in a process that emphasizes discovery and learning experience. Most importantly, it is critical to explore whether online pedagogies

or techno-pedagogies serve learners' interests and allow them to have high levels of engagement and learning outcomes that teachers and teacher educators aspire to achieve.

Pre-service teachers' level of self-regulation in a fully online flipped classroom

This part presents pre-service teachers' self-regulation skills in a fully online flipped classroom. Self-regulation skills were assessed in the following aspects: metacognitive skills, time management, environmental structuring, persistence, and help-seeking.

Table 3. Pre-service teachers' level of self-regulation skills in a fully online flipped classroom

INDICATORS	Mean	Qualitative Description	Qualitative Interpretation
Metacognitive skills			
I think about what I have learned after I finish working on this course.	3.14	Always	Highly self-regulated
I ask myself questions about how well I am doing while learning something in this course.	3.13	Always	Highly self-regulated
I change strategies when I do not make progress while learning for this course.	3.11	Always	Highly self-regulated
I think about what I really need to learn before I begin a task in this course.	3.07	Always	Highly self-regulated
I think about what I really need to learn before I begin a task in this course.	3.06	Always	Highly self-regulated
Although we don't have to attend daily classes, I still try to distribute my studying time for this evenly across days.	3.01	Always	Highly self-regulated
I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the whole course).	2.84	Usually	Moderately self-regulated
Time Management Skills			
I make sure I keep up with the weekly readings and assignments for this course.	2.93	Usually	Moderately self-regulated
I often find that I don't spend very much time on this course because of other activities. *	2.54	Usually	Moderately self-regulated
I find it hard to stick to a study schedule for this course.*	2.43	Usually	Moderately self-regulated
Environmental structuring			
I know what the instructor expects me to learn in this course.	3.21	Always	Highly self-regulated
I find a comfortable place to study for this course.	3.20	Always	Highly self-regulated
I choose the location where I study for this course to avoid too much distraction.	3.20	Always	Highly self-regulated
I know where I can study most efficiently for this course.	3.09	Always	Highly self-regulated
I have a regular place set aside for studying for this course.	2.93	Usually	Moderately self-regulated
Persistence			
When my mind begins to wander during a learning session for this course, I make a special effort to keep concentrating.	2.96	Usually	Moderately self-regulated
When I begin to lose interest for this course, I push myself even further.	2.90	Usually	Moderately self-regulated
I work hard to do well in this course even if I don't like what I have	2.90	Usually	Moderately

to do.			self-regulated
When I am feeling bored studying for this course, I force myself to pay attention.	2.73	Usually	Moderately self-regulated
Help seeking			
When I am not sure about some material in this course, I check with other people.	3.24	Always	Highly self-regulated
When I do not fully understand something, I ask other course members in this course for ideas.	3.20	Always	Highly self-regulated
I communicate with my classmates to find out how I am doing in this course.	3.11	Always	Highly self-regulated
I share my problems with my classmates in this course online so we know what we are struggling with and how to solve our problems.	3.10	Always	Highly self-regulated
I am persistent in getting help from the instructor of this course.	2.87	Usually	Moderately self-regulated

Table 4. Summary of pre-service teachers' level of self-regulation skills

INDICATORS	Mean	Qualitative Description	Qualitative Interpretation
1. Environmental structuring	3.13	Always	Highly self-regulated
2. Help seeking	3.11	Always	Highly self-regulated
3. Metacognitive skills	3.11	Always	Highly self-regulated
4. Persistence	2.90	Usually	Moderately self-regulated
5. Time management	2.87	Usually	Moderately self-regulated
OVERALL MEAN	3.02	Always	Highly self-regulated

The summary of pre-service teachers' level of self-regulation skills in five categories is presented in Table 4. Among five indicators, three indicators were rated as "Always ". "Environmental structuring" ranked first and obtained the highest overall mean value of 3.13; followed by ""Help-seeking" with an overall mean value of 3.11; and "Metacognitive Skills" with an overall mean value of 3.11. Two indicators were rated "Usually". They are: "Persistence" (2.90) and "Time management" (2.87). This variable had an overall mean score of 3.02 with a qualitative description of "Always" and qualitative interpretation of "Highly self-regulated".

Results indicate that the pre-service teachers apply their ability to monitor and manage their emotions, thoughts, and behaviors in acceptable ways in their online flipped class. They also employ their ability to sustain focus on working with their coursework while relating well to other course members. They also regulate and monitor their own learning by using their metacognitive strategies and time management skills, thus simultaneously controlling their motivation to perform these strategies. They apply their self-learned knowledge and adopt better self-regulation strategies for their online activities.

In consonance to the study conducted by Sahin et al. (2015), they found out that the core concept of flipping activities helps students grow as self-regulated learners that is, to think about, participate in, and regulate their own learning process. This consists of reversing the thinking behind traditional teaching and using innovative teaching strategies. According to Adnan (2017), flipped learning improves students' self-discipline and self-regulation skills because it requires students to view videos in advance and manage their learning processes. Flipped classrooms apply emerging technologies and need students to prepare for classes by viewing online videos provided by the teachers (Flumerfelt & Green, 2013). However, in this study, it should be noted that there were no in-class or face-to-face activities. All activities were done purely online due to the ongoing pandemic. Active learning methods tend to be more student and learning-oriented than traditional teaching methods. The pre-service teachers don't only listen but also read, write, discuss, and engage in active learning activities.

Results indicate that "Environmental structuring" and "Help-seeking" obtained the two highest mean among indicators. This means that the pre-service teachers apply their ability to structure their environment and seek help from other people, when needed, in their online flipped class. This simply means that they designed their learning environment, such as planning activities, organizing teachers' support and instructions, formations and resources, and how the physical environment may be rearranged to avoid distractions to enhance their learning in their online flipped class. They also apply their ability to connect with their classmates and instructor for self-improvement by asking for opinions and ideas. They share their struggles in seeking a solution from the course members. This finding also emphasizes that the pre-service teachers had a clear view of what they are expected to learn in their fully online flipped class. They also structured their physical and online learning environment to be not distracting for them. With this support, it may be considered that the pre-service teachers understand their learning strengths and weaknesses. They also know when to seek assistance and support. This may be because the fully online flipped classroom approach also flips the student role from passive listeners in traditional large-enrollment classrooms to active learning agents and take the primary responsibility for their learning. Learning at home, especially in this pandemic, can be quite a challenging learning experience. Such blended/online classes are likely to result in a greater need for help. Students may need support to overcome academic difficulties such as understanding those difficult concepts and solving complicated problems when individual resources are ineffective.

In this study, before the application process, the pre-service teachers were asked to attend their virtual class orientation live-broadcasted via Facebook Live for them to be acquainted with how their education environment works in the new normal. Introduction of the subject teacher, an overview of the course, delivery of learning modalities, grading system, educational tools to be used in class, netiquette guidelines, and frequently asked questions was also presented during the virtual class orientation. They were asked to register in the course through Google Classroom Learning Management System. It is believed that students gain their learning experiences into this system. In addition, they were oriented to use the educational tools through tutorial videos shown in the virtual class orientation. They were acquainted with the fully online flipped learning approach during the virtual class orientation. They have to watch the lecture videos or listen to podcasts created by the instructor, uploaded in Google Classroom, and the instructor's Facebook Page (Ms. G's Facebook Page). This allows easy access for students since most students are already familiar with how these learning spaces work. Lastly, it was emphasized in the animation video created by the instructor on "Online Etiquette" that students must find a quiet space to participate in class and that they should accomplish their pre-class activities. It was also emphasized that coming to their fully online flipped class unprepared may result in low participation and cause them to fail during class time.

These findings concur with the previous work by Hidi & Renninger (2004), which states that learning goals should be precisely summarized for students before flipped learning activities. When students have a clear view about what they are expected to learn and how these learning goals are connected to the flipped learning activities, they are more likely to be motivated to engage in the active learning approach and regulate their own learning.

Results also indicate that "Persistence" and "Time Management" obtained the two lowest mean among indicators. The study results manifest that the pre-service teachers moderately regulate their ability to manage time and persistence to complete their online self-paced course work independently. In this study, the pre-service teachers were oriented to manage their time to complete weekly pre-class activities prior to their synchronous class via Google Meet. The findings of this study concur with the research work by Winnie & Perry (2000), which revealed that better incorporation of time management into the provision of feedback affords potential for the student to exercise metacognitive control and monitoring that adapts engagement in mid-task. They also suggest that for instructors to promote effective time management strategies, they can provide personalized feedback to the students in the first half of a semester weekly rather than giving the feedback throughout the entire course duration. In the same vein, to draw these perspectives together, in the present study, the pre-service teachers were provided feedback through comments on their class works on Google Classroom and audio input through Vocaroo to improve their learning and outputs.

Pre-service teachers' level of learning satisfaction in a fully online flipped classroom

This part presents the level of pre-service teachers' learning satisfaction in a fully online flipped classroom.

Table 5. Pre-service teachers' level of learning satisfaction in a fully online flipped classroom

INDICATORS	Mean	Qualitative Description	Qualitative Interpretation
Learning foundational content prior to class greatly enhances my understanding of the material.	3.17	Strongly Agree	Highly satisfied
I like watching and listening the lessons on video or podcast.	2.97	Agree	Very satisfied
I felt prepared to complete course tasks in class after watching to the video content or listening to a podcast.	2.94	Agree	Very satisfied
I feel that watching videos and taking notes contribute efficiently.	2.91	Agree	Very satisfied
Fully online flipped classroom can improve interest in exploring topics.	2.90	Agree	Very satisfied
Fully online flipped classroom encourages me to practice critical and creative thinking.	2.84	Agree	Very satisfied
I wish more instructors use fully online flipped classroom.	2.74	Agree	Very satisfied
Fully online flipped classroom gives me less class time to practice the concepts of the course.	2.64	Agree	Very satisfied
I feel that mastering learning through flipped classroom improved my course understanding.	2.56	Agree	Very satisfied
I enjoy learning in our fully online flipped classroom.	2.53	Agree	Very satisfied
The level of my interactions with my classmates in fully online flipped classroom is higher than in a traditional face-to-face class.	2.44	Agree	Very satisfied
With fully online flipped classroom, I feel more prepared for my exam.	2.43	Agree	Very satisfied
I believe that I am able to learn material with fully online flipped classroom instruction better than with traditional lecture-based instruction.	2.37	Agree	Very satisfied
Fully online flipped classroom is more engaging than the traditional classroom.	2.30	Agree	Very satisfied
OVERALL MEAN	2.70	Agree	Very satisfied

Table 5 shows the pre-service teachers' level of learning satisfaction in a fully online flipped classroom. Among fourteen indicators, one indicator was rated as "Strongly Agree". This indicator was "Learning foundational content prior to class greatly enhances my understanding of the material" (3.17). Thirteen indicators were rated as "Agree" which are as follows: "I like watching and listening the lessons on video or podcast" (2.97); "I felt prepared to complete course tasks in class after watching to the video content or listening to a podcast" (2.94); "I feel that watching videos and taking notes contribute efficiently" (2.91); "Fully online flipped classroom can improve interest in exploring topics" (2.90); "Online flipped classroom encourages me to practice critical and creative thinking" (2.84); "I wish more instructors use fully online flipped classroom, I feel more prepared for my exam" (2.43); "I believe that I am able to learn the material with online flipped classroom instruction better than with traditional lecture-based instruction" (2.37); and "Online flipped classroom is more engaging than the traditional classroom" (2.30). This variable produced a pooled average weighted rating of 2.70 with a qualitative description of "Agree" and "Very satisfied" qualitative interpretation.

Generally, the finding reveals that the Science major pre-service teachers are satisfied with the online flipped classroom approach's active learning possibilities. In this sense, they perceived their fully online flipped class as effective because they learned to be motivated in joining the class knowing the course content ahead of the time and after seeking and exerting efforts on learning more of it through the use of technology and many sources. In

addition, the idea of learning by their free time and available instructional materials provided by the instructor encouraged them to enhance their understanding in their fully online flipped class. Similar findings were obtained by Davies, Dean, and Ball (2013), who compared three different instructional strategies in an information systems spreadsheet course. They showed that students attending the fully online flipped classroom course were also more satisfied with the learning environment than the other treatment groups. Active learning methods tend to be more student and learning-oriented than traditional teaching methods. The pre-service teachers don't only listen but also read, write, discuss, and engage in active learning activities. This entails how students take their responsibility and initiative for self-directed learning and organize their schedules. However, in this study, it should be noted that there were no in-class or face-to-face activities. All activities were done purely online due to the ongoing COVID-19 pandemic. Learner satisfaction was one of the crucial bases for assessing the success and effectiveness of a course because student satisfaction was a major performance indicator for higher education institutions, with many universities implementing rigorous quality assurance processes. This finding conforms to the study of Shih and Tsai (2017), they found out that students are satisfied with courses and exert more effort on learning in the online flipped classroom.

Result reveals that "Learning foundational content before class greatly enhances my understanding of the material" and "I like watching and listening to the lessons on video or podcast" obtained the two highest overall mean among indicators. This means that the pre-service teachers were satisfied with the learning materials given to them in advance before their synchronous class via Google Meet. This finding strongly indicates that they like learning the foundational course content through video or podcast created by the instructor. This may be because they can watch the videos several times, pause and rewind the videos and take notes while watching the teacher made lecture videos or listening to the podcast. Having access to course materials for 24/7 provided flexibility for them in which they could have different learning preferences and personal commitments. In this study, students were given 1-2 weeks to do the pre-class activities like reading their self-learning module, watching teacher made lesson videos or listening to podcasts, and completing quizzes. This allowed them with longer, student-driven tasks that may foster autonomy. The synchronous meetings were also recorded for those students who were unable to attend the scheduled meeting and those who were struggling with internet connectivity. The synchronous sessions were dedicated mainly to reinforcing complex concepts and a summary of the learning outcomes of the video lectures. The wide time frame for the online submission was also an attempt to mitigate the reduced access to Google Classroom online submission from students in other regions of the Philippines with intermittent internet connections. This gives them the freedom over how, when, and where they learn and lets them engage with the video/podcast/learning module content in the way that suits them best. It is also recognized that the learning environment of students differs from each other as well as the capacities of students in understanding the concepts.

From the results of this current and previous studies, it could be claimed that using online platforms with other technological tools like videos/podcasts and links could support learners' engagement and satisfaction both within and outside the classroom, whether emotionally or in terms of participation, skills and performance. Thus, lecture videos offer flexibility and convenience on the part of the students and promote active learning by allowing them to replay parts or the whole video and increasing accessibility to students (Newton et al., 2014). The results of the present study support previous research by Velegol et al. (2015) which confirmed that one of the most cited benefits of flipped learning was flexibility. An added value of the flipped approach was re-watching the lecture videos. Students could pause and rewind the videos, take notes and solve example problems while watching the lecture videos. This flexible teaching and learning environment also created time for complex problem solving and opportunities to cover more materials. In this study, it should be noted that the pre-service teachers were not only exposed to lecture videos via online resources, they were also encouraged to attend synchronous classes via Google Meet. Since the pre-service teachers are familiar with the subject matter even before the class starts, the instructor then spent the class hours collaborating with students and helping them understand the topic better through more engaging, collaborative, and active learning activities. The collaborative interaction and learning activities also occurred during their synchronous class. Instructional activities that were employed during videoconferencing assisted instruction via Google Meet are: solving real-world problems through talk shows, scavenger hunt, draw it activity, quescussion activity/structured discussion, debates, virtual game activities ("Are you smarter than a fifth-grader?" and "Who Wants to Be a Millionaire?"), etc. Following that, the students completed the activities in their module, which the instructor created within the course period. After completing their modules, students turned in

their outputs on Google Classroom Classwork. The instructor then provided comments on their works and audio feedback through Vocaroo to improve their learning and outputs.

Results of the study also indicate that "I believe that I am able to learn material with online flipped classroom instruction better than with traditional lecture-based instruction" and "Online flipped classroom is more engaging than the traditional classroom" obtained the two lowest overall mean among indicators. This may be because none of the participants in this study reported prior experience with fully online flipped classroom. Thus, this pedagogy or teaching strategy was an entirely new experience to this cohort. Students' hesitation toward purely online instruction may stem from the fact that our country has the worst and slowest Internet connection speed among ASEAN countries. Poor internet connection has already been a problem in the country ever since the pandemic began until the need to shift to online or flexible learning because of a pressing necessity. It is also recognized that the learning environment of students differs from each other as well as the capacities of students in understanding the concepts. Common problems, such as power interruptions, unstable internet connection, and non-academic responsibilities, are some hurdles encountered during asynchronous learning. Thus, this study could not capture participants' lived experiences in an online flipped classroom, which examines in more depth precisely how interactions can strengthen the participants' learning satisfaction in an online flipped classroom.

Relationship between pre-service teachers' engagement, self-regulation skills and learning satisfaction in a fully online flipped classroom

A correlation analysis between pre-service teachers' engagement, self-regulation skills, and learning satisfaction in a fully online flipped classroom is shown in Table 6.

Table 6. Stepwise correlation analysis between pre-service teachers' engagement, self-regulation skills and learning satisfaction in an online flipped classroom

LEARNING SATISFACTION		
Variables	Pearson r value	Significance
Student engagement	.512	.000**
Engagement with course topics	.497	.000**
Cognitive engagement	.465	.000**
Personal motivations	.406	.000**
Emotional engagement	.369	.000**
Self-Regulation Skills	.443	.000**
Metacognitive skills	.492	.000**
Help seeking	.282	.000**
Time management	.272	.000**
Persistence	.265	.000**
Environmental structuring	.181	.133 ns

The relationship between pre-service teachers' engagement self-regulation skills and learning satisfaction in a fully online flipped classroom was determined by the correlation coefficients shown in Table 6. Results revealed that there was a significant relationship between students' engagement and self-regulation skills on learning satisfaction in a fully online flipped classroom. The significant relationship was expressed with the correlation coefficients of .512 ($p<0.01$) and .443 ($p<0.01$), respectively. This suggests that the higher the students' engagement and self-regulation skills, their learning satisfaction is better. In this sense, the more engaged they are in their fully online flipped class and the more they regulate their emotions, thoughts, and behaviors in acceptable ways, the higher is their learning satisfaction. Thus, the null hypothesis stating that "there is no significant relationship between students' learning engagement, self-regulation skills and learning satisfaction in a fully online flipped classroom" is rejected. The study's finding aligns with the works of Ali & Ahmad (2011), where this study has shown a positive correlation between engagement, self-regulation skills, and learning satisfaction in a fully online flipped learning. This emphasizes that students who are actively engaged, exert effort and time, interact with faculty and other

students, and are given enriching educational experiences will have better learning satisfaction than those who are not. This finding also emphasizes that those students who do not possess those self-regulation skills as mentioned above tend not to be satisfied in their fully online flipped courses. This study may be attributed to the opportunities for interaction among the pre-service teachers themselves and interaction between students and their instructor in the fully online flipped classroom model, and the preparation of course content and learning materials at the students' convenience. Students were also enabled to work individually and in groups. This may have assisted their familiarity of the course, making it interesting and triggering their productivity, engagement, and motivation in the online learning environment.

In the present study, the pre-service teachers were asked to complete pre-class activities like watching videos or listening to podcasts made by the instructor. They were also given self-learning modules and completed online assessments. They read the class materials asynchronously based on their time and at their own pace. Then, they use synchronous class time via Google Meet videoconferencing instruction to participate in online discussions or other collaborative learning activities like solving real-world problems, group discussions, playing virtual games, etc. They learned the content before class, and then, during their synchronous class via Google Meet, the instructor and the students discussed what they learned through engaging and collaborative learning activities. According to Jackson (2015) and Kuh et al. (2007), a positive correlation existed between student engagement and student satisfaction in the online environment. In contrast, Larose (2010) reported that the lack of attention paid to fostering student engagement in the online environment as opposed to the traditional classroom is the reason for poor student satisfaction rates. These results agree with the research study made by Yoshida (2016), in which students evaluated the learning according to the flipped classroom model to be helpful. As conveyed by Martín-Rodríguez (2017), this teaching strategy improves students' comprehension of the lessons and makes better use of the class time, which results in greater interest in their learning, better motivation and learning satisfaction. In this sense, the results presented coincide with Esperanza's (2016). A positive effect was observed on student attitudes and learning satisfaction following the application of the said model.

Correlation coefficients were computed to determine which of the following aspects in science major pre-service teachers' engagement contributed significantly to students' learning satisfaction. It was found that there was a significant correlation among "Engagement with course topics" ($r=.497$, $p=<0.01$), which has the highest correlation, followed by "Cognitive engagement" ($r=.465$ $p=<0.01$)), then "Personal motivations" ($r=.406$, $p=<0.01$), and lastly Emotional engagement ($r=.369$, $p=<0.01$). The findings of this study were consistent with Baepler, Walker, and Driessen (2014) research study, which compared the effectiveness of the traditional classroom with two active learning groups (flipped/blended) courses on students' satisfaction and their learning outcomes. Their study showed statistically significant positive results for students who were taught in both active learning courses compared to their counterparts in the traditional group. The results of the present study support previous research by Small horn (2017), which compared students' learning outcomes and engagement and their after replacing lectures with flipped classroom method activities.

The study results showed students' attention increased statistically with a positive attitude towards the learning method. In the present study, the third-year pre-service teachers were asked to incorporate this active learning approach during their online teaching activity for the final term. This enabled them to grapple with online flip learning. This acquainted the pre-service teachers with online learning approaches that they can use in the future. This is imperative for Teacher Education Programmes to prepare pre-service teachers to adapt to work in complex settings as the world faces the current COVID-19 global pandemic. This is to allow them to integrate and apply their knowledge in the course. They were asked to work in teams. They were assigned different tasks as designated by their leader. The pre-service teachers then instructed their classmates (as their students) to preview the instructional videos they created before their synchronous class. During videoconferencing assisted instruction via Google Meet, the pre-service teachers (who were the teachers in class) and students (their classmates) worked collaboratively, which allowed them to grapple with, apply and elaborate on course concepts. Pre-service teachers then employed collaborative coursework and active learning strategies during their live meetings, such as solving real-world problems, game activities, debate, structured discussion, etc.

Additional correlations were also computed to determine which self-regulation skills contributed significantly to learning satisfaction. It was found that there was a significant correlation among "Metacognitive skills" (r=.492, p=<0.01), which has the highest correlation, followed by "Help-seeking" (r=.282, p=<0.01), then "Time management" (r=.272, p=<0.01), and lastly "Persistence" (r=.265, p=<0.01). However, it was found that Environmental structuring (r=.181, p=<0.01) has no significant relationship with learning satisfaction. This suggests that it is important to assess the level of environmental structuring in their online flipped course based on their choices, including organizing their physical and online environments. It also includes designing their learning environment, planning activities, organizing teachers' support and instructions, formations, and resources. This also suggests providing students a clear view about what they are expected to learn and how these learning goals are connected to the flipped learning activities. They are more likely to be motivated to engage in the active learning approach and regulate their own learning. Hao (2016) concurs with this position, asserting that it is essential for instructors to evaluate student readiness levels to flip their classrooms to be adaptive and tailor their flipped classrooms to meet the needs of individual students. In the online flipped classroom, the role of the teacher is to support students in the classroom activities rather than transfer the knowledge to students (Steen-Utheim & Foldnes, 2018). Therefore, teachers should provide meaningful learning and help students overcome problems in flipped learning (Yılmaz & Baydas, 2017).

Both studies examined the relationship between the two constructs in online learning environments. Studies related to self-regulation and student satisfaction showed a positive correlation between the constructs (Puzziferro, 2008; Wang et al., 2013). These results were the same for community college students (Puzziferro, 2008) and undergraduate and graduate students (Wang et al., 2013). Students who had prior experiences with online learning were likely to be more motivated. Additionally, motivation was directly linked to self-regulation learning strategies, and in all cases, increased motivation levels were associated with higher course satisfaction levels. According to Moore (2009), factors such as peer-tutor support, ability to apply knowledge, the use of learning strategies, and achievement of learning outcomes indicate those elements that impact students' overall satisfaction in online learning. Ismail (2018) contended that a learning strategy is a set of tasks through which learners plan and organize their engagement to facilitate knowledge acquisition and understanding. Aung and Ye (2016) reported that students' success and achievement were positively related to student satisfaction. Thanh and Viet (2016) also added that enhancing the learning process with appropriate learning strategies may contribute to better outcomes and performances.

Predictors of pre-service teachers' learning satisfaction

Table 7 presents the variables that best predict pre-service teachers' learning satisfaction in a fully online flipped classroom. Among the independent variables, two came out as the predictors of pre-service teachers' learning satisfaction. These independent variables are learning engagement and metacognitive skills.

Table 7. Stepwise Multiple Regression Analysis of the independent variables to students' learning satisfaction

Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	Beta	Std. Error	Beta		
(Constant)	.498	.395		1.260	.212
Learning Engagement	.388	.141	.341	2.757	.000**
Metacognitive Skills	.310	.131	.294	2.372	.000**

R= .565 r 2=.320 p value= 0.01 F-value= 15.733

Hence, the regression equation for this results is:

Y= 0.498 + 0.388X, + 0.310 X2
Where

Y= Learning Satisfaction
X1= Learning Engagement
X2= Metacognitive Skills

The multiple correlation coefficients (R) represent the total correlation between the combination of the independent variables such as learning engagement and metacognitive skills (X1 and X2) and the dependent variable of pre-service teachers' learning satisfaction (Y). R-squared stands for pre-service teachers' learning satisfaction with a total value of 32 percent. This implies that 32 percent of the pre-service teachers' learning satisfaction is explained and accounted for learning engagement and metacognitive skills, which is statistically significant at $p<0.01$. Thus, 68 % is attributed to other factors. These two have a significant contribution to the variations of their learning satisfaction. This is apparent in the beta weights, which are .388 for learning engagement and .310 for metacognitive skills. The study's findings explain that learning engagement and metacognitive skills significantly influenced the learning satisfaction of the pre-service teachers. This means that the higher their learning engagement and metacognitive skills, the higher their learning satisfaction. Learning engagement has a beta (.388), which significantly influences students' learning satisfaction. It means the higher their learning engagement, the higher their learning satisfaction. As indicated in the F-value of 15.733 with the corresponding probability value (p value= 0.01). Thus, the regression model is significant.

Therefore, the null hypothesis "there is no variable, singly or in combination, best predict pre-service teachers' learning satisfaction is rejected". In this study, this may be attributed to the opportunities for interaction among students themselves and the interaction between students and their instructor in the fully online flipped classroom model, and preparation of course content and learning materials at the students' convenience. This allowed students to work individually and in groups. This may have assisted their familiarity of the course, making it interesting and triggering their productivity, engagement, and motivation in the online learning environment. In this sense, fully online flipped learning seems to affect their cognitive and affective behavior, making them more engaged and motivated towards their learning. Thus, it enabled them to promote their positive learning emotions and cognitive learning engagement, which increased their active learning, and enjoyment. Moreover, the present study aimed to understand students' engagement in a fully online flipped classroom, especially during the COVID-19 pandemic. Thus, providing a student-centered learning environment is also necessary during this Covid-19 pandemic.

The study results conform to the study of Rose et al. (2019). They found out that using videos with chemistry students showed engagement with the learning material outside the classroom, increased learning satisfaction, and achieved better exam results. From the results of these current and previous studies, it could be claimed that using online platforms with other technological tools like videos/podcasts and linkscould support learners' engagement, metacognitive skills, and satisfaction both within and outside the classroom, whether emotionally or in terms of participation, skills and performance. Prior studies examined learning engagement, student satisfaction, and student success (Burrow & McIver, 2012; Korobova & Starobin, 2015; Webber et al., 2013) in a single study. The study by Webber et al. (2013) reported that the dimensions of the student engagement associated with academic activities predicted higher levels of student success (cumulative GPA) and learning satisfaction. The other studies examined predictors within each construct and not the relationship between constructs and student success (Burrow & McIver, 2012; Korobova & Starobin, 2015). The results of the Webber et al. (2013) study confirmed the predictive nature of student engagement and metacognitive skills on pre-service teachers' learning satisfaction obtained in the current study. Studies have also shown that students reported a higher level of engagement and expressed a strong preference for multimedia created by their own instructor in an online course (Xu and Jaggars, 2014; Briggs, 2005). This empirical study shows that the pre-service teachers apply their metacognitive skills for their learning activities in their fully online flipped classroom. They regulate and monitor their own learning by using their cognitive and metacognitive strategies and simultaneously control their motivation to perform these strategies. They apply their self-learned knowledge and adopt better self-regulation strategies for their online activities. In this view, the results presented coincide with those of Broadbent and Poon (2015), which reviewed several studies exploring self-regulated learning strategies in the online higher education context. They found that self-regulated learning strategies are positively correlated to students' academic success, highlighting the strategies of time management, metacognition, critical thinking, and effort regulation in particular.

In a similar vein, the present study's findings may be explained because the pre-service teachers were given self-learning modules that were coupled with the lecture video or podcast made by the instructor. They were also asked to answer the Watch, React, and Reflect (WRR) assessment. For the Watch, students were asked to specify the concepts of the instructional video made by the instructor. For the React, students were asked to give their reactions to the instructional video. Lastly, to reflect, students were asked to give the insights they gained to apply to real life. In addition, to detect the students' previous knowledge, tools such as Mentimeter, Google Forms, and ZipGrade Online Quiz are used by the instructor. They make it possible to detect students' difficulties in the lesson, which allow the instructor to enrich the videos with questions. This allowed them to reflect on the concepts they learned from the video or podcasts made by the instructor. This somehow promoted their metacognitive skills and led them to do introspection.

Bergmann et al. (2013) and Tucker (2012) highlighted that watching videos is not enough to make flipped learning effectively. In this present study, it should be noted that the pre-service teachers were not only exposed to lecture videos and podcasts via online resources, they were also encouraged to attend synchronous classes via Google Meet. Since the pre-service teachers are familiar with the subject matter even before the class starts, the instructor then spent the class hours collaborating with students and helping them understand the topic better through more engaging, collaborative, and active learning activities. The collaborative interaction and learning activities also occurred during their synchronous class. Instructional activities that were employed during videoconferencing assisted instruction via Google Meet are: solving real-world problems through talk shows, scavenger hunt, draw it activity, quescussion activity/structured discussion, debates, virtual game activities ("Are you smarter than a fifth-grader?" and "Who Wants to Be a Millionaire?"), etc. Following that, the students completed the activities in their module, which the instructor created within the course period. After completing their modules, students turned in their outputs on Google Classroom Classwork. The instructor then provided comments on their class works and audio feedback through Vocaroo to improve their learning and outputs.

However, in this study, it should be noted that there were no in-class or face-toface activities. All activities were done purely online due to the ongoing pandemic. None of the participants in this study reported prior experience with fully online flipped classroom. Thus, this pedagogy was a new experience for this cohort. Students' hesitation toward purely online instruction may stem from the fact that our country has the worst and slowest Internet connection speed among ASEAN countries. Poor internet connectivity is already a problem in the country ever since the COVID-19 pandemic began until the need to shift to online or flexible learning because of a pressing necessity. It is also recognized that students' learning environment differs from each other and the capacities of students in understanding the concepts. Common problems, such as power interruptions, unstable internet connection, and non-academic responsibilities, are some hurdles encountered during asynchronous learning.

Thus, this study was not able to capture the lived experiences of participants in an online flipped classroom which examined in more depth precisely how interactions can strengthen the participants learning satisfaction in an online flipped classroom. In light of the foregoing findings of the study, Uttl et al. (2017) reiterated in their research that student satisfaction is related to several factors that may be irrelevant to student learning. Thus, students may dislike an educational intervention even though it improves learning. This can arise when there is a discrepancy between what students perceive to be an appropriate workload and the actual workload entailed by the most effective teaching methods (Centra, 2003; Greenwald & Gillmore, 1997) or when the workload is perceived to be not germane to instructional objectives (Marsh, 2001). Wiggins et al. (2017) showed that interactive activities that depended on cooperation were beneficial in more student interaction and increased learning outcomes, compared with constructive activities, even if students worked in groups in both conditions. Another possible substantive explanation is that several factors (e.g., group duration and size, participant interdependence, and formal assessment) can influence the effectiveness of social activities (Tomcho & Foels, 2012). In his massive synthesis of meta-analyses on teaching and learning strategies, Hattie (2009, 2011, 2015) found that promoting metacognitive and self-regulatory strategies stimulating active learning is essential for academic performance and learning satisfaction. Hattie's main conclusion is that learning should be visible. Moving problem-solving and discussion activities into the classroom seem likely to make students' learning processes—not only outcomes revealed on tests and exams—more visible to both student and teacher. The flipped classroom may accommodate more interaction between teachers and students. Indeed, if such interaction leads to closer relationships between teachers and

students, it may improve students' academic achievement, learning satisfaction, and persistence (Robinson, Scott, & Gottfried, 2019).

Conclusions and Recommendations

Based on the findings of the study, the following conclusions and recommendations are hereby drawn:

1. The pre-service teachers are highly engaged in their fully online flipped class. They take responsibility for their choices, utilize feedback, assess personal behavior, utilize feedback, assess responses to engage, analyze opportunities and take action to improve autonomously. This may be attributed to the possibilities for interaction among students themselves and interaction between students and their instructor in the online flipped classroom mode, in addition to the preparation of course content at the students' convenience. They were enabled to work individually and in groups. This may have assisted their familiarity of the course, making it enjoyable and triggering their productivity, engagement, and motivation in the online learning environment.
2. The pre-service teachers can monitor and manage their emotions, thoughts, and behaviors in acceptable ways in their fully online flipped class. They also employ their ability to focus on working with their coursework while relating well to other course members. They also regulate and monitor their own learning by using their metacognitive strategies and time management skills, thus simultaneously regulating their motivation to perform these strategies. They apply their self-learned knowledge and adopt better self-regulation strategies for their online activities. The level of pre-service teachers' engagement, self-regulation skills, and learning satisfaction in a fully online flipped classroom is suggested to be maintained or developed. Teachers may also consider providing a student-centered learning environment necessary during this pandemic. Environmental structuring was found that it has no significant relationship with pre-service teachers' learning satisfaction in a fully online flipped classroom in this study. Thus, school administrators and teachers might consider assessing the level of environmental structuring of the course based on students' time and effort invested, active and collaborative learning, opportunities for interaction with faculty and other students, and enriching educational experiences for students. These also include their choices in organizing their physical and online environments. This can be achieved through brief survey via Google Forms by analyzing the results to improve instructional practices for future students. Instructors might also consider evaluating students' readiness levels to fully online flipped learning before the class starts. Teachers may tailor their flipped classrooms to meet the needs of individual students and help students overcome problems in flipped learning.
3. The pre-service teachers are satisfied with the fully online flipped classroom approach's active learning possibilities. They perceived their flipped class as effective because they learned to join the class knowing the course content ahead of the time and after seeking and exerting efforts on learning more of it through the use of technology and many sources. In addition, the idea of learning in their free time and available instructional materials provided by the instructor encouraged them to enhance their understanding in their fully online flipped class. Hence, this strategy is considered a manageable and effective alternative adapted to fully online instruction.
4. There was a significant relationship between students' engagement, self-regulation skills, and learning satisfaction in a fully online flipped classroom. The significant relationship was expressed with the correlation coefficients of .512 ($p<0.01$) and .443 ($p<0.01$), respectively. This suggests that the higher the students' engagement and self-regulation skills, their learning satisfaction is better. Thus, the null hypothesis stating that "there is no significant relationship between students' learning engagement, self-regulation skills and learning satisfaction in a fully online flipped classroom." is rejected.
5. Among the independent variables, two came out as the predictors of students' learning satisfaction. These independent variables are learning engagement and metacognitive skills. Learning engagement and metacognitive skills significantly influenced the learning satisfaction of the pre-service teachers. This means that the higher their learning engagement and metacognitive skills, the higher their learning satisfaction. Therefore, the null hypothesis "there is no variable, singly or in combination, best predict pre-service teachers' learning satisfaction is rejected." The findings in this study will add valuable resources for further hybrid instruction in the post-COVID-19 time in higher education. It is recommended that more research

is needed to predict learning satisfaction. The relationship among students' engagement, academic skills, and learning satisfaction in a fully online flipped classroom should be studied with larger samples. The small sample size in this study raises the prospect of selection bias in the results. Missing from the data are the voices of students who were not satisfied with the class. Conducted on more significant numbers of students will reduce the possibility of selection bias and give more confidence in forming conclusions. These issues constrain the representativeness and generalizability of findings. Most importantly, it is recommended to examine whether online pedagogies serve the best interests of learners and enable the high levels of engagement and outcomes and students develop their self regulation that teachers and teacher educators aspire to achieve.

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