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ASSESSING FLIPPED CLASSROOM IN FLEXIBLE LEARNING VIA COMMUNITY OF INQUIRY FRAMEWORK

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ABSTRACT Educational institutions adopted online distance learning to ensure continuity of education during the COVID-19 pandemic. The idea of online distance learning was not welcome by some stakeholders for a variety of reasons such as poor internet connection particularly in rural areas, and lack of technological devices to support learning and teaching. Compared to traditional face-to-face delivery, studies show that online distance learning needs new teaching strategies and approaches. One teaching approach that has been seen beneficial to students with limited resources in attending online classes is the use of flipped classroom pedagogy. This study aimed to assess the flipped classroom pedagogy in flexible learning modality using the Community of Inquiry (CoI). It further tried to identify the different issues and challenges of students in using this teaching approach in the context of the pandemic. The descriptive research design was utilized to attain the goal of this study. Using the purposive sampling technique, respondents were selected from two identified cohort classes employing the flipped classroom pedagogy. The findings show that teaching presence, social presence, and cognitive presence are observed in the flipped classroom pedagogy. In addition, the study identified advantages of the flipped classroom pedagogy in online distance learning during the pandemic. As perceived by the respondents, the flipped classroom (1) provides flexibility and convenience to students, (2) addresses the problem of students on internet connectivity and access to technological devices, and (3) offers heightened reinforcement. The study further identified two issues of flipped classroom as observed by the students. These are (1) needed interaction during asynchronous lecture, and (2) limited time for synchronous meetings. Results are futher discussed as well as the implications for future research.

Keywords: flipped classroom, community of inquiry, distance learning, flexible learning, teaching in pandemic

A. INTRODUCTION

The COVID-19 pandemic forced education institutions to adopt distance education. This is to ensure the continuity of education without compromising the safety of the students and the academic community. In the Philippines, the Commission on Higher Education (CHED) released CMO no. 4 s. 2020, which served as guidelines for higher education institutions (HEIs) in the country to implement flexible learning. The term flexible learning was used to refer to different modalities that can be utilized as HEIs implement their strategies to deliver distance education to students. In this study, flexible learning will cover and refer to the different modalities used for distance education, such as online learning, remote learning, and blended learning (including synchronous, asynchronous, and modular approaches).

Although flexible learning is not new in higher education, its implementation for all curricular programs is more challenging for state universities and local colleges. Concerns are

centered on the capability of students to own appropriate technological educational devices, such as laptops, and their access to a stable internet connection (Laguador, 2021). Students from these HEIs are not ready and expressed their opposition to online classes, primarily due to the additional cost of internet and mobile data. Students further contend that they are not able to fully grasp the content of the lesson due to constant buffering and persistent internet disconnection. Such experience adds to the stress of online distance education. The issues of poor internet connection and lack of technological educational devices are also encountered by teachers (Moralista & Oducado, 2020) particularly those living in rural and remote areas. With these problems, the teacher may find it hard to discuss the topic and convey the content of the lesson to his/her students.

Because of these issues, university administrators urge their teachers to come up with teaching strategies that are flexible enough to accommodate students and facilitate learning. Several studies claim that to promote an effective, flexible learning environment, different models, approaches, and pedagogies are needed from traditional face-to-face delivery (Panicker, 2018; Andrade & Alden-Rivers, 2019; Li et al., 2020). Teachers should devise another approach so as to effectively deliver the lesson despite the problem of internet connectivity and limited access to technological and educational devices by the students.

One approach that is beneficial to students is the use of the flipped classroom pedagogy. The flipped classroom is a pedagogical model in which a traditional learning environment and its activities are reformed or rearranged (Awidi & Paynter, 2018). In a flipped classroom model, class activities which usually take place in a traditional classroom such as lectures and presentations, can be done at home by reading or watching pre-recorded lesson presentations. While activities which are typically done at home like synthesis and formative assessments, can be completed during in-class schedule.

In this study, the flipped classroom pedagogy specifically when applied in a flexible learning environment, was assessed using the Community of Inquiry (CoI). Different issues and challenges experienced by students in using this classroom pedagogy in the context of pandemic were also identified. The results are seen to be beneficial to teachers who plan to employ the flipped classrom in online distance learning. The findings of the study are also viewed to be significant to the students since their perceived issues and challenges will improve the conduct and implementation of flexible learning in the university.

A number of studies have already been conducted assessing flipped classroom using CoI framework (Yilmaz, 2017; Lee & Kim 2018; Stower, 2019); however, literature is limited in the

local context. Hence, this research will be an addition to the pool of studies that assessed flipped classroom particularly its application in a flexible learning during the COVID-19 pandemic.

B. REVIEW OF LITERATURE

Flipped Classroom

Traditionally, the time allotted for the face-to-face delivery of lessons covers the course content. This is followed by student activities intended to be completed at home or at the library during the student's free time. Flipped classroom is the opposite of this order. It is a teaching methodology that reverses the traditional teaching delivery (Little, 2015). It is described as a reversed teaching method where the instructor utilized several forms of technology such as videos, to record lecture in discussing the lesson (Findlay-Thompson & Mombourquette, 2014). Students are then required to access and view the video lectures before the scheduled class time. In the flipped classroom, students use their own free time in viewing or reading lesson content, after which, activities, and lesson are done during class time. It is also called the inverted classroom (Arnold-Gaza, 2014), since class lecture and homework are switched or reversed (Gilboy et al., 2014). For example, the student will view the recorded lesson provided by the instructor at home before attending the class. During in-class time, only lesson synthesis will be discussed followed by activities or lesson application. This strategy is the opposite of the regular lecture-during-in-class-time followed by lesson-application or activities-at-home.

The early use of prerecorded lessons is associated with Bergmann and Sams (2012). In 2006, Bergmann and Sams first recorded their lessons and posted them online for those students who missed their chemistry classes. With this method, students who missed the lessons can listen and watch the video to catch up with the course. These efforts of the proponents were appreciated not only by the students who missed the class but also by those who viewed the recorded lessons for reinforcement (Tucker, 2012). Some students tend to forget parts of the lessons quickly when distracted during lecture time, but if lessons are recorded, they can playback the lessons for review. Hence in 2007, Bergmann and Sams decided to prerecord all their lessons, podcast them, and instruct students to view scheduled lessons before coming to class the following day.

Flipped classroom model is closely related with blended learning (Rotellar & Cain, 2016). The latter acknowledged the flipped classroom model as an effective teaching strategy. Hoshang et al. (2021) also recommends the flipped classroom pedagogy to support online and remote learning environment. As some studies claim, it became more popular with the increasing availability of internet connectivity (Akçayır & Akçayır, 2018) and the advancement of

educational technology. Because of its main strategy of prerecording lessons and posting them online, more and more online instructors find it convenient to podcast their lessons for easy access by students. The pedagogy shifts educational activity to online setting and reduces classroom time for lesson discussion. Since students are expected to have viewed or read the lessons in advance, instructors are able to process the learning of the students during synchronous meetings and to allow more time for student engagement. Students may raise questions about the lessons, and the instructor is able to give timely feedback to student output. The strength of flipping the classroom is not the prerecorded lessons but the increase in-class time (Little, 2015) which can be devoted to other learning activities. It was also observed in Akçayır and Akçayır (2018) that during synchronous meetings in a flipped classroom, the teacher can spend more time answering queries, monitoring progress and providing feedback to students in lieu of discussing the lessons.

Several studies recognized the advantages of the flipped classroom pedagogy. These advantages include: enhanced academic performance and achievement (Little, 2015; Akçayır & Akçayır, 2018; Martinez-Jimenez & Ruiz-Jimenez, 2020); improved engagement between student and teachers (Arnold-Garza, 2014; Rotellar & Cain, 2016); student-centered instruction support (Lee & Kim 2018; Hoshang et al., 2021); and increased student satisfaction (Martinez-Jimenez & Ruiz-Jimenez, 2020). Flipped classroom pedagogy likewise creates opportunities for active learning that promote students higher-order thinking skills (Little, 2015; Hoshang et al., 2021) such as problem solving, research, and project-based learning (Martinez-Jimenez & Ruiz-Jimenez, 2020).

A flipped classroom also provides pedagogical contributions (Akçayır & Akçayır, 2018) because of its flexibility. Different learning styles of students can be accommodated (Arnold-Garza, 2014) since students are allowed to work independently and to manage their own learning pace. Those students who need reinforcement can review and replay lessons, while others who are ready can proceed to the next topic. As to working students, they find this method more advantageous to them since they can harmonize their learning schedule with their working hours. For these reasons, the flipped classroom design is perceived to be more and more relevant in online distance learning and blended learning modality.

Although several studies have been conducted examining the effectiveness of the flipped classroom model, there is limited studies on its application during the pandemic. This study assessed the suitability of this pedagogy in the context of the pandemic wherein the main challenge faced by students in flexible learning is internet connectivity and access to appropriate technological devices. This study followed suit other studies (Yilmaz, 2017; Lee & Kim 2018;

Stover & Houston, 2019) in assessing the flipped classroom pedagogy using the CoI framework since it was utilized in the context of flexible learning.

Community of Inquiry Framework

The Community of Inquiry (CoI) is a collaborative approach to learning, which was first introduced to examine the effects and the quality of the learning process in computer-mediated communication (Garrison et al., 2000), which later shifted to the perspective of online learning (Garrison et al., 2010). It has attracted significant attention among educators and scholars. The model has been the leading theoretical reference, adopted and adapted worldwide, to study and examine teaching and learning practices in an online environment (Swan & Ice, 2010; Garrison, 2017; Panicker, 2018).

The CoI framework claims that learning in an online environment, occurs with the interaction of three identified critical elements of educational experiences which are the teaching presence, social presence, and cognitive presence. Although there have been updates and refinements on the framework, Garrison et al. (2010) proved these critical elements to be relatively stable. Each element has its categories and indicators that examine educational experiences contributing to an effective learning environment. The teaching presence is perceived to be the binding element in creating a community in inquiry (Garrison et al., 2010) and is largely dependent on the role of the teacher in an online class. It is categorized into course design and organization, discourse facilitation, and direct instruction (Garrison, 2017). Social presence is defined as the ability of participants to identify with the group, communicate in a trusting environment, and develop personal relationships by way projecting their personalities (Garrison, 2009). Categories of social presence include affective expression, open communication, and group cohesion. Cognitive presence refers to the inquiry process where learners construct meaning and confirm understanding of lesson content (Garrison, 2009). Categories of cognitive presence include triggering event, exploration, integration, and resolution.

The CoI framework and its questionnaire have been validated by several studies (Arbaugh et al., 2008; Bangert, 2009; Heilport & Lakhal, 2019). It has been proven to be reliable and valid (Stenbom, 2018) in examining learning experiences in blended approaches. Educators use the model to design and assess online and flexible learning. It has also been utilized to examine active learning (Stover & Ziswiler, 2017), students' perceived learning and course grades (Rockinson-Szapkiw et al., 2016), learning experiences and student satisfaction (Choo et al., 2019), and different online learning designs (Amemado & Manca, 2017; Krzyszkowska & Movrommati, 2020).

This study aimed to assess the flipped classroom pedagogy based on students' experiences using the CoI framework. The assessment was focused on teaching, social, and cognitive presence in a flexible learning environment. The study futher tried to identify issues and challenges encountered by students in using this pedagogy.

C. RESEARCH METHOD

Respondents

This paper utilized the descriptive method since it assessed the use of flipped classroom pedagogy in flexible learning using the CoI framework. A total of 51 respondents participated in this study. Using a purposive sampling technique, respondents were selected from two cohort classes of the undergraduate program of the knowledge management department of a state university. The state university delivered its education through flexible learning during community quarantine implemented due to COVID 19 pandemic. The flipped classroom pedagogy was utilized and applied to these participants.

Instrument

Since this study is anchored on the CoI framework, it adopted the CoI survey questionnaire as its main research instrument. Upon review, the instrument is free from biases in terms of gender, class, ethnicity, and cultural differences of the respondents. The CoI questionnaire was first developed and validated by a collaborative research team (Arbaugh et al., 2008) and is accessible online with a creative common (CC BY-SA) licensing. The CoI questionnaire is a 34-item tool that uses a 5-point Likert-type scale level of agreement for each item.

Procedures

A flexible learning toolkit was developed for the students. The toolkit includes prerecorded lessons, reading materials, activity sheets, and lecture notes. Saved in a flash drive, the toolkit was mailed to the students before the start of the semester. Soft copy of this toolkit was also uploaded in the learning management system (LMS) of the university so that students can access and view its contents. To provide students maximum accessibility to the toolkit, it was also uploaded in a Google Drive folder and shared with all students.

Before the classes start, students were oriented as to the course design, how to use the learning toolkit, as well as the course schedule which includes one synchronous and one asynchronous session each week. Before the end of semester, the students were asked to answer the research instrument via Google Form.

Data Analysis

Gathered data were analyzed using percentage and weighted mean for the CoI instrument. On the other hand, thematic analysis was utilized to analyze the issues and challenges of the flipped classroom pedagogy in flexible learning during the pandemic.

D. FINDINGS AND DISCUSSION

Teaching Presence

Findings of the study show that respondents strongly agree that there is teaching presence in flipped classroom pedagogy with a weighted mean of 4.77. The category design and organization of the course received the highest mean of 4.85, followed by direct instruction at 4.75, and facilitation of learning with a mean of 4.73. The weighted means can be interpreted that there is a strong teaching presence in the flipped classroom pedagogy. The items that received the highest mean score under the category design and organization include "*clearly communicated important due dates/time frames for learning activities"* and *"provided clear instructions on how to participate in course learning activities."* On the other hand, the item that received the lowest mean in the teaching presence under the category of facilitation is *"reinforced the development of a sense of community among course participants,"* which is still interpreted as strongly agree. Table 1 below shows the summary of scores for teaching presence.

Table 1. Teaching Presence in Flipped Classroom

	Mean	Interpretation
Design and organization	4.85	Strongly Agree
Facilitation	4.73	Strongly Agree
Direct instruction	4.75	Strongly Agree
Average	4.77	Strongly Agree

Previous study (Stover & Ziswiler, 2017) reported that flipped classroom pedagogy decreases teaching presence. The respondents of that study felt that less discussion time meant less teacher presence. The results of this study showed otherwise. The premise of a flipped classroom pedagogy is to provide lesson content asynchronously. The role of the instructor during asynchronous session is to remind students of their tasks in viewing lessons and reading assigned materials. During synchronous meetings, the teacher had more time monitoring students progress and providing class consultation and further instructions. Thus, students feel more teaching presence both from synchronous and asynchronous meetings.

Social Presence

With a weighed mean of 4.05, respondents agree that there is social presence in the flipped classroom pedagogy. The category with the highest mean is affective expression with the mean

of 4.18, followed by open communication with the mean of 4.00, and the lowest mean is 3.96 which is under the group cohesion category, all interpreted as agree. The item that received the highest mean of 4.39 and is interpreted as agree, is "*getting to know other course participants gave me a sense of belonging in the course"* under the category of affective expression; while the lowest mean is also under the same category with 3.82, interpreted as agree, is the item "*online or web-based communication is an excellent medium for social interaction*." Table 2 below shows the summary of scores for social presence.

Table 2. Social Presence in Flipped Classroom

	Mean	Interpretation
Affective expression	4.18	Agree
Open communication	4.00	Agree
Group cohesion	3.96	Agree
Average	4.05	Agree

This result indicated that social presence is felt by respondents in a flipped classroom pedagogy. Although respondents agreed to its presence, social presence according to Shelton et al. (2017) can be improved particularly when teacher and students interact consistently in a productive way. The reason why social presence was not strongly felt by the respondents may be attributed to the university policy of discouraging group assigments and activities that require internet connection and additional online time. A course design focused on reconstructing student-to-student engagement may be created to improved social presence.

Cognitive Presence

For cognitive presence, the respondents agreed to its presence with weighted mean of 4.42. The highest mean of all the categories under cognitive presence is integration, with the mean of 4.50, which is interpreted as strongly agree. This was followed by the category exploration, resolution, and triggering event which garnered weighted mean of 4.46, 4.41, and 4.32 respectively, all interpreted as agree. The item that received the highest mean is "*brainstorming and finding relevant information helped me resolve content-related questions,*" with the mean of 4.57 under the category exploration interpreted as strongly agree. This is followed by the item "*learning activities helped me construct explanations/solutions,*" with a mean of 4.55 under the category of integration, also interpreted as strongly agree. The item with the lowest mean is "*problems posed increased my interest in course issues*" with a mean of 4.39, although this item is still interpreted as agree. Table 3 shows the summary of scores for the cognitive presence.

Table 3. Cognitive Presence in Flipped Classroom

	Mean	Interpretation
Triggering event	4.32	Agree
Exploration	4.46	Agree

Integration	4.50	Strongly Agree
Resolution	4.41	Agree
Average	4.42	Agree

As shown by the results, cognitive presence in a flipped classroom pedagogy is felt by the respondents. They perceived its presence through brainstorming and problem solving which are both considered as higher form of thinking. This finding supports the claim of Little (2015) who stated that the flipped classroom pedagogy facilitates higher-order thinking skills. Because less time is need for lesson discussion during in-class time, he stated that the teacher is able to provide opportunities for application of learning.

Advantages and Disadvantages

Based on the findings of the current study, students appreciate the flipped classroom pedagogy as they gave more emphasis on its advantages than perceived challenges. The study identified three major advantages of the flipped classroom pedagogy in the context of the pandemic using thematic analysis. Respondents claim that flipped classroom (1) addresses the problem of internet connectivity and access to technological educational devices, (2) provides flexibility and convenience to students, and (3) offers heightened reinforcement. The result of the study identifying flexibility and convenience to students as an advantage of this methodology is in contrast with the study of Hagen and Fratta (2014), as cited by Stover and Houston (2019), which states that students expressed disinclination on managing their learning pace. On the other hand, it supports the finding of Bonnici et al. (2014) on the preference of the students to asynchronous delivery since it accommodates their lifestyles. Findings of the current study suggest that students find it more convenient if they have control over the pace of their learning in the flexible leaning modality, as they may have other activities they need to attend to at home or at work.

The study also identified two issues of flipped classroom as perceived by the students, these are (1) needed interaction with the instructor during asynchronous lecture, and (2) lack of time during synchronous meetings. These findings support the study of Hoshang et al. (2021) which stated that students cannot obtain direct explanation from the teacher when needed while watching prerecorded lessons. Respondents in this current study indicated that they are sometimes hesitant to clarify lessons and ask questions through email or instant messages to the teachers. Instead, they wait for synchronous session to clarify their lessons; however, they usually forget to raise their concerns. The students added that the 60-minute synchronous

session was not enough for lesson abstraction and activities; thus, there was no time left to facilitate their questions.

E. CONCLUSION

This study assessed the flipped classroom pedagogy using the CoI framework in flexible learning modality during the COVID-19 pandemic. Findings suggest that this teaching pedagogy addresses the vital challenges experienced by students in a flexible learning modality. Such challenges include poor internet connection and lack of access to technological educational devices. With flipped classroom pedagogy, students can access and download their lesson content either from their school's LMS or Google Drive folder. Downloaded files can be repeatedly viewed offline afterwards. With this design, there is no apprehension of lesson interruption due to video buffering and internet disconnection. With prerecorded lesson content, students who just share laptops with their siblings, can study their lessons when the devise is available for them to use. This intensifies the flexibility of the flipped classroom pedagogy, which is welcome not only by students with poor internet connection but also by working students. Furthermore, the flipped classroom model facilitates reinforcement of lessons since students can replay and review lessons easily. Students attend synchronous classes prepared and ready for class discussion as they have viewed the lessons beforehand. Because the instructor do not need to discuss the lesson content in detail during synchronous class, lesson abstractions and activities are facilitated during online class, which also adds to reinforcement of learning. Enough time can also be allotted to answering student queries and giving feedback. With these perceived advantages, this study recommends the flipped classroom pedagogy to help students overcome the challenges of flexible learning during the pandemic.

Although this study also identified issues on the utilization of flipped classroom, they can be addressed with improved course design and implementation. The need for direct communication with the instructor can be facilitated using forums and group messaging. Instructors should encourage students to send questions about the prerecorded lessons using group forums so that other students may view and read the posts as well. In addition, viewing forums and sending messages in group chats cost less for students than opening email applications. On the other hand, the issue of limited time for the synchronous meeting can be attributed to the policy of the university on limited online time. With this result, the study recommends for academic administrators to review online class time policies and allow instructors the flexibility of extending synchronous meetings when deemed necessary and when called for by the nature of the course.

It is also worthy note that the disadvantages of flipped classroom mentioned in other researches particularly the reported increased workload of viewing lessons out of the regular class time by students (Akçayır & Akçayır, 2018), were not observed by the respondents of the present study. This may be due to the flexible learning or blended modality, which included schedules for both synchronous and asynchronous meetings. Since students are instructed to view and read assigned lessons during the asynchronous schedule, they do not see it as a burden or additional workload. As such, this study implies that the flipped classroom pedagogy is suitable for blended learning modality, wherein asynchronous classes are devoted to studying lessons content, and synchronous classes are used for lesson synthesis, course activities, and feedback.

It may also be concluded that CoI is present and practiced in a flipped classroom environment when applied in online flexible learning. The students appreciates the efforts of the instructor in preparing and designing the course content. In this pedagogy, there is constant communication between the instructor and students on the course schedule since students are being reminded to view and read the instructional materials in advance. Thus, this study assumes there is teaching presence, social presence, and cognitive presence in flipped classroom as perceived by the students when implemented in flexible learning environment.

However, social presence can still be improved by focusing on student-to-student engagement. Although some universities discourage group activities from limiting students' online time, such engagement is needed to build the social presence in an online class. Students engagement among their peers may be enhanced even in an online setting if they can build trust among themselves. This may be possible by facilitating collaborative activities and group work and providing opportunities for them to get to know each other, create impressions, establish themselves, work together, and build support groups.

The findings are very encouraging; however, this study is not without limitations. First notable limitation was the number of respondents. Respondents came from only two cohort classes; thus, the results can not be generalized. Future research with more number of respondents is recommended accordingly. Another limitation was the non-inclusion of the students' satisfaction with the flipped classroom pedagogy in relation to their academic achievement. Last limitation was the lack of control group. Future researchers are encouraged to conduct a large-scale experiment that would include experiment and comparison groups to better assess flipped classroom pedagogy vis-a-vis other teaching approaches utilized in flexible learning modality.

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