Exploring the Pros and Cons of Implementing Flipped Classroom in a Virtual Learning Environment in Mathematics 7

Anton A. Romero
Scholar, Department of Science and Technology
Faculty, Partido State University
Goa, Camarines Sur, Philippines

Edarlyn D. Angeles
Faculty, Ateneo de Naga University
Naga City, Philippines

Abstract
Effective implementation of virtual learning has been a challenge encountered by many teachers. This paper investigates the experiences of twenty (20) grade seven students from a university exposed to virtual learning using the flipped classroom model in Mathematics. The informants were chosen from eight learning groups (LG) enrolled in online learning from 2020-2021. The study employed a case study design and used the Clarke and Braun thematic analysis (TA) approach to interpret the qualitative data. It used individual interviews, focused group discussions (FGD), and interviews with parents and teachers to collect relevant information. Google Meet was used to gather the data needed. This study aims to address the challenges encountered by the implementation of virtual classes during the pandemic. It also seeks to explore the pros and cons of putting the flipped classroom approach into practice in a virtual learning environment. The findings revealed that the flipped classroom approach could be an effective strategy in enhancing students' positive attributes toward learning and socialization in an online learning environment. Also, the teacher could transform the teaching and learning process into a more student-centered classroom in which assessment could be carried out effectively. For future purposes, researchers could address the cons of this study by integrating anecdotal records and performance trackers into the new flipped classroom model developed.

Keywords: flipped classroom model; virtual learning; pros and cons of flipped classroom; thematic analysis approach

1. Introduction

The outbreak of the COVID-19 pandemic forced the educational sector to change its mode of instruction from in-person to virtual learning. In the Philippines, the Department of Education and other private schools settled on a modular approach, while some big schools shifted to blended learning utilizing both modular and online classes. With COVID-19, a reliable internet connection is necessary to stay productive (Bueno and Pacis, 2020).

Many vital aspects of the teaching and learning process were sacrificed with the modular approach as it failed to cater to the different learning styles and abilities of the students. Therefore, online learning is a way to complement the limitations of the modular approach. Also, the COVID Action Network stressed the importance of internet connectivity as a tool in the fight against the continuing pandemic (The Manila Times, 2020). However, the Philippines ranks 73 out of 140 in terms of mobile speed and 63 out of 180 in terms of worldwide fixed broadband speeds (Speedtest Global Index, 2021). In addition, schools that could implement online classes still face regular problems with students' participation, engagement, and attendance.

Thus, implementing different methods in an online learning environment is necessary to raise the standard of education and learning. The flipped classroom is a new trend in education, and many studies support its effectiveness in enhancing the skills of learners today. According to research, the flipped classroom improves learning outcomes like achievement, motivation, engagement, and interaction (Zainuddin & Halili, 2016). It also has many positive features that enhance learning, advantageous for both teachers and students. However, this study employs Jeff Dunn's flipped classroom model in a virtual learning environment.

This study aims to address the challenges encountered by the implementation of virtual classes during the pandemic. It also seeks to discover the pros and cons of applying the flipped classroom model in a virtual learning environment. Specifically, the study aims to answer the following questions: (1) What are the pros and cons of implementing the flipped classroom in a virtual learning environment in Mathematics 7? (2) What flipped classroom models could be developed to enhance students' learning capabilities?

Therefore, implementing the flipped classroom model in a virtual learning environment is worth studying. The result of the study could be used by universities and other schools capable of implementing synchronous classes to improve students' overall learning experience. Moreover, if the model effectively develops the students' essential skills despite the absence of face-to-face interaction, it could be of great help in times like the pandemic. In this case, both private and public schools could consider a flipped classroom model in a virtual learning environment to ensure quality education.

2. Related Literature

Shifting education from a teacher-centered classroom to a more student-centered one requires teachers to focus on learning rather than teaching. The creation of the "flipped classroom" approach is a key repercussion of this current shift of focus in education. Rather than students sitting and listening to teachers in a regular classroom setting, the students in this approach were performing and showing the teacher ways of doing things (Tambis, 2018). However, Du et al. (2014) studied the advantages and disadvantages of the flipped classroom, and other studies supported these findings.

The use of video and other pre-recorded media, on the other hand, gives students control over their courses: they can watch the portion that they need (Du et al., 2014). According to Yildirim and Kiray (2016), in a flipped classroom, each student can go at their own pace while taking classes, with the option to watch the material again if necessary. Each video lecture could be viewed as many times as required by students (Mok, 2014). Furthermore, according to Kadry and El Hami (2014), students viewed the flipped classroom approach as a pleasant experience, particularly with the benefit of viewing lectures in their own time and at their own pace. It also provides a flexible learning environment where students can learn when and where they want (Flipped Learning Network, 2014).

According to Du et al. (2014), a flipped classroom encompasses various approaches, including active and collaborative learning. Collaborative learning projects can promote social contact, teamwork, and cultural diversity among students, making it more straightforward for them to assist one another with mutual learning and for students of different ability levels to support one another. In line with this, the flipped classroom has been found to promote student-teacher connection, class participation, peer-to-peer interaction, individual education, and active learning (Jang & Kim, 2020). Students who are more engaged in learning and actively participate in the learning environment will enjoy their work more. (Yildirim & Kiray, 2016). These students are more likely to raise questions, clear up misconceptions, and actively participate in class (Gouia & Gunn, 2016).

The flipped mode group exhibited greater learning emotional mean scores than its standard equivalent, according to Jdaitawi (2020). The total EQ is divided into five areas by the composite scales, including intrapersonal and interpersonal scales (Bar-On, 1997). According to Wilson (2016), understanding one's emotions and using them to make good decisions, manage feelings well, motivate oneself with zeal and persistence, and keep hope in the face of frustration are indicators of high intrapersonal levels, whereas exemplifying empathy and compassion, socializing smoothly, and building a relationship are indicators of high interpersonal levels. Peer-to-peer study and discovery, according to the student, should highlight the importance of student-faculty connections for relationship development, peer learning, and meaningful interaction with the faculty (McCallum, 2015). Students' motivation, pleasure, and confidence have improved in flipped courses (Jang & Kim, 2020). According to Du et al. (2014), another advantage of the flipped classroom is that it allows students to study papers and view videos at home before working with their colleagues during project hours. All these factors improve teamwork, abilities, and mutual understanding, and trust.

Aside from the advantages mentioned above, the majority of the learners agreed with the assertion., "Medical Sciences 4200 helped improve my independent learning skills" (McLean et al., 2016). It was also discovered that flipped classrooms had a favorable impact on student's engagement, academic achievement, interaction, and motivation (Zainuddin & Halili, 2016). Flipped classroom teaching can effectively develop autonomous and cooperative learning abilities and actively influence learning attitude and habit development (He, 2020). Additionally, during the flipped session, learners appeared to be more engaged. Through talks with their peers, they formed a learning community. They became quite self-sufficient and in charge of their education by the end of the semester (Ziegelmeier & Topaz, 2015).

However, there are also disadvantages to flipping the classroom. This paradigm has numerous obstacles, according to Akçayr and Akçayr (2018). The bulk of these are associated with external activities, such as insufficient preparation before classes. Learners may come to the class without preparing themselves for active learning, and it is difficult for teachers to follow up with whether the students have watched the videos. Students also have difficulty learning if they have limited or no internet connection or computer (Yildirim & Kiray 2016). Furthermore, according to Du et al. (2014), some students are less driven than their peers, and a demotivated attitude to this teaching approach may lead to fewer accomplishments. Low-income students may not have access to the computers and Internet that the flipped classroom requires.

Furthermore, the flipped learning paradigm switches education to a learner-centered approach; in-class time is devoted to exploring lessons in-depth and providing opportunities for learning. As a result, students participate in and evaluate their learning personally, taking an active role in knowledge generation (Flipped Learning Network, 2014). Teachers can also devote time to aiding students in building synthesis skills and working one-on-one with those who require extra help during class (Du et al., 2014). The flipped classroom allows for more task and practice time in class

and real-time assessments (Lo et al., 2017). According to McLean et al. (2016), students viewed that deep, active learning in the flipped context is the most significant addition offered. In a flipped classroom, the position of a teacher is considerably more crucial and often more challenging than in a typical classroom, according to the Flipped Learning Network (2014). Teachers keep a close eye on their students during class, offering them timely feedback and grading their work. According to Bergmann and Sams (2014), whenever flipped classroom teachers can share their experience they say: "No one is left behind, no one is held back."

2.1 Theoretical Framework

Transactional distance theory (TDT) is the gap between the teacher and the students, according to Delgaty (2018). This separation can be troublesome and can lead to students feeling isolated, and low on motivation and involvement.
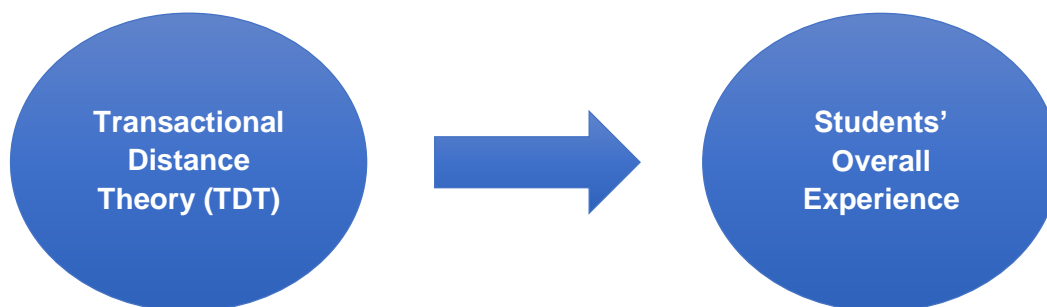
Theoretical Paradigm

In a flipped classroom, the lesson was assigned before the synchronous session. Thus, the time in synchronous classes was maximized for relevant activities and a more collaborative student-teacher engagement. Hence, the flipped classroom in a virtual setting may contribute to the students' overall experiences in the virtual learning environment by minimizing the said distance.

3. Methodology

This section discusses the research design, research environment, research informants, inclusion criteria, and research instrument.

3.1 Research Design

This paper employs qualitative research methods using a case study design. Specifically, it utilizes a thematic analysis (TA) approach, which mainly matches the objective of this study. Case study research is a qualitative approach in which the investigator gathers detailed, in-depth data over time from multiple sources of information (e.g., observations, interviews, audiovisual materials, documents, and reports) to investigate a bounded system (a case) or multiple bounded systems (cases), then reporting back a case description and case-based themes (Creswell, 2007).

3.2 Research Environment

This paper is conducted virtually with informants attending synchronous classes at home. Students also have allocated learning time intended for pre-class and other out-of-class activities. The case study implemented online learning as a mode of instruction for the entire school year between 2020-2021.

3.3 Research Informants

Twenty informants were selected to be part of the individual interview and focused group discussion (FGD). They were chosen from eight groups of Grade 7 students comprised of 160. For an in-depth analysis, Pontillas (2020) triangulated additional data such as journals and interviews. In this study, the lone teacher who handled the class and five parents were interviewed for verification and triangulation purposes. According to Shetty (2020), a good sample size should be used in a qualitative investigation to uncover various viewpoints, and the sample size should be restricted at the point of saturation. In creating similar divisions within the population, the standard advice for in-depth interviews is to have a sample size of 20-30. In some circumstances, a minimum of 10 is acceptable, provided population integrity is maintained during recruitment.

3.4 Inclusion Criteria

The informants should be part of the eight learning groups (LG) of a university and have parental consent signed by their parents or guardian. The latter underwent virtual learning using the flipped classroom strategy during the last term of 2020-2021 at a university. The researchers used mixed purposeful sampling to choose the informants from the participants of the study.

3.5 Research Instruments

A semi-structured interview was used in this study and underwent a validation process involving a graduate school professor, an English instructor, and an education specialist. The comments and suggestions were collected through Google Docs. The research tool aimed to examine and explore the learners' experiences in the virtual learning environment using the flipped classroom strategy. The responses of the informants were gathered via Google Meet.

3.6 Analysis of Data

The researchers transcribed the taped interviews and then manually coded the interview transcripts to construct the study's primary themes. As a basis, the thematic analysis method can examine various data types, ranging from secondary sources like media to transcripts of FGD or interviews (Clarke & Braun, 2013). The researchers adopt the steps of thematic analysis used in the study of Pontillas (2021).

3.6.1 Data familiarization

In this stage, to familiarize themselves with the data, the researchers reviewed the transcripts of the interviews several times and highlighted essential elements.

3.6.2 Coding

The researchers divided the interview extracts relating to the study's premises codes (C1, C2, C3, C4, etc.).

3.6.3 Looking for Themes

The researchers classified the codes with comparable answers into themes.

3.6.4 Themes Revision

Two more intercoders were requested to assess the first draft of themes by the researchers. This was also a technique of validating the data and limiting the study's biases.

3.6.5 Themes are defined and named.

The researchers and two other intercoders finalized the themes employed in data analysis and interpretation.

3.6.6 Writing-Up
In the discussion section, the researchers used the finalized themes.

4. Results and Discussion

After a mindful and thorough analysis of the transcripts, the researchers found four themes for pros and two for cons of the flipped classroom in an online learning environment. The themes for pros were as follows: (a) developing study habits; (b) learning is active; (c) opportunity to enhance intrapersonal and interpersonal skills; and (d) effective assessment. On the other hand, the cons were (a) inactive learners and (b) technical difficulties. Also, Jeff Dunn's model is shown, and the developed flipped classroom model by the researchers is described and discussed thoroughly in section 4.2.

4.1 Themes
Theme 1: Developing Study Habits
He (2020) mentioned that the flipped classroom teaching mode could effectively develop a learner's autonomy and influence their actively developing learning attitude and habit. Yildirim & Kiray (2016) said that in a flipped classroom, each learner has an option to carry out their task at their own pace, with the opportunity to see the material again if necessary. To prepare for class, students could watch each video lecture as many times as they wanted (Mok, 2018) and learn at their own pace (Kadry & El Hami, 2014). The informants of this study stated that they watched the pre-recorded videos anytime and as much as they needed to. They stated that they were able to learn better when watching videos alone. They could learn the lesson beforehand, and therefore slower learners could keep up with the material. Students can also find other resources for more examples and in-depth discussions to fully understand the topic so that both the slow and fast learner students are prepared before coming to synchronous class.

In addition, the informants also mentioned that they were able to set goals to finish their tasks since they said that they usually followed the schedule provided to them and became more organized and productive. By doing so, they now enjoyed studying and, at the same time, deepened their understanding since they were excited and motivated to learn. During flipped classes, they grew incredibly self-sufficient and took control of their education (Ziegelmeier & Topaz, 2015). However, other informants mentioned that, for instance, they did not thoroughly understand the topic. They still sought help from others, specifically from their peers and family members. According to Zainuddin and Halili (2016), flipped classrooms improved students' learning achievement, motivation, and engagement. These statements were validated by the parents interviewed. They stated that the pre-recorded videos were a big help for the students since they would provide a chance for students to learn at their desired pace and feel ready before the synchronous session. They also highlighted that the students followed a specific schedule at home to maximize learning and maintain a balanced lifestyle. Moreover, the parents emphasized that because of the flipped classroom, their children developed independent learning. They too could guide the students and help them whenever necessary, they concluded.

Based on the informants' responses, students studied in advance, learned at their own pace, managed their time, and were resourceful, responsible, independent, and motivated in learning. Thus, the flipped classroom helped to develop their study habits.

Theme 2: Learning is Active
Collaborative projects can encourage social interaction, teamwork, and cultural diversity among students, making it easier for individuals of all abilities to support one another through mutual learning (Du et al., 2014). During the individual interviews, the study informants stated that they could collaborate with their classmates in the flipped classroom. They also mentioned that they

could share what they have learned from the previous discussion individually and as a group. Some learners said that sometimes they watched videos with their classmates and collectively brainstormed so when there were topics that they did not individually understand, they could share their thoughts with classmates who did, and vice versa. Even without synchronous classes, leaners can talk by group meetings to collaborate and help answer questions.

Meanwhile, during the focused group discussion (FGD), most informants expressed that they were excited to share their ideas and present them to the whole class. They also highlighted that their relationship with their classmates improved since they could now collaborate. The teacher also observed that the students were now more open to voicing their thoughts and collaborating.

Students in a flipped classroom are more engaged in learning and actively participating in the learning environment (Yildirim & Kiray, 2016). They may raise questions, clear up misconceptions, and actively participate in class (Gouia & Gunn, 2016). Additionally, during the flipped session, students appeared to be more interested. They formed a learning community through discussions with their peers (Ziegelmeier & Topaz, 2015). During individual interviews, the informants enumerated what they planned to do. They assign a task to each member of the group so that each member has their own responsibilities and can actively contribute to their group. They also emphasized that the grouping stage requires a team effort, and that there will be consequences if a member does not contribute anything, and this acts as a motivation to work in a team. They also mentioned that when other learners have different answers, they collaboratively talk about the differences and think about the correct answers together. Other informants also initiated meeting and assigning tasks to their group mates. They even required their peers to contribute to the group through solving, sharing their thoughts and ideas, and writing the solutions. Moreover, during the focused group discussion (FGD), most informants shared that they worked as a team and ensured they checked each solution and answer. Thus, they felt more confident in presenting since they worked hard for it. They further emphasized that by a flipped classroom approach, they improved their communication skills. The teacher also remarked that the students were able to show their distinct capabilities, such as leadership and communication skills.

The students in the learning process were active according to the statements of the informants and the teacher. They showed positive, collaborative behavior through teamwork, sharing their thoughts and ideas, leadership, and helping and supporting each other.

Theme 3: Opportunity to Enhance Intrapersonal and Interpersonal Skills
According to Jdaitawi (2020), the flipped mode group had greater learning emotional mean scores than the traditional mode group. Total EQ is divided into five areas by the composite scales, including intrapersonal and interpersonal (Bar-On, 1997). Wilson (2016) emphasized the importance of demonstrating empathy and compassion, interacting effortlessly, and managing relationships efficiently at the interpersonal level for effective relationship building (McCallum et al., 2015). In the individual interview, the informants of this study stated that they were able to build relationships and become closer with their classmates by joking around from time to time. They also stated that their friendship improved, and connections were improved. They reminisced that they didn't know much from their class before the flipped classroom, but they gained more friends and maintained strong relationships since. They also added that they overcame their shyness since they got to know more about their classmates and communicate freely. Even if they did not get to talk in person, they were still able to have fun and interact with each other online. With this, they highlighted that not only did they become close and build friendships, but more importantly they grew academically and socially. Also, two students considered other members to join the group who had reasonable excuses otherwise, but still showed a willingness to present. Furthermore, during the focused group discussion (FGD), the students agreed that they gained

many friends and became close. They put time into the relationships, and their connections and communication skills improved, and this was useful as they needed to liaise with their groupmates and present in class. In addition, the teacher witnessed that the students developed camaraderie and built a rapport with their peers.

Knowing one's sentiments and using them to make intelligent judgments, such as regulating feelings successfully, motivating oneself with enthusiasm and persistence, and keeping hope in the face of frustration are all examples of intrapersonal expressions, according to Wilson (2016). In addition, students' pleasure and confidence have increased in flipped classrooms (Jang & Kim, 2020). Secondly, during individual interviews, informants of the study said that the flipped classroom approach is a convenient learning strategy. It made students more focused and allowed them to show more interest in learning since they understood its importance and the effect it has on their future. Moreover, they articulated that they were more comfortable completing their tasks alone. Their self-confidence was boosted when they shared their thoughts in a small group, presented in a crowd, and recited and participated during synchronous classes. They then concluded that they felt happy and confident whenever they presented or expressed their own opinions. The teacher also attested that during the flipped classroom, the students were able to unfold their self-confidence.

Regarding the students' experiences during the flipped classroom implementation, they showed that they could manage their own emotions and build confidence. Also, they made friendships and camaraderie and showed compassion and empathy to others. Hence, the flipped classroom could be a way to improve students' interpersonal and intrapersonal skills.

Theme 4: Effective Assessment

According to Bergmann & Sams (2014), whenever flipped classroom teacher can share their experiences they say: "No one is left behind, no one is held back." Flipped Learning Network (2014) wrote that in a flipped classroom, the educator's work is more crucial and often more challenging than in a typical classroom. They keep a close eye on their kids during class, offering timely feedback and grading their work. The flipped classroom increases in-class time for task/practice and real-time feedback (Lo et al., 2017). In the informants of this study, during individual interviews, they listed that there were a number of advantages of the flipped classrooms. First, students will receive a participation point whenever they recite. Also, in case of any misunderstandings or misconceptions of the lessons, the students could be corrected in real-time. The learners also emphasized that they no longer had to ask twice if their classmate raised the same question, as immediate feedback was given. They also mentioned that whenever somebody explained something wrong, it could be clarified right away. They said that immediate feedback was very effective for online classes and could be given attention if flipped classrooms were continuously observed. They also inferred that the teacher would assess whether the students learned from the pre-recorded video they watched and if they could test their understanding based on the assignment they have accomplished and how they presented this in class. With this, another informant stated that the teacher could provide chances to everyone and discover each student's potential and capabilities.

Furthermore, with in-class time committed to delving deeper into topics and providing rich learning opportunities, the Flipped Learning model shifts education to a learner-centered approach. Additionally, teachers can invest time in assisting students in developing synthesis skills and use the class time working one-on-one with students who require additional assistance (Du et al., 2014). During the individual interview, they affirmed that flipped classrooms deepened their understanding since several guide questions were necessary to think critically and reflect on their solutions and answers. They also stressed that they were conditioned for preparation before class

because the teacher would ask them questions. Thus, they needed to study hard and understand the topic. Moreover, the students appreciated the pre-recorded videos as an addition to the module. During the focused group discussion, they made it easier to understand the lesson and the step-by-step procedure with the videos available.

The statements gathered from the informants showed that the teacher in the flipped classroom provided an effective assessment. The teacher assessed individual learnings, provided immediate feedback, deepened students' understanding, and catered to varied learning styles.

Theme 5: Inactive Learners
The flipped classroom paradigm has numerous obstacles, according to Akçayr & Akçayr (2018). The bulk of these is related to activities outside of class, such as unprepared learners. They may come to the class without preparing themselves for active learning (Yildirim & Kiray, 2016). Also, Du et al. (2014) found that some students are not as interested as others. Aside from the advantages of the flipped classroom that the informants enumerated, students also stated the disadvantages. They mentioned that some students were not participating when called upon, and emphasized that whenever this happened, the time intended for other activities was compromised. When they did not respond, the time allotted for the session was not maximized. They then stated that some of their classmates did not take part during groupings and thought that a few reasons were due to addiction to online games or that their groupmates had so much on their plate that they did not know what to prioritize first. They also admitted that inactive groupmates affected them, and they were worried that they wouldn't finish the task. Hence, they concluded that those students who did not contribute to their group were often absent, did not know what to do, or were not listening to the instruction. This was supported by the informants in the focused group discussion who did not engage during the grouping stage.

The information from the informants showed that the inactive learners were not attending synchronous sessions, not participating in the group activities, or not doing their pre-class activities. Lack of self-esteem and pre-requisite skills of the learners also contributed to the students' negative behavior in learning.

Theme 6: Technical Difficulties
According to Yildirim & Kiray (2016), the students had difficulty learning if there was no internet or computer access. Moreover, learners in low-income communities may not have access to the gadgets and internet connections required in a flipped classroom (Du et al., 2014). Another disadvantage that the informants noticed was the technical difficulties. They explained that these were why students were absent during synchronous classes. There were numerous instances where the internet connection in their area was not working. It was also troublesome to students since the internet was often gone the whole day, which affected their performance and attendance in class.

Although most students in a university have an internet connection at home and can obtain the necessary gadgets required in this kind of instruction, there were circumstances where the students could not enter the synchronous sessions and participate in group activities due to internet problems.
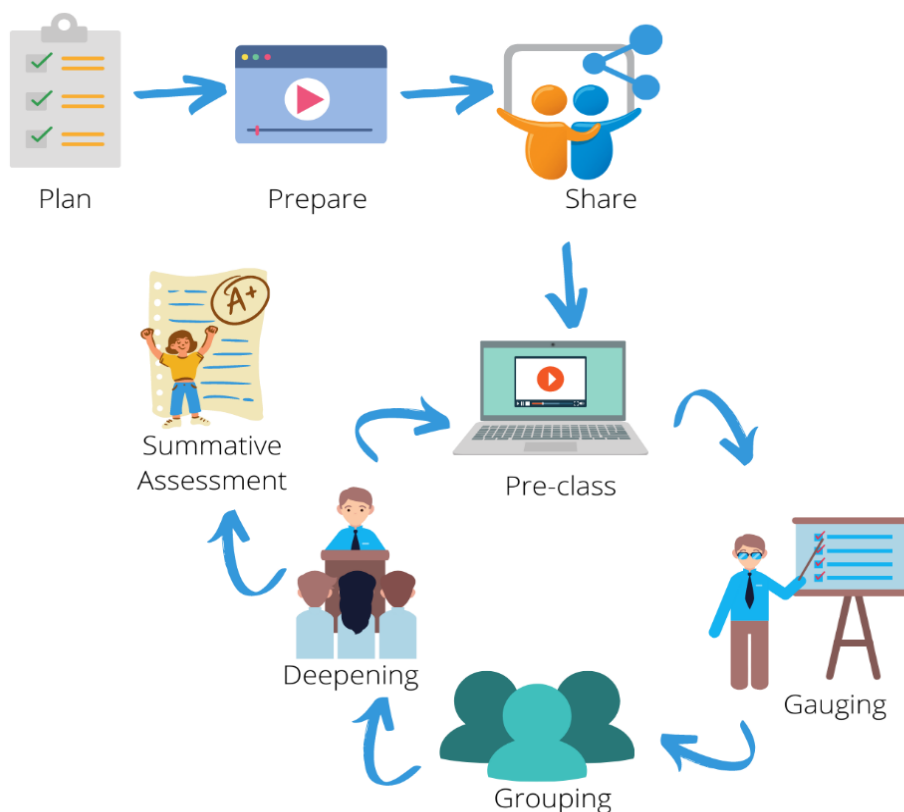
4.2 The Developed Flipped Classroom Model
The six-step flipped classroom model proposed by Jeff Dunn (2014) was used in this study and is the basis used to develop a new model. Also, this portion of the study enumerates and discusses the eight stages of the flipped classroom model created by the researchers. It also included remarks

to assist the designed flipped classroom approach in addressing the students' learning behavioral issues.

JEFF DUNN'S FLIPPED CLASSROOM MODEL

The significant changes that can be found in the developed model are in the gauging and deepening stages. In the gauging stage, the main goal of the teacher before moving to the grouping stage is to ensure that all the students have a grasp of the concept or knowledge, while in the deepening stage, the teacher expects that the students have an in-depth understanding and mastery of the lesson.

DEVELOPED FLIPPED CLASSROOM MODEL

Stage 1: Plan

The teacher plans the number of days allotted for each competency, the activity, and strategy used, the number of summative assessments, quizzes, and worksheets.

Stage 2: Prepare

The teacher creates and chooses video lessons, modules, learning packages, quizzes, summative tests, anecdotal records, format for the tentative grades, mini task and performance task, worksheets, LMS, and other learning materials needed.

Stage 3: Share

The teacher distributes the learning package, shares the video lesson through YouTube and other learning resources through LMS.

Stage 4: Pre-class

The students are required to utilize the resources shared by the teacher and complete the activity at the end of the video lesson.

Stage 5: Gauging

The teacher assesses students' learning and understanding and makes sure that all students grasp the lesson and the problem given.

Stage 6: Grouping

The teacher creates a venue for the learners to collaborate, practice, master the lessons, and plan and prepare for the deepening stage.

Stage 7: Deepening

The teacher assesses the students' mastery and in-depth understanding of the lesson.

Stage 8: Summative Assessment

The teacher gives a test after each term or chapter.

Notes:

1. The teacher makes an anecdotal record that they observe during the in-class or synchronous classes to address the behavioral problems of the students that affect learning.
2. The teacher provides a grade tracker using Google Sheets for the students and parents to be aware of the student's academic status.

5. Conclusion

Based on the findings, the learners need to be prepared before coming to class by learning in advance, learning at their own pace, and learning independently. Through this, flipped classrooms developed their own study habits. Secondly, learners became active through participating in group activities, collaborating with others, helping each other, and working as a team. This process also built friendships and closeness among them, and they showed empathy and compassion for others. They boosted their confidence and managed their own emotions when presenting in front of the crowd, a manifestation that can enhance their interpersonal and intrapersonal skills. Then, the teacher was able to effectively assess and understand the needs of each student by providing relevant feedback, deepening students' learning, and catering to varied learning styles. On the other hand, some inactive learners were not completing their pre-class tasks and seldom attended synchronous sessions. The technical issues also explained why learners could not participate in synchronous sessions or virtual classes. It has been concluded that the flipped classroom could be

an effective strategy in enhancing students' positive attributes toward learning and socialization in an online learning environment. Also, the teacher could transform the teaching and learning process into a more student-centered classroom in which assessment can be carried out effectively. Hence, transactional distance theory (TDT) supports the findings of this study since the flipped classroom in the virtual learning environment enhances the learners' overall experience by minimizing the distance between the teacher and the students. For future purposes, researchers could address the cons of this study by integrating anecdotal records and performance trackers into the new flipped classroom model.

5.1 Limitation of the Study
Due to time constraints and the students' other commitments to their schoolwork, their journals' writing was not implemented. The individual interview and focused group discussion data were not triangulated to their journals. Instead, the researchers interviewed the parents and the teachers to verify the students' responses during the interview. It may have affected the result of the study differently if the students were able to express their thoughts and ideas more freely through journals without the presence of an interviewer.

6. Implications
Investigating the pros and cons of the flipped classroom approach in an online learning environment can lead to fruitful insights. The result of this study could improve not only the flipped classroom model but also impact the following groups:

6.1 Teachers
The teachers could shift their classroom to a student-centered approach by employing the developed flipped classroom model. They could also focus on learning rather than teaching by practicing effective assessment principles.

6.2 Students
Slow learners have the opportunity to cope up with lessons by learning in advance, at their own pace, and through seeking help from others before coming to class. Likewise, fast learners could learn mathematics concepts and could have the chance to develop other skills necessary in later life.

6.3 Parents/Guardians
Parents/guardians could increase bonding time with their child through watching video lessons and helping to prepare the pre-class activities.

6.4 Field of Mathematics Teaching
With the students' struggles in learning mathematics, especially the Filipino learners, continuous innovation on teaching techniques, strategies to improve the flipped classroom model, and assessments are necessary to improve the curriculum.

6.5 Researchers
The researchers could study the effectiveness of implementing the flipped classroom model on variables related to study habits, active learning, intrapersonal and interpersonal skills, and effective assessment.

7. References
Akçayır, G., & Akçayır, M. (2018). The flipped classroom: A review of its advantages and challenges. *Computers & Education*, *126*, 334-345. https://doi.org/10.1016/j.compedu.2018.07.021

Bar-On, R. (1997). *BarOn emotional quotient inventory*. Multi-health systems. https://doi.org/10.5772/38875

Bergmann, J., & Sams, A. (2014). *Flipped learning: Gateway to student engagement*. International Society for Technology in Education. https://www.readpbn.com/pdf/Flipped-Learning-Gateway-to-Student-Engagement-Sample-Pages.pdf

Bueno, A., & Pacis, J. (2020). As COVID-19 forces life to move online, who is left behind? CNN Philippines. https://cnnphilippines.com/life/culture/2020/5/20/internet-access-pandemic.html?fbclid=IwAR3ATCk77YUttLKf0Ux0JdZqK-4fk7Y5vNInK6EKRUr_OpEVN8TPgj9NNp4

Canva.com.

Clarke, V., & Braun, V. (2013). Teaching thematic analysis: Overcoming challenges and developing strategies for effective learning. *The Psychologist*, *26*(2), 120-123. https://uwe-repository.worktribe.com/output/937596/teaching-thematic-analysis-overcoming-challenges-and-developing-strategies-for-effective-learning

Creswell, J. (2007). Qualitative Inquiry & Research Design Choosing Among Five Approaches (2nd Edition). Sage Publicaion, Inc.

Delgaty, L. (2018). Transactional distance theory: a critical view of the theoretical and pedagogical underpinnings of e-learning. In *Interactive Multimedia-Multimedia Production and Digital Storytelling*. IntechOpen.

Dunn, J. (2014). The 6-step guide to flipping your classroom. https://medium.com/@jdunns4/the-6-step-guide-to-flipping-your-classroom-d721878f85c1

Du, S. C., Fu, Z. T., & Wang, Y. (2014). The flipped classroom advantages and challenges. In *International Conference on Economic Management and Trade Cooperation,* 107, 17-20.

Flipped Learning Network (FLN) (2014). The Four Pillars of F-L-I-P™. https://flippedlearning.org/wp-content/uploads/2016/07/FLIP_handout_FNL_Web.pdf

Gouia, R., & Gunn, C. (2016). Making mathematics meaningful for freshmen students: investigating students' preferences of pre-class videos. *Research and practice in technology enhanced learning*, *11*(1), 1-8. https://doi.org/10.1186/s41039-015-0026-9

He, J. (2020). Research and practice of flipped classroom teaching mode based on guidance case. *Education and Information Technologies*, *25*(4), 2337-2352. https://doi.org/10.1007/s10639-020-10137-z

Jang, H. Y., & Kim, H. J. (2020). A Meta-Analysis of the Cognitive, Affective, and Interpersonal Outcomes of Flipped Classrooms in Higher Education. *Education Sciences*, *10*(4), 115. https://doi.org/10.3390/educsci10040115

Jdaitawi, M. (2020). Does Flipped Learning Promote Positive Emotions in Science Education? A Comparison between Traditional and Flipped Classroom Approaches. *Electronic Journal of e-Learning*, *18*(6), 516-524. https://doi.org/10.34190/JEL.18.6.004

Kadry, S., & El Hami, A. (2014). Flipped classroom model in calculus II. *Education*, *4*(4), 103-102. https://doi.org/10.5923/j.edu.20140404.04

Lo, C. K., Hew, K. F., & Chen, G. (2017). Toward a set of design principles for mathematics flipped classrooms: A synthesis of research in mathematics education. *Educational Research Review*, *22*, 50-73. https://doi.org/10.1016/j.edurev.2017.08.002

McCallum, S., Schultz, J., Sellke, K., & Spartz, J. (2015). An Examination of the Flipped Classroom Approach on College Student Academic Involvement. *International Journal of Teaching and Learning in Higher Education*, *27*(1), 42-55. https://files.eric.ed.gov/fulltext/EJ1069793.pdf

McLean, S., Attardi, S. M., Faden, L., & Goldszmidt, M. (2016). Flipped classrooms and student learning: not just surface gains. *Advances in physiology education*. https://doi.org/10.1152/advan.00098.2015

Mok, H. N. (2014). Teaching tip: The flipped classroom. *Journal of information systems education*, *25*(1), 7. https://ink.library.smu.edu.sg/cgi/viewcontent.cgi?referer=https://scholar.google.com/&httpsredir=1&article=3363&context=sis_research

Pontillas, M. S. D. (2020). Reducing the Public Speaking Anxiety of ESL College Students Through Popsispeak. *3L: Language, Linguistics, Literature®*, *26*(1).

Pontillas, M. (2021). Opportunities and Challenges of a Filipino Educator in a Home-based Online EFL Industry: A Single Case Study. *Journal of Education, Management and Development Studies*, *1*(1), 77-88.

Shetty, S. (2020). Determining sample size for qualitative research: What is the magical number. https://interq-research.com/determining-sample-size-for-qualitative-research-what-is-the-magical-number/#:~:text=Our%20general%20recommendation%20for%20in,the%20population%20integrity%20in%20recruiting.

Speedtest Global Index, (2021). Global Speed August 2021. https://www.speedtest.net/global-index

Tambis, Z. M. (2018). Flipped classroom in elementary education. The Freeman. https://www.philstar.com/the-freeman/cebu-lifestyle/2018/10/07/1858047/cebu-lifestyle

The Manila Times. (2020). Reliable internet: Critical weapon in Covid-19 fight. https://www.manilatimes.net/2020/05/17/business/sunday-business-i-t/reliable-internet-critical-weapon-in-covid-19-fight/725184/

Wilson, L. O. (2016). The Second Principle. https://thesecondprinciple.com/optimal-learning/eqeducational-applications/?fbclid=IwAR2r5peJ3d3_e63FnnYhadvCCNPiw3p1GaIJ60dpnN0clH0sofjtC2uLLxI

Yildirim, F. S., & Kiray, S. A. (2016). Flipped classroom model in education. *Research Highlights in Education and Science 2016*, 2. https://www.researchgate.net/profile/Ayseguel-Aslan/publication/333033565_THE_EFFECTS_OF_MENTORING_ON_CHEMISTRY_TEACHERS%27_PROFESSIONAL_DEVELOPMENT/links/5cd7da43458515712ea4db9e/THE-EFFECTS-OF-MENTORING-ON-CHEMISTRY-TEACHERS-PROFESSIONAL-DEVELOPMENT.pdf#page=7

Zainuddin, Z., & Halili, S. H. (2016). Flipped classroom research and trends from different fields of study. *International review of research in open and distributed learning*, *17*(3), 313-340. https://doi.org/10.19173/irrodl.v17i3.2274

Ziegelmeier, L. B., & Topaz, C. M. (2015). Flipped calculus: A study of student performance and perceptions. *Primus*, *25*(9-10), 847-860. https://doi.org/10.1080/10511970.2015.1031305

Appendix A
FGD/Interview Guide Questions to the Subjects
1. What are the advantages of the "pre-class stage" in the form of video lessons? Share specific learning experiences. What are the disadvantages? If any, share specific learning experiences? What can you recommend to improve your learning experiences during the pre-class activity?
2. What are the advantages of the "change stage" in the flipped classroom model? Share specific learning experiences. What are the disadvantages? What can you recommend to improve your learning experiences during the change stage?
3. What are the advantages of the "grouping stage" in the flipped classroom? Share specific learning experiences. What are the disadvantages? What can you recommend to improve your learning experiences during the grouping stage?

4. What are the advantages of the "regrouping stage" in the flipped classroom? Share specific learning experiences. What are the disadvantages? What can you recommend to improve your learning experiences during the regrouping stage?

5. What are the changes brought to you by the flipped classroom method regarding behavior in learning? What are your relationships with others? Share specific experiences.

6. What are your overall learning experiences on the flipped classroom as a method in a virtual learning environment? Share specific learning experiences.

Appendix B
One-on-one Guide of Interview Questions for Teacher
1. What did you notice during the change and regrouping stages of the flipped classroom in terms of your students':
   a. preparedness
   b. participation
   c. behavior in learning?
2. What advantages and disadvantages did you notice during the grouping stage?
3. What changes did you notice during the third term on the students':
   a. behavior in learning
   b. students' engagement?
4. As a teacher, what are the advantages and disadvantages of implementing flipped classroom in an online learning environment?
5. What modifications should be carried out on aspects of the flipped classroom model to maximize learning?

Appendix C
Interview Guide Questions for Parents/Guardians
1. What are the advantages of pre-class activity in the form of video lessons based on your observation? Share specific scenario/s. What are the disadvantages? What can you recommend to improve the learning experience of your child at home?