

Exploring the Lived Experiences of College Students with Flexible Learning in Mathematics: A Phenomenological Study

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Abstract As the world is embracing the new normal social landscape, the education sector is also opening to restructuring and innovating learning modalities to adapt to the constant and current changes. The Commission on Higher Education ordered that flexible learning is the new norm in the delivery of instruction, as outlined in Memorandum Order No. 4 s. of 2020 on the Guidelines on the Implementation of Flexible Learning. However, the shift to this new learning modality poses problems for college students as they encounter difficulties such as limited face-to-face interaction, difficulty staying motivated, absence of instructional materials, and limited opportunities for collaboration. This study explored the students' experiences in learning mathematics in a flexible modality. The study employed a descriptive phenomenological research design, with seven (7) randomly selected 2nd-year college students participating in focus group discussion. Braun and Clarke's thematic analysis evaluated and interpreted the qualitative data. The research's findings produced five (5) primary themes: clever approaches to learning mathematics in flexible learning; utilizing education technologies for enhanced learning; recognizing extra miles done by the teacher; self-motivation and engagement in mathematics learning; and peer collaboration in completing mathematical tasks. This study suggests that some students find flexible learning to be an ineffective way to learn math. However, with the proper support and teacher guidance, students can have a successful and rewarding experience teaching mathematics through flexible learning.

Keywords: education technology, flexible learning in mathematics, independent learning, student motivation, peer collaboration, phenomenology

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1. Introduction

As the world is embracing the new normal social landscape, the education sector is also opening to restructuring and innovating learning modalities to adapt to the constant and current changes. Learning modalities have become unconventional, adapting to the new innovative trends in technology and learners' diversified learning styles and landscapes to prepare every student for their future [1]. Hence, the Commission on Higher Education ordered that flexible learning is the new norm in the delivery of instruction, as issued in Memorandum Order No. 4 s. of 2020 on the Guidelines on the Implementation of Flexible Learning. This CMO was strengthened by the issuance of Memorandum Order No. 6 s. of 2022 with an addendum on the report of Dr. Roel P. Anticas on "Sustaining Flexible Learning in Higher Education." This stipulates encourage higher education institutions to continuously implement blended/hybrid

learning, distance learning, e-learning, and other synonymous modes of delivery that are not the same as the traditional modes of teaching. It involves digital and non-digital technology and covers face-to-face and out-of-classroom learning modes [2]. It may be synchronous, real-time discussions and time-bounded assessments or asynchronous, time-unbounded assessments such as pre-recorded video presentations and activities that will not require immediate submission [3].

In recent years, higher education institutions have begun to offer flexible learning modalities for mathematics courses, especially during the COVID-19 pandemic. It has been widely accepted due to its potential to provide access to quality education for a broader range of students. The factors contributing to students' acceptance and readiness vary based on behavioral and demographic variables. Students' behavioral acceptance of flexible learning was significantly influenced by their technological readiness, prior experience with distance learning, self-regulation skills, self-discipline, student motivation, time management, and perceived support from math teachers. On the other hand,

demographic variables such as age were found to significantly impact students' flexible learning readiness. College students tend to have high retention, self-regulation, and coping mechanisms, which are vital for flexible learning in higher education [4].

Many universities globally have adopted flexible learning even before the pandemic [5,6]. These studies determined and explored the factors that influence students' flexible learning readiness in mathematics. The results showed that students' attitudes, availability of the use of devices, cost of the internet, technical competencies, social competencies, and communication competencies were the significant factors that explain higher education students' preparedness to be admitted to universities [5,6].

Although studies confirmed college students' readiness for flexible learning, current research findings showed that students experienced challenges in implementing this modality. College students' positive response to the course mathematics is more significant in traditional face-to-face classes than in flexible learning [7]. In fact, a study conducted in the USA explained that blended instruction produced the least success rate when compared to traditional face-to-face and online learning [8]. The absence of instructional materials that explain how to answer the activities and tasks provided by math instructors is one of the difficulties students encounter when engaging in flexible learning. Moreover, college students in the Philippines still like the traditional way of teaching, where the teacher discusses the math concepts followed by a formative evaluation [9]. With these, instructors must develop creative ways to ensure that students acquire the objectives of mathematics instruction [10] and train them on varied, flexible learning methods, instructional materials, and interactive learning tools [11].

In the Philippines, various phenomenological studies on flexible learning have been carried out utilizing multiple learning modalities, focusing on K-12 education. However, there is little study on flexible learning in higher education in phenomenological mathematics studies. Hence, this study aims to investigate students' experiences and challenges when learning mathematics in tertiary education using flexible learning methods.

The researchers are best positioned to propose solutions if they know the student's problems and difficulties. We can only offer helpful solutions once we can identify the cause of the problem. With these, the researchers interviewed 2nd-year college students at Davao Doctors College to learn about their learning experiences with mathematics and their challenges and difficulties in flexible learning modality.

2. Methodology

This study employed descriptive phenomenology in understanding college students' experiences and challenges with flexible learning in mathematics. This approach aimed to capture the essential structures and characteristics of participants' experiences, allowing for a comprehensive and detailed understanding of their subjective perspectives. Phenomenology is done through interviews with individuals with first-hand knowledge of an event, situation, or experience [12]. The interviews

attempt to answer two broad questions: What have you experienced regarding this phenomenon? What contexts or situations have typically influenced your experiences of the phenomenon? [13]

The participants were purposively chosen from the 2nd year college students at Davao Doctors College (DDC), a private higher education institution in Davao City, Philippines. The sample size was determined based on data saturation, aiming to comprehensively understand college students' lived experiences with flexible mathematics learning. The selection criteria were established to ensure the relevance and richness of the data. First, the participants were bona fide students of Davao Doctors College. Second, they were enrolled in the second semester of the academic year 2022-2023. Third, they finished taking any mathematics course (e.g., Mathematics in the modern world, statistics). Finally, they studied mathematics using any flexible learning modality (e.g., online, modular, blended, synchronous/asynchronous). The researcher also considers the potential impact of the limitations of the study. The sample was confined to 2nd-year college students, which restricts the generalizability of the findings to broader student populations as well as the underrepresentation of marginalized groups and students from non-traditional educational backgrounds.

An orientation was conducted by the researchers with the selected participants. The orientation focused on the data collection technique, confidentiality of information, and voluntary participation, all based on Republic Act 10173, also known as the Data Privacy Act. The researchers also informed the participants that the interview would be recorded, and they could freely express their answers in vernacular (Davaoeno). After the orientation, the researchers asked for participants' permits to participate in the study.

The next day, the researchers conducted a focus group interview using researcher-made semi-structured interview questions based on the research objective of the study (Table 1). The interview questions focused on students' experiences with flexible learning in mathematics, engagement and motivation with instructors and classmates, strategies and adaptive measures in understanding mathematics, and their perception of technology integration. To maintain confidentiality, the interview was held in the classroom with just the researchers and participants in attendance.

Table 1. Researcher-Made Interview Question

Research Questions
1. What methods do students employ to enhance their understanding of mathematical concepts during flexible learning?
2. How important are distance education technologies in learning mathematics?
3. How do students perceive the efforts made by their teacher in facilitating mathematics learning during flexible learning?
4. How do students answer the tasks or activities in math class?

The thematic analysis examined the data anchored on Braun and Clarke [14]. It is a six-step process that begins with familiarizing yourself with the data, then moves on to creating codes, searching for themes, reviewing themes, defining and labeling themes, and finally producing the final report. The researchers familiarized the data by

frequently listening to the interview recording and transcribing it verbatim. After transcribing the data, the researchers translate it into English. Then, the translated transcript generated codes by highlighting or tagging data sections related to a particular idea or concept. The codes were then analyzed to search for themes across the codes by looking at the similarities and differences in the data and grouping related codes. Next, the researchers review the themes by double-checking the translated transcripts. The emerging themes were named and defined based on the translated transcript and the coded data. Finally, the researchers wrote the data analysis based on the data collected and its developing themes.

The researchers used pseudonyms to conceal the participants' real names. For instance, participants 1 and 2 are tagged as P1 and P2, respectively, and so forth. The results were then presented to the participants for confirmation and clarification of the data analysis to prevent biases and misunderstandings. In any qualitative study, the degree to which the data and data analysis are to be taken as believable and trustworthy is used to determine the research quality [15].

3. Results and Discussion

The findings of the study on 2nd-year college students' experiences in learning mathematics in flexible learning yield five (5) central themes: clever approaches to learning mathematics in flexible learning, utilizing education technologies for enhanced learning, recognizing extra miles done by the teacher, self-motivation and engagement in mathematics learning, and peer collaboration in completing mathematical tasks.

3.1. Clever Approaches to Learning Mathematics in Flexible Learning

The first theme discusses how the students learned mathematics in a flexible modality. In general, many participants did not like mathematics even before the shift to flexible learning. During the interview, the participants preferred whether mathematics instruction should be traditional face-to-face or a combination of different flexible learning modalities. According to P1, "I prefer full face-to-face classes since mathematics is hard and it is difficult to understand math, especially in an online class." P3 added, "Face-to-face allows you to interact and ask questions directly to the teacher."

In addition, some participants also mentioned that they could participate better in their mathematics classes face-to-face than in online classes. They can ask for clarifications directly from the teacher and become more attentive to the teacher when it is done face-to-face. As P2 stated, "If I have a question addressed to my math teacher through Messenger, he cannot respond immediately." Moreover, P4 shared, "Unlike face-to-face, you are obliged to listen because the teacher might ask you a question."

The Commission on Higher Education (CHED) recommended that HEIs continue leveraging available flexible learning and unconventional delivery modes

instead of on-campus setups. Despite this, students still favor face-to-face instruction for communication, discussions, grasping mathematical ideas, and expanding their mathematical learning [16].

Despite the difficulties they have experienced in learning mathematics, the participants were resourceful in finding ways to cope with the mathematics lessons. According to P7, "I ask my teacher for a copy of the recording, and then he usually sends it to us to let us review the discussed topic." P4 stated, "I do note-taking and practice solving math problems during my free time." In addition, P5 added, "If there are lessons that I find difficult, I ask for help from my genius friends and classmates."

Even though students encounter challenges in learning mathematics, they can employ coping strategies that foster collaboration and interaction. This includes social support from their mentors and classmates. Students' ability to cope with mathematics can be improved with social support from teachers and fellow students. Group projects, peer reviews, social networking, and online discussion forums are examples of collaborative learning activities that can improve student engagement and learning while facilitating social support [17].

3.2. Utilizing Education Technologies for Enhanced Learning

The second theme discusses the importance of education technologies, particularly the participants' dependence on flexible learning. Distance education technologies aid in further learning the subject content in mathematics. It helps connect distant students with their teachers. Moreover, distance education technologies properly channel learning difficulties in mathematics through search mechanisms. As P3 stated, "Gadgets like cell phones and laptops are beneficial, especially during online classes and searching the web browser."

The use of educational technology in mathematics instruction has become increasingly important as students' reliance on technology continues to grow. By incorporating technology, teachers can help students develop crucial problem-solving and analytical skills essential in today's job market [18].

Participants generally utilize education technologies as an auxiliary since math teachers conduct synchronous and asynchronous classes using different learning platforms accessible through gadgets. These distance education technologies helped a lot during the pandemic. It serves as a coping mechanism in terms of mathematics lessons. As P4 stated, "I have two gadgets to use during an online class, especially during the pandemic." In addition, participants do not see the Internet as a problem. P2 discloses, "So far, the connection is not a problem in synchronous classes."

Technology in education can be utilized as a suitable learning medium to help students improve their mathematical skills [19]. Moreover, teachers and students from urban regions are better prepared for distance learning education than those from rural areas because of good internet connectivity and the availability of devices and gadgets [20].

3.3. Recognizing Extra Miles Done by the Teacher

The third theme showcases how the participants describe an ideal math teacher regarding flexible learning. It revealed that most of them preferred a teacher who was innovative in her teaching. A teacher who supplements video lessons to understand concepts in mathematics provides feedback to reinforce student learning and thoroughly explains the concepts to aid student understanding of mathematics lessons. The participants answered as P1 shared that, in her case, "The teacher provided me with a module and video lessons that are used during online classes." However, other participants expressed their ideal math teacher, as P2 said, "The teacher is effective when he provides an activity after every lecture and assesses it before the next lesson." P4 added, "If the teacher explains the step-by-step solution of a math problem."

Participants also shared that their math teachers provide them with enough time upon submission of tasks and activities. They say teachers are approachable, which helps students quickly understand mathematics lessons. Also, time-bound activities help them be resourceful in answering it and improve their ability to complete tasks on time. According to P3, "Our teacher is understandable. You cannot feel any pressure because, even though it is midnight, he will remind you through chat regarding your missing quizzes, and you can submit them anytime." P2 has the same sentiment: "The teacher is accommodating in the class and is easy to approach." Also, P1 stated that "The teacher updates us regularly about the activities to be submitted."

While students may encounter additional difficulties and barriers in flexible learning modalities, teachers must demonstrate empathy toward students when submitting work. Providing clear instructions and expectations for each activity can help students feel more confident and reduce their anxiety when submitting their work. Teachers should be responsive and available to answer students' questions on time through email, chat, or virtual office hours. In addition, teachers may also offer flexibility when it comes to the submission of outputs or extending deadlines. As a result, teachers must offer their students much support, especially regarding flexible learning [21].

3.4. Self-Motivation and Engagement in Mathematics Learning

The fourth theme describes the participants' engagement in the class during flexible learning. Most of the participants feel sleepy during mathematics class. They are unmotivated to learn mathematics primarily because of the teacher's unengaging activities. As P1 said, "Most of the time, I always fall asleep during math class since it is my first subject in the morning. I just opened my laptop while the teacher was discussing it. P6 added, "I prefer to listen in other subjects than math. I am too lazy to listen to my teacher." However, one exception is when the teacher explains the concepts well and allows them to interact and communicate distantly. As P7 stated, "Even if I do not like math, I listen to the lesson because the teacher explains the concepts well. I can focus because

I can follow the teacher's instructions even if I am not good at math. In addition, P3 mentioned that "I can understand mathematics better when our teacher gives us problems to solve. It gives you satisfaction, especially when you correctly solve the problem."

Lack of interest in mathematics is one of the leading causes of low motivation to learn. Students may need help to remain interested and motivated when a subject needs to be more engaging or relevant to their goals. Also, students may feel distracted and unmotivated if they cannot pursue their interests and passions. Teachers must therefore concentrate on providing a stimulating and encouraging learning environment that considers students' interests and encourages a growth mindset [22].

However, most participants agree that despite their lack of interest and low engagement in class, they still need to find ways to stay motivated and complete the required tasks. One of the strategies they employ is utilizing technology. This includes using educational applications and watching online tutorials. P4 said, "If I do not understand the lesson during online or face-to-face class, I just watch it on YouTube or search for it on Google. Another strategy is to practice solving math problems regularly. Solving problems helps students build their confidence and improve their math skills if done regularly. As P4 mentioned, "I practice solving math problems and comparing my answers to my classmates."

Students can keep themselves engaged in mathematics by seeking help from their classmates and utilizing various technological tools. Using technological tools such as searching the web browser, watching educational videos online, and participating in online discussion forums where students interact encourages participation and engagement [17].

3.5. Peer Collaboration in Completing Mathematical Tasks

The fifth theme discusses the students' ability to collaborate with their classmates in completing the activities set by their math teachers. The findings indicate that students actively engage in collaborative work by reminding each other of the task deadlines and working together to complete them. They also enjoy the flexible timeline their math teacher provides, which alleviates the pressure associated with submitting outputs. As P5 mentioned, "I can collaborate with my classmates when working on the activities in math." In addition, P6 said, "Whenever I encounter difficulty in understanding the math concept, I ask for help from my other classmates."

Collaboration among students can effectively develop their understanding of mathematics and improve their problem-solving skills. In a flexible learning environment, where students have more control over their learning experience, collaborative learning can be particularly beneficial as it allows students to discuss math problems and share their knowledge and insights. With these, students could submit the tasks by the deadline [23].

The result indicates that peer collaboration helps students meet task deadlines. The support and contributions from classmates create a conducive environment for completing tasks within the designated timeframe. Students benefit from shared responsibility as

they work towards a common goal and motivate each other to stay on track. This collaborative approach enables their ability to submit tasks by the deadline.

4. Conclusion

Thus, the researchers conclude that students' learning of mathematics in flexible modality varies. Some students find flexible learning an effective way to learn math, while others may need more structure and face challenges staying motivated and engaged.

One of the main benefits of flexible learning in mathematics is that it allows students to learn at their own pace. Students who struggle with certain concepts can take the time to fully understand the material, while those who quickly grasp concepts can move on to more challenging topics. This individualized approach to learning can lead to improved student outcomes and tremendous overall success in mathematics.

Another advantage of flexible learning in mathematics is the capacity to gain access to a wide range of resources and tools. Students can access instructional videos, online textbooks, and interactive simulations, which can provide additional support and help clarify complex concepts. It can be particularly beneficial for students needing help with traditional classroom instruction.

Despite these benefits, some students may find the need for more structure and face-to-face interaction in flexible learning environments challenging. These students may need help to be motivated and miss traditional classroom instruction's social interaction and accountability. Additionally, students who need help with time management may experience difficulty keeping up with coursework in a flexible learning environment.

To address these challenges, math teachers must provide clear expectations and guidelines for students and regular opportunities for interaction and feedback. Math teachers can use technology tools like video conferencing and online discussion boards to facilitate student collaboration and engagement. By providing structure and support, teachers can ensure that students have a positive and fruitful experience learning mathematics in a flexible learning environment.

In conclusion, flexible learning can benefit students learning mathematics, including learning at their own pace and accessing a wide range of resources and tools. However, math teachers need to address the unique challenges of this type of learning environment, including the need for more structure and face-to-face interaction. With the proper support and guidance, students can have a successful and rewarding experience learning mathematics through flexible learning.

Based on the findings, the identified themes shed light on the challenges and strategies college students employ in learning mathematics during flexible learning. The findings contribute to understanding how students adapt to and cope with the demands of flexible learning modalities. They provide insights into the factors influencing student engagement, motivation, and learning outcomes in mathematics. These findings can inform the development of a theoretical framework that explores the intersection of

flexible learning, mathematics education, and student experiences.

The findings highlight the importance of designing instructional approaches catering to students' preferences and needs in mathematics education. Educators should consider incorporating traditional face-to-face instruction and various flexible learning modalities to accommodate different learning styles and promote student engagement. In addition, teachers should maximize the utilization of various digital resources to enhance the learning experience. This includes video lectures, interactive tutorials, and virtual simulations. It is also essential for institutions to provide adequate support and training for both faculty and students to ensure a successful transition to flexible learning.

Finally, the study opens avenues for future research in mathematics education and flexible learning. Further investigations can explore the specific pedagogical strategies and interventions that effectively promote student engagement, motivation, and learning outcomes in mathematics during flexible learning modalities. Longitudinal studies can examine the long-term effects of flexible learning on students' mathematical achievement and attitude toward mathematics. Additionally, comparative studies can be conducted to explore the differences in experiences and outcomes between different groups of students (e.g., urban vs. rural, high-achieving vs. low-achieving) in the context of flexible learning in mathematics.

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