



An In-Depth Qualitative Exploration of Normale Lecture Classes (NLec) in Mathematics: Understanding Student Experiences and Pedagogical Implications

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An In-Depth Qualitative Exploration of Normale Lecture Classes (NLec) in Mathematics: Understanding Student Experiences and Pedagogical Implications

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Abstract

Normale Lectures is a delivery model of academic coursework designed as an innovative response to address the challenges of human and infrastructural limitations. To respond to these challenges, the Philippine Normal University has developed an academic course delivery model called PNU Normale Lectures, or NLec. Along this line, I was interested in exploring general education students' experiences in NLec mathematics class. With this, an open-ended questionnaire was administered to the eighty-three students of the Philippine Normal University, Visayas. Responses generated five essential themes about their challenges: a) classroom environment and distractions; b) teacher's impact and teaching style; c) personal engagement and learning difficulties; d) classroom structure and size; and e) online learning and technology. Coping strategies, on the other hand, are (a) study materials and notes; (b) peer and teacher support; (c) online resources and technology; (d) positive attitude and motivation; (e) practice and review; and (f) active listening and notetaking. These findings underscore the complex nature of these challenges and emphasize the importance of educators and institutions addressing them for improved student outcomes. The study also identified coping strategies, highlighting the need for innovative approaches to enhance the mathematics education experience for these students.

Introduction

Mathematics education is a critical component of modern academic curricula, with lecture classes as a fundamental mode of instruction. Traditional lecture-based approaches, referred to as Normale Lecture Classes (NLec), have been a cornerstone of mathematics instruction for decades. These lecture classes typically involve an instructor delivering mathematical content through direct, in-person teaching, providing a structured environment for students to grasp fundamental concepts (Smith, 2008). While some argue for the efficacy of NLec in conveying mathematical knowledge (Jones, 2007), others contend that alternative instructional methods may better cater to diverse learning styles and engage students more effectively (Brown et al., 2014). In addition, McKeachie and Svinicki (2014) state that lectures are particularly good for presenting up-to-date information, summarizing material, adapting material to the background and interests of a particular group of students, and focusing on key concepts, principles, or ideas. Furthermore, research in educational psychology, as Matheson

(2008) noted, has shown that lectures can serve as a valuable platform for fostering classroom discussion and interaction. This dynamic exchange of ideas can enhance comprehension and retention. Likewise, Barkely and Major (2018) highlight the effectiveness of lectures in delivering current information, tailoring content to diverse student backgrounds, and emphasizing essential concepts. As Ernst and Colthrope (2007) noted, lectures can facilitate vibrant classroom discussions, ultimately enriching comprehension and memory.

While the advantages of lecture-based instruction highlighted by McKeachie and Svinicki (2014) and Matheson (2008) are well documented, a notable gap exists in understanding how these benefits are optimized or potentially limited in contemporary mathematics education. The traditional lecture format has been the standard for decades, but rapid advancements in technology and pedagogical research have given rise to various alternative approaches, such as online learning and active learning strategies. Thus, there is a need for a comprehensive examination of how these innovative approaches can be seamlessly integrated with traditional lectures and whether they can enhance mathematics education by addressing students' diverse learning needs and preferences.

On the other hand, to respond to the shift from face-to-face to flexible learning along with the challenges of human and infrastructural limitations, the Philippine Normal University has developed an academic course delivery model called PNU Normale Lectures, or NLec. This academic course responds to global and national development goals and directions. Innovating the delivery of academic courses is central to these endeavors. As the National Center for Teacher Education (NCTE), the university remains committed to creating, testing, and modeling innovative pedagogical teaching and assessment approaches based on best practices. However, in the context of a rapidly changing educational landscape, it is crucial to critically examine established teaching methods like NLec to ensure they remain effective and aligned with the evolving needs of students and society. This research endeavors to contribute to the ongoing dialogue about the future of mathematics education by offering a nuanced exploration of NLec, thereby informing educators, policymakers, and curriculum developers about how mathematics instruction can be enhanced and made more responsive to the diverse needs and preferences of students in the 21st century. Through this investigation, the researcher aims to pave the way for a more student-centered and effective approach to mathematics education grounded in a deep understanding of student experiences and pedagogical implications.

Method

Research Design

Qualitative research was used to extensively explore NLec in mathematics. According to Creswell (2014), qualitative research examines a natural situation and is suitable for describing the actual results from the participants. It is used to uncover trends in thought and opinions and dive deeper into the problem (Wyse, 2011). Furthermore, it explores the issues, understands the phenomena, and answers questions by analyzing and making sense of structured data (QSR, International, 2014).

More specifically, the study employed a phenomenological research pattern. The phenomenological pattern focuses on phenomena we know but need an in-depth and detailed understanding. This pattern is used to research

phenomena that we are not entirely familiar with but, at the same time, cannot fully comprehend (Yildirim & Simsek, 2008). The experiences in mathematics of the general education students in Nlec class are current issues that are important in the pedagogy of teaching mathematics in the classroom. Accordingly, the phenomenological pattern is regarded as a significant method in exploring and understanding the experiences of general education students in their Nlec class and its pedagogical implications; hence, the study is conducted through this pattern. The study participants were 83 general education students at the Philippine Normal University Visayas in the Philippines. Since Nlec classes were piloted in the general education students, this research expects challenges and coping experienced by the participants.

Data Collection

Data collection is a crucial component of qualitative research, playing a pivotal role in generating rich and in-depth insights into the research questions or objectives at hand. This study explores the experiences and implications of Nlec classes in mathematics for general education students of the Philippine Normal University Visayas. By employing qualitative research methods, this research delves into the subjective perspectives of mathematics learning in Nlec class. Gathering comprehensive and rich insights into the experiences of the general education students in mathematics in Nlec class, this research employed an open-ended questionnaire. According to Ballou (2008), one of the main advantages of using an open-ended structure is getting specific, individual information. The lists of verbatim answers need to be organized to be useful for data analysis and reports.

Using an open-ended questionnaire, the researcher distributed an open-ended questionnaire to a group of 83 general education students of the Philippine Normal University Visayas recruited through purposive sampling since they are the groups that were pilot-tested for an Nlec class. The questionnaire consisted of open-ended questions designed to elicit detailed responses on their experiences of learning mathematics in Nlec class. The two questions administered by the researcher were: (1) What are the challenges experienced by the general education students in their Nlec class in mathematics? (2) How do general education students address the challenges they have experienced?

The questionnaire was developed based on a thorough review of existing literature, research objectives, and initial exploratory interviews conducted before the primary data collection phase. The open-ended format allowed participants to freely express their thoughts and opinions, providing a rich source of qualitative data. Participants were given a day to complete the questionnaire at their convenience. The responses were collected electronically using an online survey platform, ensuring confidentiality and anonymity. Participants were encouraged to provide detailed and comprehensive responses to each question to understand their experiences better.

Data Analysis

The data analysis for this qualitative study aimed to explore the experiences of the general education students in Nlec class in learning mathematics. The data analysis involved a systematic procedure that included transcription, coding, theme development, data exploration, synthesis, interpretation, and discussion.

The data analysis followed a rigorous and systematic procedure to derive meaningful insights from the qualitative data collected in this study. Firstly, the open-ended responses were transcribed verbatim, ensuring the accuracy and fidelity of the data. Scholars and researchers in qualitative research methodology, such as Creswell (2013) and Silverman (2016), emphasize the importance of accurate transcription in maintaining data validity and reliability. They highlight how verbatim transcription provides researchers with a reliable and rich dataset that can be analyzed and interpreted rigorously and systematically.

Next, an inductive coding approach was employed, where the researcher read and coded the transcripts, focusing on identifying recurring patterns and themes related to general education students' experiences in learning mathematics in NLec class. In the context of qualitative research, an inductive coding approach refers to a coding process that allows themes and categories to emerge directly from the data rather than being predetermined or guided by pre-existing theories or frameworks (Charmaz, 2014). It involves analyzing the data bottom-up, allowing patterns, themes, and concepts to surface from the raw data. Research authorities and scholars in qualitative research methodology, such as Creswell (2013) and Saldaña (2015), often discuss and endorse using inductive coding to derive meaningful insights from the data.

Following the initial coding, the researchers engaged in a collaborative process of theme development, grouping related codes into broader themes that captured the essence of the data. These themes were reviewed, refined, and validated through ongoing discussions and analysis of the gathered qualitative data. The aim was to ensure that the identified themes accurately represented the experiences and perspectives of the participants. The data analysis procedure employed in this study adhered to rigorous qualitative research standards, ensuring the trustworthiness and credibility of the findings.

Results

This section presents the results of the study "An In-depth Qualitative Exploration of Normal Lecture Classes (NLec) in Mathematics: Understanding Student Experiences and Pedagogical Implication." The investigation delved into the intricate dynamics of Normale Lecture Classes (NLec) and sought a comprehensive understanding of the student experience within this educational context. Through meticulous qualitative analysis, this study illuminates the multifaceted dimensions that shape students' experiences in their NLec mathematics class.

The participants' responses identified five emerging themes based on the challenges they experienced in their NLec class in mathematics. These themes are (1) Classroom environment and distractions, (2) teacher's Impact and Teaching Style, (3) Personal Engagement and Learning Difficulties, (4) Class Structure and Size, and (5) Subject-Specific Challenges. challenges

As can be seen in Table 1, there are various challenges general education students face in their classroom environment, specifically about distractions. The most frequently reported challenge relates to noise and distractions in the classroom, accounting for 40.74% of responses. In addition, 20.37% of students express challenges focusing on classrooms with many peers, underlining the challenges associated with sizable class sizes.

A notable proportion of students (12.96%) also mention concerns about crowded and hot classroom environments. Furthermore, 7.41% of responses touch upon challenges associated with classroom space and seating arrangements. Lastly, the struggle to hear the teacher amid noise (11.11%) highlights the disruptive influence of noise within the classroom.

Table 1. Frequencies and Percentages of Qualitative Responses on the Theme “Classroom Environment and Distractions”

Codes	Frequency	Percentage
Challenges related to noise and distractions in the classroom	26	40.74
Challenges due to crowded and hot classroom environment	7	12.96
Challenges with classroom space and seating arrangement	4	7.41
Challenges in focusing on a large number of students	11	20.37
Challenges hearing the teacher due to noise	6	11.11
Total	54	100.00

Table 2 presents the findings related to the theme "Teacher's Impact and Teaching Style."

Table 2. Frequencies and Percentages of Qualitative Responses on the Theme “Teacher’s Impact and Teaching Style”

Codes	Frequency	Percentage
Challenges related to teacher-student interaction	12	50.00
Challenges with understanding complex topics in a short time	7	29.17
Challenges when the teacher cannot address all questions	5	20.83
Total	24	100.00

The data indicated that challenges related to teacher-student interaction are the most frequently mentioned concern, with 50.00% of students reporting difficulties. Furthermore, 29.17% of students mention challenges in understanding complex topics within a limited timeframe. Finally, 20.83% of students note challenges when teachers cannot address all of their questions, underscoring the significance of individualized support and the need for teachers to manage student inquiries effectively.

Table 3 displays the frequencies and percentages of qualitative responses related to the theme "Personal Engagement and Learning Difficulties." Among the reported challenges, 20.37% of students indicated difficulties understanding abstract concepts and formulas. Additionally, 29.63% of respondents expressed memory, recall, and retention challenges. Challenges in focusing and staying engaged in the learning process accounted for 14.81% of responses. Furthermore, 5.56% of students reported feelings of anxiety and nervousness regarding their comprehension of the lesson. At the same time, an equal percentage expressed shyness or hesitation in asking questions, potentially hindering their active participation in the classroom. Challenges associated with self-study and time management were noted by 3.70% of students. Finally, 20.37% of responses indicated challenges with applying formulas and solving problems.

Table 3. Frequencies and Percentages of Qualitative Responses on the Theme “Personal Engagement and Learning Difficulties”

Codes	Frequency	Percentage
Challenges with understanding abstract concepts and formulas	11	20.37
Challenges with memory, recall, and retention	16	29.63
Challenges in focusing and staying engaged	8	14.81
Challenges related to anxiety and nervousness in understanding the lesson	3	5.56
Challenges related to shyness or hesitation to ask questions	3	5.56
Challenges with self-study and time management	2	3.70
Challenges with applying formulas and solving problems	11	20.37
Total	54	100.00

Table 4 outlines the frequencies and percentages of qualitative responses concerning the theme "Classroom Structure and Size." Among the reported experiences, 32.00% of students noted their experiences associated with class size, and the inability to provide individual attention accounted for 24.00% of responses. Additionally, 20.00% of students expressed challenges linked to class discussions and interactions. Concerns related to quizzes and tests were mentioned by 8.00% of respondents, indicating the impact of assessment methods on the learning experience. Another 8.00% reported challenges with the class schedule, which can affect students' ability to manage their time effectively.

Table 4. Frequencies and Percentages of Qualitative Responses on the Theme “Classroom Structure and Size”

Codes	Frequency	Percentage
Challenges with class size and inability to provide individual attention	12	48.00
Challenges related to class discussions and interactions	7	28.00
Challenges related to quizzes and tests	3	12.00
Challenges related to the class schedule	3	12.00
Total	25	100.00

Table 5 provides insights into the frequencies and percentages of qualitative responses related to the theme "Online Learning and Technology."

Table 5. Frequencies and Percentages of Qualitative Responses on the Theme “Online Learning and Technology”

Codes	Frequency	Percentage
Challenges with online learning	8	34.78
Challenges with data connection and requirements submission	12	52.17
Challenges in utilizing technology for enhanced learning	3	13.04
Total	23	100.00

Among the reported challenges, 34.78% of students mentioned difficulties with online learning. A significant

proportion of respondents, 52.17%, expressed challenges related to data connection and requirements submission. Additionally, 13.04% of students discussed using technology for enhanced learning, suggesting some opportunities for leveraging technology to improve the quality of education. On the other hand, the participants' responses concerning coping strategies with references to the challenges are six emerging themes. These are (1) Study Materials and Notes, (2) Peer and Teacher Support, (3) Online Resources and Technology, (4) Positive Attitude and Motivation, (5) Practice and Review, and (6) Active Listening and Note Taking.

Table 6 presents the frequencies and percentages of qualitative responses regarding how participants cope with challenges in their NLeC mathematics class, specifically focusing on "Study Materials and Notes." A significant majority of participants, accounting for 60.87% of responses, reported using lecture notes provided by the professor as a key strategy to cope with their challenges. A smaller proportion of respondents, 13.04%, mentioned the practice of taking down notes during class as part of their coping mechanism. Additionally, 8.70% of students mentioned utilizing study materials and guidelines, while an equal percentage emphasized the importance of reading notes and review materials to enhance their understanding. Lastly, 8.70% of participants reported relying on textbooks and materials from past years.

Table 6. Frequencies and Percentages of Qualitative Responses on the Theme "Study Materials and Notes"

Codes	Frequency	Percentage
Using lecture notes provided by the professor	14	60.87
Taking down notes during class	3	13.04
Utilizing study materials and guidelines	2	8.70
Reading notes and review materials	2	8.70
Relying on textbooks and materials from past years	2	8.70
Total	23	100.00

Table 7 provides insights into the frequencies and percentages of qualitative responses related to the theme "Peer and Teacher Support."

Table 7. Frequencies and Percentages of Qualitative Responses on the Theme "Peer and Teacher Support"

Codes	Frequency	Percentage
Asking classmates for help and guidance	4	30.77
Seeking help and clarification from the professor	4	30.77
Active participation in class discussions and interactions	2	15.38
Seeking help from peers and friends	2	15.38
Collaborating with classmates	1	7.69
Total	13	100.00

Approximately 30.77% of participants mentioned asking their classmates for help and guidance to address their challenges. Similarly, an equal percentage (30.77%) reported seeking help and clarification directly from the professor. Approximately 15.38% of students indicated that they actively participate in class discussions and

interactions as part of their coping mechanisms, underlining the significance of engaging with the course content and peers. Another 15.38% mentioned seeking help from peers and friends, showcasing the value of peer support networks in navigating academic difficulties. Lastly, 7.69% of respondents reported collaborating with classmates.

Table 8 offers insights into the frequencies and percentages of qualitative responses regarding the theme "Online Resources and Technology" to cope with challenges. A significant portion of participants, comprising 52.63% of responses, mentioned using the Internet for research and accessing various resources to aid their learning process. Additionally, 15.79% of students reported watching YouTube videos and online tutorials. Approximately 10.53% of respondents mentioned utilizing online platforms and applications, reflecting the importance of digital tools in their learning journey. Similarly, an equal percentage (10.53%) noted using smartphones and gadgets as tools to support their mathematics studies. Furthermore, 10.53% of students mentioned searching on Google for information.

Table 8. Frequencies and Percentages of Qualitative Responses on the Theme "Online Resources and Technology"

Codes	Frequency	Percentage
Using the Internet for research and resources	10	52.63
Watching YouTube videos and online tutorials	3	15.79
Utilizing online platforms and application	2	10.53
Using smartphones and gadgets	2	10.53
Searching on Google for information	2	10.53
Total	19	100.00

Table 9 provides insights into the frequencies and percentages of qualitative responses related to the theme "Positive Attitude and Motivation ." Approximately 50.00% of participants mentioned staying motivated as a key strategy to address challenges. Similarly, 50.00% of students reported having dedication and determination as essential qualities for overcoming challenges.

Table 9. Frequencies and Percentages of Qualitative Responses on the Theme "Positive Attitude and Motivation"

Codes	Frequency	Percentage
Staying motivated	4	50.00
Having dedication and determination	4	50.00
Total	8	100.00

Table 10 provides insights into the frequencies and percentages of qualitative responses related to the theme "Practice and Review" as strategies for addressing challenges in the NLec mathematics class. Approximately 18.75% of participants mentioned the importance of practicing regularly. A significant majority, accounting for 62.5% of responses, emphasized the value of reviewing lecture notes as a key strategy to address challenges. An

additional 18.75% of students mentioned using online resources, showcasing the relevance of digital tools and online materials in supplementing their practice and review efforts.

Table 10. Frequencies and Percentages of Qualitative Responses on the Theme “Practice and Review”

Codes	Frequency	Percentage
Practicing regularly	3	18.75
Reviewing lecture notes	10	62.5
Using online resources	3	18.75
Total	16	100.00

Table 11 provides insights into the frequencies and percentages of qualitative responses related to the theme "Active Listening and Notetaking" as strategies for success in the NLec mathematics class. A significant majority of participants constituted 39.29% of responses. Additionally, 35.71% of students reported taking down notes as a crucial strategy. Approximately 12.50% of participants mentioned paying attention to the teacher's discussion. A smaller proportion, 5.36%, discussed the practice of engaging in class discussions. Moreover, 7.14% of students noted the importance of asking questions.

Table 11. Frequencies and Percentages of Qualitative Responses on the Theme “Active Listening and Note Taking”

Codes	Frequency	Percentage
Listening attentively	22	39.29
Taking down notes	20	35.71
Paying attention to the teacher’s discussion	7	12.50
Engaging in class discussion	3	5.36
Asking questions	4	7.14
Total	56	100.00

Discussion

The results of the study "An In-depth Qualitative Exploration of Normal Lecture Classes (NLec) in Mathematics: Understanding Student Experiences and Pedagogical Implication" offer a comprehensive analysis of the intricate dynamics within NLec mathematics classes, shedding light on the experiences faced by general education students in this educational context. One of the central themes that emerged from the study is the challenges students encounter in the "Classroom Environment and Distractions." Students highlighted issues related to noise, distractions, and the physical setting of the classroom. These distractions, which accounted for a significant percentage of responses, substantially impact students' engagement and ability to focus on the material being presented. Along this line, the challenges associated with the "Classroom Environment and Distractions" theme are paramount in understanding the student experience within NLec mathematics classes. These findings resonate with a wealth of educational psychology and cognitive science research, which underscores the learning environment's critical role in shaping students' cognitive processes, engagement, and overall learning outcomes.

First and foremost, noise and distractions are a well-documented concern in educational settings. Research has consistently shown that excessive noise and distractions can lead to reduced attention, hindered concentration, and impaired information processing (Hygge et al., 2003). Along this line, one female participant said, *"Some of the challenges I experienced was I find it hard to concentrate because of the noise, and I feel the room is too crowded, making it hotter."* A male participant added, *"Sometimes I cannot concentrate listening to the discussion because of the noise."* According to Glass and Kang (2018), when students face constant disruptions, they are forced to divert cognitive resources away from the subject matter to manage the chaos in the environment. As a result, their ability to absorb and process the material presented in class is compromised. This affects their immediate comprehension and has long-term consequences for knowledge retention and academic performance.

Furthermore, the impact of many peers in the classroom and crowded, hot environments on student engagement is a concern that has pedagogical implications. Research in educational psychology has shown that students in larger classes tend to have lower participation, interaction, and engagement (Pascarella & Terenzini, 2005). A crowded and hot classroom can create physical discomfort as a barrier to active learning. These environmental factors can undermine students' ability to effectively engage with the content and interact with their peers and instructors. One participant's statement supports this: *"Because there are so many of us in the classroom, we are very crowded and super-hot inside the classroom, and the noise is unavoidable."* Another participant said, *"I think the most challenging experience that I had in learning mathematics in NLec class was to focus on the discussion while the temperature inside the room was hot."*

The findings regarding classroom space and seating arrangements highlight the importance of physical infrastructure in learning environments. The design of classrooms, including seating configurations, lighting, and temperature control, has been linked to students' academic performance and satisfaction (Sundstrom et al., 1987). Inadequate seating arrangements or cramped spaces can create physical discomfort and hinder students' ability to focus on the subject matter. As reflected by a male participant sitting at the back, *"Because there are so many of us in the classroom, we are very crowded. Thus, it is hard for us to pay attention during class discussions, affecting our academic performance."* Another female participant also supported this, saying, *"The teacher can no longer focus on the discussion because the space is limited for, we are many in the classroom, we are 85 students in one class."*

Another significant theme is "Teacher's Impact and Teaching Style." Students expressed concerns about their interactions with instructors and the effectiveness of teaching methods. It also underscores the critical role that instructors play in shaping students' educational experiences. The concerns expressed by students regarding their interactions with teachers and the effectiveness of teaching methods have substantial implications for pedagogy and education as a whole. These findings align with extensive research in educational psychology and the science of learning, highlighting the importance of effective teaching and the need to adapt to diverse learning styles and paces.

Students' challenges in understanding complex topics within limited timeframes reveal the importance of pacing and content delivery in teaching. This issue is consistent with the cognitive load theory, which suggests that

effective learning occurs when cognitive resources are optimally allocated to process information (Sweller, 1988). Complex topics presented too quickly can overwhelm students, leading to cognitive overload and reduced comprehension. Instructors in this regard need to be mindful of the pace at which they cover content, ensuring that it aligns with students' cognitive capacities and prior knowledge. As cited by a female participant, *"I have difficulty with abstract concepts of time and direction."* Another response from the male participants states, *"The lecture becomes fast. It is a challenge for slow learners to catch up. Thus, it is hard to understand the topics."*

The theme also touches on difficulties in teacher-student interactions, emphasizing the need for effective communication and support from instructors. Studies have consistently demonstrated the significance of strong teacher-student relationships in facilitating learning (Roorda et al., 2011). When students feel disconnected or unsupported by their teachers, their motivation and engagement tend to decrease. Effective teacher-student interactions involve clear communication, approachability, and a willingness to address students' concerns, ultimately fostering a positive and conducive learning environment. As cited by one participant, *"The most challenging experience I have had in our NLec class was I could not interact with my professor because there are so many in the classroom. One participant added, "Sometimes I am disconnected from the lesson, and I feel less motivated to engage in my NLec class in math."*

"Personal Engagement and Learning Difficulties" unveiled students' struggles with abstract concepts, memory, focus, and anxiety. One participant contends, *"Difficulty with abstract concepts of time and direction."* Another participant says, *"For me, one of the biggest challenges I have experienced was memory issues with math facts, ideas, formulas, sequences, and procedures."* These challenges underscore the need for personalized support and strategies to address diverse learning needs. Additionally, the theme highlights the importance of developing students' metacognitive skills and self-regulation to enhance their learning experience. The theme reveals profound insights into students' challenges in their NLec mathematics classes. The difficulties in grappling with abstract concepts, memory, focus, and anxiety reflect common obstacles learners face in various educational settings. These findings underscore the imperative for personalized support and the development of metacognitive skills to facilitate practical learning experiences.

The struggles associated with comprehending abstract concepts and formulas are emblematic of the cognitive demands of mathematics education. As stated by a female participant, *"Difficulty remembering math facts, concepts, rules, formulas are my biggest challenge during our NLec math class."* Another participant added that *"Following sequential procedures and directions in math is one of the biggest challenges I have experienced in my NLec class in math."* Mathematics is often rooted in abstraction and relies on symbolic representations, which can be challenging for students to grasp (Vinner, 2003). Students encountering abstract concepts without appropriate support or guidance can lead to frustration and disengagement. This emphasizes the need for instructors to provide clear explanations, visual aids, and practical applications to make abstract content more accessible.

The challenges related to memory, recall, and retention are integral to the learning process. The ability to store and retrieve information is essential for academic success. As responded by a male participant, *"The challenge*

that I have experienced being in a class with a large number of students, specifically in learning mathematics, is lack of focus." A female participant also supports this, saying, "Sometimes I have been experiencing difficulty remembering math facts, concepts, rules, and formulas." Research in cognitive psychology highlights the significance of effective memory strategies, such as elaborative rehearsal and retrieval practice, in enhancing long-term retention (Dunlosky et al., 2013). Educators can play a pivotal role in teaching students these strategies to improve their memory and learning outcomes.

Difficulty focusing and staying engaged in learning is a common challenge in education. Attention and concentration are critical for effective learning (Mastroberardino et al., 2018). This is also reflected in the responses of a female participant: "Some of the challenges that I experienced were that it was hard to concentrate because of the noise, and it felt too crowded inside the room, making the room hot." Another female participant says, "Lack of focus and sometimes dizziness is one of my biggest challenges attending NLec class in math." Educators can employ active learning, interactive discussions, and dynamic teaching materials to enhance student engagement and maintain their focus throughout the class.

Feelings of anxiety and nervousness about understanding the lesson are indicators of the emotional aspect of learning. As quoted by one female participant, "So far, I have not experienced any challenges Being in many classes. However, I felt anxious and nervous because I might not understand the lesson." Another participant said, "I feel nervous and anxious when my course professor asks me to go to the board and solve a specific question." Anxiety can hinder cognitive performance and information processing (Putwain et al., 2013). Educators must create a supportive and low-stress learning environment where students feel comfortable asking questions and seeking clarification without fear of judgment.

Shyness or hesitation in asking questions can have a detrimental effect on student participation. In an inclusive learning environment, educators should encourage active questioning and provide multiple avenues for students to seek help or express their concerns. One participant says, "I have experienced challenges because I am not that good in math, and I am not that extrovert. Sometimes, I am too shy to ask questions, and I hesitate to try solving math problems independently." Another response from a male participant supported this, stating, "I am shy to ask the teacher because I have so many classmates, and I am afraid that they will judge me." This fosters a culture of openness and collaboration, where students can overcome their hesitations and actively engage in learning.

Challenges associated with self-study and time management highlight the need for students to develop metacognitive skills. Metacognition involves awareness and control of one's learning processes (Efklides, 2011). Students who can effectively monitor their comprehension, set goals, and regulate their learning strategies are better equipped to navigate these challenges. A female participant responded, "The challenges I have experienced were managing my time to self-study the lesson to understand further." Teachers can support the development of metacognitive skills by explicitly teaching strategies for effective studying, time management, and self-assessment.

The theme "Classroom Structure and Size" highlighted the impact of the physical arrangement of the classroom and class sizes on students' experiences. These factors affected students' ability to engage with course content and their instructors. The findings emphasize the significance of pedagogical practices considering classroom design and class sizes to facilitate meaningful interactions and personalized learning experiences. The study sheds light on the substantial influence of physical classroom arrangement and class sizes on students' educational experiences in NLeC mathematics classes. The findings in this regard align with existing research in the field of education, emphasizing the pivotal role of these factors in shaping students' engagement, interactions with instructors, and, ultimately, their learning outcomes.

Challenges related to class size and the inability to provide individual attention highlight the pedagogical implications of class size in education. Smaller class sizes have been linked to improved student-teacher interactions, increased engagement, and better learning outcomes (Blatchford & Mortimore, 1994). In contrast, larger classes can make it challenging for instructors to address individual needs and provide personalized support. One participant's claim supports this, "*The challenges I experienced include contending with potential distractions and experiencing less interactive group activities and discussions due to the class's size, and besides, individual instruction rarely happens.*" These findings emphasize the need to consider class size in the planning and delivery of educational programs, especially in subjects like mathematics, where personalized support can significantly impact student success.

Class discussions and interactions are vital components of active learning. These findings underscore the importance of creating classroom structures that encourage meaningful interactions among students and between students and instructors. Active learning approaches, such as group discussions, peer teaching, and collaborative problem-solving, can be effective strategies in larger classes to promote engagement and participation (Prince, 2004). As stated by one participant, "*Being in a class with a large number of students is hard, especially when learning in mathematics, as sometimes we cannot hear and understand the professor while discussing because of some noises. This scenario has caused us students in the classroom not to interact with each other and our course professor*". Classroom design should support these pedagogical practices, providing students with the physical space and resources to facilitate interactions and discussions.

Concerns related to quizzes and tests reveal the impact of assessment methods on the learning experience. As stated by a female participant, "*During the test, it can be quite challenging for me since there are many in the classroom taking the test, and it is hard for me to concentrate on the test sometimes. Besides, the tests given to us are the same for all of us in a large class.*" Educators should consider employing various assessment techniques, including formative and performance-based assessments, to reduce the stress associated with high-stakes exams and promote a more holistic view of student progress (Black & Wiliam, 1998). This approach can alleviate the challenges associated with assessment and enhance the overall learning experience.

"Online Learning and Technology" revealed the challenges students faced when transitioning to virtual learning environments, emphasizing the critical role of technology infrastructure in education. The theme also hinted at the potential benefits of technology in enhancing the quality of education, pointing to opportunities for

incorporating innovative teaching and learning tools. The theme also underscores the transformative impact of technology on education and the multifaceted challenges that students face when transitioning to virtual learning environments. It also highlights the essential role of technology infrastructure in shaping contemporary education and the potential benefits of technology in enhancing the quality of education. These findings resonate with the broader discourse on the integration of technology in education.

Students' challenges when transitioning to online learning environments are emblematic of the digital divide, which refers to disparities in access to and proficiency with technology. Along this line, one participant contends, *"It is difficult in an online class because the professor cannot solve the problems properly without a marker and a whiteboard. We need an actual class."* Another participant stated, *"It is also a challenge, especially if we have limited resources such as the gadgets and the load to connect and attend our online class."* Research has shown that inequities in access to technology can hinder students' ability to engage in online learning (DiMaggio et al., 2004). This underscores the importance of addressing these disparities to ensure that all students have equal opportunities to access and benefit from online education. The critical role of technology infrastructure in education must be considered. Robust and reliable internet connections, necessary software and hardware access, and digital literacy skills are prerequisites for effective online learning (Hodges et al., 2020). Institutions and educators must invest in technology infrastructure to provide students a seamless online learning experience. Moreover, they should offer support and training to enhance students' digital literacy skills, enabling them to navigate online resources and tools effectively.

The potential benefits of technology in education are vast. Online learning can provide flexibility, enabling students to access educational resources and materials conveniently, which is particularly beneficial for non-traditional students and working professionals (Allen & Seaman, 2017). Moreover, technology can facilitate active learning, personalized instruction, and data-driven feedback, enhancing the quality of education (Means et al., 2010). Innovative teaching and learning tools like virtual labs, simulations, and interactive multimedia resources can create more engaging and immersive learning experiences (Hattie, 2009). On the other hand, the coping strategies students adopt provide insights into navigating the challenges of NLeC mathematics classes. "Study Materials and Notes" emerged as a dominant strategy, with students relying on lecture notes and textbooks provided by the professor. These materials serve as valuable resources for reinforcing learning and comprehending challenging content.

The emergence of "Study Materials and Notes" as a dominant coping strategy among students in NLeC mathematics classes highlights the significance of well-structured and comprehensive learning resources in enhancing the learning experience. This strategy reflects the students' awareness of the importance of utilizing available materials to reinforce learning and comprehend challenging content.

The reliance on lecture notes provided by the professor underscores the role of clear and organized course materials in supporting students' understanding of complex mathematical concepts. As quoted by a male participant, *"I was so happy that our course professor provided us lecture notes because it helped us a lot, especially when we missed the discussion because of the noise and other distractions brought by the large class"*

size.”. These notes often serve as a structured roadmap for the course, summarizing key concepts, providing examples, and offering a reference for students to revisit and review the content. Effective note-taking can be valuable for students in capturing essential information during class (Kiewra, 2002).

Textbooks and materials from past years, as mentioned by some students, contribute to the diversity of study materials available to them. Textbooks are typically designed to provide in-depth explanations, practice problems, and supplementary resources, making them valuable assets for students seeking a deeper understanding of mathematical concepts. Furthermore, materials from past years can serve as additional practice and reference materials, offering historical perspective and accumulated knowledge.

The practice of taking down notes during class is another valuable strategy employed by students. Notetaking during lectures can enhance active engagement with the course content and improve retention (Peverly et al., 2003). Effective note-taking involves summarizing, paraphrasing, and organizing information, aiding later comprehension and recall. This is true, as stated by one participant: *"I take notes and self-study at home because I believe that taking notes is one way that I can familiarize myself with what was being discussed by our course professor."*

Utilizing study materials and guidelines, as mentioned by some students, demonstrates the importance of various supplementary resources. These may include study guides, online tutorials, and other aids that offer alternative explanations and perspectives on the subject matter. These resources can support students, particularly when they encounter challenging concepts. One participant's statement supports this: *"I rely on study materials, online resources, and seeking help from peers to overcome challenges in learning mathematics in NLec class. This is my way of coping with challenges from our NLec class."*

"Peer and Teacher Support" underscored the significance of seeking help and guidance from classmates and instructors. Active participation in class discussions, interactions, and collaboration with peers were identified as effective ways to address academic challenges. The theme reflects the pivotal role of support systems in helping students navigate the challenges they encounter in NLec mathematics classes. The findings highlight the importance of seeking assistance from peers and instructors, the benefits of active participation in class discussions and interactions, and collaborative efforts among students.

Asking classmates for help and guidance is a testimony to the power of peer support networks in education. Peer support has positively impacted students' academic performance, motivation, and overall well-being (Tinto, 1997). When students seek assistance from their peers, they can benefit from different perspectives, explanations, and approaches to problem-solving. As reflected by a female participant, *"I ask for help from my classmates who understand the problems to help me how to solve the problems."* Another participant supported this by saying, *"I rely on my classmates and friends who are willing to recall our topics."* The act of the students fosters a sense of community and collaborative learning, which can be particularly valuable in subjects like mathematics, where peer explanations can be illuminating.

Seeking help and clarification directly from the professor underscores the importance of instructor support in addressing academic challenges. Instructors play a vital role in facilitating compelling learning experiences. Students who feel comfortable approaching their instructors for help are more likely to receive guidance, feedback, and clarification, ultimately enhancing their understanding of course content (Chickering & Gamson, 1987). One participant supports This by stating, *"I ask questions to the professor when I do not understand something in the lesson. This coping greatly helps me, especially when I did not understand discussions."*

Active participation in class discussions and interactions is crucial to effective learning. Engaging with the course content through discussions and interactions can deepen understanding and help students connect theoretical concepts to practical applications. Active learning strategies, such as group discussions and collaborative problem-solving, can promote critical thinking and knowledge retention (Bonwell & Eison, 1991). The statement of the participant supports this: *"To cope with challenges in learning mathematics in a large class, I often find it helpful to actively participate in class discussions, seek clarification from the instructor or peers, practice regularly, and utilize additional resources such as textbooks, online tutorials, and study groups."*

Collaborating with classmates can foster a sense of shared responsibility and a collaborative approach to problem-solving. Collaborative learning effectively promotes student engagement and improves academic outcomes (Springer et al., 1999). When students work together, they can benefit from their peers' diverse skills and knowledge, potentially addressing challenges more effectively. This is reflected in students' responses to an open-ended question: *"I study with classmates who are good at this subject, so I have a high chance of remembering what I have learned. Another participant supported this by saying, "If I cannot understand or easily catch up on a problem, I call for help from my classmates who listen carefully."*

"Online Resources and Technology" highlighted the potential of digital tools and the Internet for research and learning. Students utilized various online resources, from videos and tutorials to specialized math applications, to supplement their learning. The theme illuminates digital tools and the internet's pivotal role in enhancing students' learning experiences, particularly in NLec mathematics classes. This theme underscores how students utilize various online resources to supplement their learning and access valuable information, demonstrating the vast potential of technology to enrich the educational process.

The use of the Internet for research and resources is emblematic of the information age in which we live. The Internet provides students access to information, research materials, academic databases, and educational websites. As shown in the response of a male participant, *"Online platforms such as Google, modules from past academic years, and math applications are my go-to resources to cope with the demands and challenges of NLec math class."* This allows them to explore topics in-depth, access up-to-date information, and broaden their understanding beyond the classroom (Hargittai & Hinnant, 2008). Online research can empower students to become more independent learners and critical thinkers as they navigate vast online knowledge repositories.

Watching YouTube videos and online tutorials is a testament to the value of multimedia resources in enhancing the understanding of mathematical concepts. Video-based resources can provide visual and auditory explanations

that complement traditional text-based learning materials. This is supported by a male participant stating, *"I watch YouTube videos and online tutorials to understand complex math concepts better. It helps me visualize and grasp ideas more effectively. Another participant added, "YouTube is a great resource for math. I often watch videos from different math channels to reinforce my understanding of the subject."* This multimedia approach can cater to diverse learning styles and preferences, making complex mathematical concepts more accessible and engaging (Kay, 2012).

The utilization of online platforms and applications extends the opportunities for technology-enhanced learning. These platforms offer interactive exercises, practice quizzes, and adaptive learning pathways. They can provide immediate feedback and personalized learning experiences, allowing students to reinforce their understanding of mathematics at their own pace (Means et al., 2010). One participant supports This by saying, *"I use various math learning platforms and applications to practice problems and quizzes. They provide instant feedback and help me identify areas where I need improvement"*.

Using smartphones and gadgets as tools for learning represents the ubiquity of mobile technology in education. Mobile devices offer portability and accessibility, enabling students to access educational content on the go. Mobile applications can provide quick reference materials, study aids, and even opportunities for collaborative learning (Cheung & Vogel, 2013). Mobile learning has the potential to make education more flexible and adaptable to students' needs. As indicated by one participant in an open-ended question, *"I use my smartphone to access online resources and educational apps that help me understand math concepts better."* Another participant added, *"Gadgets like tablets and smartphones are great for accessing online tutorials and practice exercises. They have become essential tools for my math studies."*

Searching on Google for information showcases the ubiquity of online search engines as a resource for academic inquiries. Search engines like Google allow students to quickly find answers to specific questions, access articles, and explore various web-based resources. This reflects the convenience and efficiency of online search tools for locating information and solutions. As one participant said, *"When I do not understand a math concept, I usually turn to Google for explanations and examples. It is a quick way to find additional resources."*

"Positive Attitude and Motivation" were crucial to overcoming challenges. Maintaining enthusiasm, a positive outlook, dedication, and determination were reported as essential for academic success. These findings highlight the importance of addressing students' emotional well-being and motivation in effective teaching. The theme highlights the vital role of student's emotional well-being and motivation in overcoming challenges in NLEc mathematics classes. These findings underscore the significance of fostering a positive mindset, dedication, and determination as essential to achieving academic success.

Staying motivated is a powerful driving force in education. Motivation can be intrinsic, where students find personal meaning and value in their learning, or extrinsic, driven by external factors like grades or recognition (Ryan & Deci, 2000). Students with high motivation levels are likelier to remain engaged, persevere through challenges, and achieve academic goals. The ability to sustain motivation is closely tied to the sense of purpose

and enjoyment students derive from their learning experiences. Thus, one participant noted, "One coping strategy was my *motivation and passion for mathematics*. Another participant also supports this by stating, "*My self-determination to learn more about mathematics is one of my best coping strategies to address the challenges of NLec class in mathematics.*"

Dedication and determination drive students to put in the effort required for academic success. These qualities are closely associated with a strong work ethic and the willingness to persevere when faced with challenging material. Determined students are more likely to engage in deliberate practice, problem-solving, and acquiring new skills (Ericsson et al., 1993). Dedication and determination can lead to higher levels of achievement, especially in complex subjects like mathematics.

"Practice and Review" strategies emphasized the significance of regular practice and the review of lecture notes in reinforcing understanding. Online resources were also used to complement traditional study methods. This theme sheds light on the essential role of practice and the review of lecture notes in consolidating students' understanding of mathematical concepts in NLec mathematics classes. These findings underscore the value of active and repetitive learning practices and the integration of technology in the review process.

Practicing regularly is a fundamental strategy for deepening understanding and skill acquisition. Regular practice allows students to apply what they have learned, reinforce their knowledge, and develop mathematical problem-solving skills. The statement of a male participant supports this: "*For me, constant practice is the most promising technique to overcome this problem. Much practice is required to build a good comprehension of any topic or concept in math. Daily practice will familiarize students with mathematical concepts, making problem-solving easier.*" A female participant also supported this, saying, "*Review until I understand the lesson. I would search different sources such as YouTube videos and Google for other information.*" The repetition of exercises and problems can lead to the automation of skills, making it easier for students to tackle complex mathematical tasks (Anderson, 1982). Consistent practice can also build confidence and reduce anxiety when faced with mathematical challenges.

Reviewing lecture notes is a tried-and-true method for revisiting and reinforcing key concepts and insights presented in class. Lecture notes serve as valuable reference materials, offering a structured summary of the course content. As stated by a male participant, "*To cope in learning math in my NLec class, I always review my lecture notes.*" Another female participant also supported this, saying, "*Review or restudy the recent lessons or watch related lessons or topics to understand it better.*" Reviewing notes can help students organize their thoughts, connect ideas, and ensure they have all the important details (Kiewra, 1985). Effective note-taking and review techniques are essential skills for success in academic settings.

The use of online resources to complement traditional study methods reflects the evolving landscape of education in the digital age. Online resources can provide additional exercises, explanations, and supplementary materials that support and enrich students' learning experiences. As quoted by one participant, "*Watching video on YouTube and sometimes I ask help from my close friends or classmates who understand the lesson well was one of the*

coping strategies I use to cope with the challenges brought by NLec class." Another participant stated, *"I search on the internet if I do not know the answer."* According to Cavanaugh (2005), integrating technology can make learning more engaging and interactive, catering to diverse learning styles. Online resources also offer the advantage of instant feedback, allowing students to gauge their understanding and progress.

"Active Listening and Notetaking" played a pivotal role in student's academic success. Attentive listening, note-taking, participation in class discussions, and asking questions were identified as strategies for actively engaging with course content. The theme highlights the fundamental role of active engagement in students' academic success, particularly in NLec mathematics classes. These findings underscore how attentive listening, note-taking, active participation in class discussions, and asking questions are crucial strategies for promoting deep understanding and meaningful learning experiences.

Attentive listening is a cornerstone of effective learning. Active listening involves hearing, comprehending, and interpreting the information being presented. Students who engage in active listening are more likely to grasp the nuances of mathematical concepts, follow complex explanations, and make connections between different topics (Zimmerman & Schunk, 2011). Through active listening, students can absorb, internalize, and reflect on the material. As indicated by one participant, *"I listen carefully, and I try to focus my mind on the discussion so that I may not miss important concepts discussed by my teacher."* Another participant also stated, *"I follow and listen to the gestures and discussions of the teacher."*

Notetaking is a practical and valuable technique for capturing and organizing information presented during lectures. Effective note-taking allows students to create a personal record of key points, concepts, and examples discussed in class. One female participant said, *"I always take notes in every discussion. In this regard, I am sure I have materials to review if I miss a certain topic."* Another participant quoted, *"My coping for this NLec class in math was I write the examples that the professor is giving, and I write the important ideas that I get from the lesson.* Students can revisit These as a structured reference when studying and reviewing the material (Kiewra, 1985). Taking notes can also enhance cognitive processes related to memory and understanding (Bohay et al., 2011). Students who engage in notetaking tend to have a more organized and comprehensive approach to learning.

Active participation in class discussions is a dynamic way for students to engage with course content. Classroom discussions allow students to express their thoughts, ask questions, and engage in critical thinking. As stated by one participant, *"To cope with the demands and challenges of NLec, I always engage in class discussions, ask questions, and contribute to group activities."* Additionally, another participant cited *I often find it helpful to actively participate in class discussions, seek clarification from the instructor or peers, practice regularly, and utilize additional resources such as textbooks, online tutorials, and study groups."* Actively participating in discussions allows students to share their perspectives, gain insights from peers, and clarify their understanding through dialogue (Gokhale, 1995). Such interactions foster a deeper and more interactive learning environment.

Asking questions is a proactive approach to learning. When students ask questions, they demonstrate their curiosity and desire for clarity. A female participant responded, *"When there are concerns regarding the subject*

matter, I always ask the professor questions when I do not understand something in the lesson.” This is also supported by the response of one male participant, noting, *“To cope with the missed discussion from my course professor, I ask my classmates about the lesson.”* Questions serve as a mechanism for seeking clarification, exploring complex topics, and identifying areas of uncertainty. By asking questions, students engage in metacognition, reflecting on their knowledge and identifying areas that require further exploration (Chin et al., 2002). Effective question-asking can stimulate critical thinking and promote a deeper understanding of mathematical concepts.

Conclusion

The qualitative responses reveal a complex array of challenges general education students face in their mathematics classes while shedding light on the strategies they employ to cope with these difficulties. The challenges encompass a range of issues, including distractions in the classroom, difficulties with teacher-student interaction, struggles with abstract concepts, and concerns about class size and online learning. These challenges point to the need for more conducive learning environments, effective teaching methods, and improved student cognitive and emotional support.

On a positive note, students have developed coping mechanisms in response to these challenges. They rely on various strategies, such as using study materials and notes, seeking peer and teacher support, leveraging online resources and technology, maintaining a positive attitude and motivation, engaging in regular practice and review, and actively participating in the learning process through listening and notetaking.

Finally, these findings underscore the importance of creating more supportive classroom environments, addressing distractions, and implementing effective teaching methods to enhance the learning experience. Moreover, the coping strategies employed by students highlight the need for a holistic approach to education that combines various forms of support within and outside the classroom to promote student success. These insights can serve as valuable guidance for educational institutions and instructors aiming to address the challenges better and support the needs of general education students in mathematics classes.

Recommendations

Several key recommendations can be considered to improve the experiences of general education students in their NLec mathematics classes. Firstly, there should be a concerted effort to enhance the classroom environment. This can be achieved through thoughtful classroom design that minimizes distractions, optimizes seating arrangements, and ensures proper ventilation. Noise reduction measures should also be implemented to create a more focused learning space.

Pedagogical improvements are essential, focusing on diverse teaching methods and adaptable teaching styles. Teachers should receive training and support in managing their time effectively during class to cover complex topics without rushing through them. Additionally, promoting peer assistance and providing mental health

services can help students better cope with personal engagement and learning challenges, including anxiety and difficulties with abstract concepts.

Addressing issues related to classroom structure and size is crucial. Consideration should be given to reducing class sizes or dividing larger classes into smaller groups to facilitate more individualized attention. Interactive discussions and group activities can further engage students in larger classes.

Technology integration should be improved, ensuring reliable internet connectivity and training students and teachers on utilizing technology effectively for learning and teaching purposes. Motivational workshops and goal-setting initiatives can motivate students and maintain a positive attitude toward their mathematics studies.

Furthermore, focusing on regular assessments, such as quizzes and formative assessments, can encourage students to consistently practice and review their knowledge. Promoting study groups can also enhance the practice and review process.

Active listening and note-taking skills are critical for success in mathematics. Workshops and resources should be made available to help students improve these skills. Inclusive class participation should be encouraged, ensuring that all students have opportunities to engage actively in discussions and ask questions.

Establishing a feedback mechanism for students to provide input on their learning experiences and challenges is essential. Finally, ongoing professional development opportunities for teachers to stay updated on best practices in mathematics education should be prioritized. By implementing a combination of these recommendations, institutions can create a more supportive and effective learning environment for general education students in NLeC mathematics classes, ultimately improving their educational outcomes and experiences.

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