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A Survey on the Problems in the Teaching and Learning of Mathematics at Plateau State University Bokkos, Nigeria

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Abstract
The challenges associated with teaching and learning mathematics at Plateau State University (PLASU), Bokkos, Nigeria, is explored this study. Despite the wide range of challenges in this context, the investigation focused on five primary domains: effective teaching and learning styles, mathematical knowledge for teaching, mathematics foundation and transition, attitudes toward mathematics, and the learning environment's conduciveness. Data were gathered using questionnaires, interviews, and focus group discussions. The findings revealed several critical issues, including students' negative attitudes toward mathematics, weak foundational knowledge, and insufficient preparation from high school for university-level mathematics. Other challenges included difficulties in adapting to new teaching practices, the impact of living off-campus, and limited access to essential resources such as updated reference books, modern mathematics software, and current journals. The study concluded with recommendations to mitigate these challenges. Key suggestions included providing lecturers and students with adequate mathematics resources and implementing teaching methods that encourage active student engagement. Additionally, it emphasized the importance of infrastructure expansion to support PLASU's growth as an internationally recognized institution serving an increasingly large student population.

1. INTRODUCTION

1.0 Introduction

Mathematics serves as a cornerstone for numerous disciplines, with its applications spanning diverse fields. Despite its critical importance, many students face challenges in comprehending mathematical concepts, which hinders their progress in mathematics-intensive courses. Mathematical education fosters intellectual and ethical development, enabling individuals to reach their full potential and cultivating well-rounded personalities. It plays an unmatched role in scientific and technological advancement, enhancing critical thinking and problem-solving skills essential for innovation.

Often referred to as the "queen of the sciences," mathematics is integral to scientific progress, as Ukeje (1990) highlights. This underscores the need for robust mathematics education to unlock young minds' intellectual potential. Similarly, Obarakpo (2009) emphasizes that a strong mathematical foundation is indispensable due to the discipline's utility across fields such as science, technology, business, medicine, and the humanities.

This study investigates the challenges of teaching and learning mathematics at Plateau State University, Bokkos, Nigeria. Addressing these challenges is crucial for improving mathematics education and enhancing student performance. At its core, effective teaching requires educators with substantial expertise, as Iji and Uka (2012) stress that curriculum success hinges on teacher quality. Beyond innate abilities, students' understanding of mathematics depends heavily on the instructional methods employed.

Mathematics education impacts society significantly by cultivating logical and analytical thinking. Far from being limited to academic exercises, mathematics shapes individual lives and global communities. It encourages imagination and reasoning, laying the foundation for innovation and intellectual development.

Recent research has examined the challenges in mathematics education across various levels, emphasizing issues such as inadequate infrastructure, pedagogical barriers, societal attitudes, and the influence of digital learning.

Denbel (2023) identified social difficulties, limited access to online resources, and instructor-related challenges in postgraduate mathematics education, advocating for a blended learning approach. Ohiri (2024) highlighted the prevalence of untrained teachers, insufficient instructional materials, overcrowded classrooms, and negative student attitudes in Nigerian secondary schools, recommending enhanced teacher training and resource allocation.

Mukuka et al. (2024) explored digital integration in Zambian teacher education, citing inadequate infrastructure and insufficient training as key obstacles. Similarly, the Key Challenges in Nigeria's Mathematics Education (2024) report pointed to a shortage of qualified teachers, poor facilities, and a misaligned curriculum as significant barriers.

Studies on remote instruction (K12 Digest, 2020) and pandemic-related disruptions (NCSM, 2021; ResearchGate, 2023) underscored difficulties in online mathematics teaching and the urgent need for systemic reforms. Discussions on curriculum changes (Education Week, 2025) and innovative teaching strategies (ASCD, 2024) emphasized the necessity of aligning mathematics education with real-world applications and fostering student resilience.

Collectively, these studies suggest that addressing mathematics education challenges requires comprehensive investments in infrastructure, teacher development, technology integration, and curriculum modernization.

1.2 Theoretical and Conceptual Framework

Educational systems worldwide face challenges, which Inana (2010) describes as barriers to success. In the context of mathematics education at Plateau State University, these challenges are particularly pronounced due to the subject's inherent complexity. The study identifies five domains as critical to understanding and addressing these challenges:

- Effective teaching and learning strategies
- Mathematical knowledge for teaching
- Foundational mathematics and transitional gaps
- Attitudes toward mathematics
- Creation of a conducive learning environment

1.2.1 Effective Teaching and Learning Styles for Mathematics

Traditional mathematics teaching often relies on passive methods, where students receive information from authoritative sources (Clements & Battista, 1990). However, Brooks and Brooks (1993) advocate for active, student-centered approaches that enable learners to construct their understanding. This perspective aligns with the constructivist learning theory, which posits that learning is an active process shaped by individual cognitive frameworks and experiences (Mathews, 2000).

In mathematics education, where student capabilities vary widely, constructivist approaches encourage personalized problem-solving and interactive tutorials to foster deeper comprehension. Mathematics, being a "doing subject," benefits significantly from active participation and collaboration.

1.2.2 Mathematical Knowledge for Teaching

Effective mathematics teaching requires specialized knowledge tailored to instruction (Ferrini-Mundy, Floden, &McCrory, 2001). At PLASU, mathematics lecturers are required to hold at least an MSc in mathematics or statistics to ensure expertise aligns with educational standards. Shulman's (1986) concept of Pedagogical Content Knowledge (PCK) highlights the importance of understanding common student difficulties and addressing those using effective teaching strategies. Lecturers must possess deep mathematical knowledge and the ability to adapt their instruction to diverse student needs, ensuring comprehensive understanding and engagement.

1.2.3 Attitudes Toward Mathematics

Attitudes toward mathematics, encompassing emotions, beliefs, and behaviors, significantly impact learning outcomes. Aiken (2000) describes positive attitudes as fostering engagement, while negative attitudes, often rooted in anxiety (Tapia, 2004), create barriers. Building self-confidence and intrinsic motivation in mathematics is crucial to overcoming these challenges and encouraging sustained interest in the subject.

1.2.4 Transition and Mathematics Foundation

The transition from secondary school to university presents significant challenges for students, often due to perceived discontinuities in mathematics instruction (Holton, 1997). A weak mathematical foundation exacerbates these challenges, making university-level courses, such as college algebra, particularly difficult (Okello, 2010).

From a social perspective, first-year students must also adapt to new freedoms and responsibilities. Establishing a solid foundation and fostering a sense of responsibility are essential for academic success.

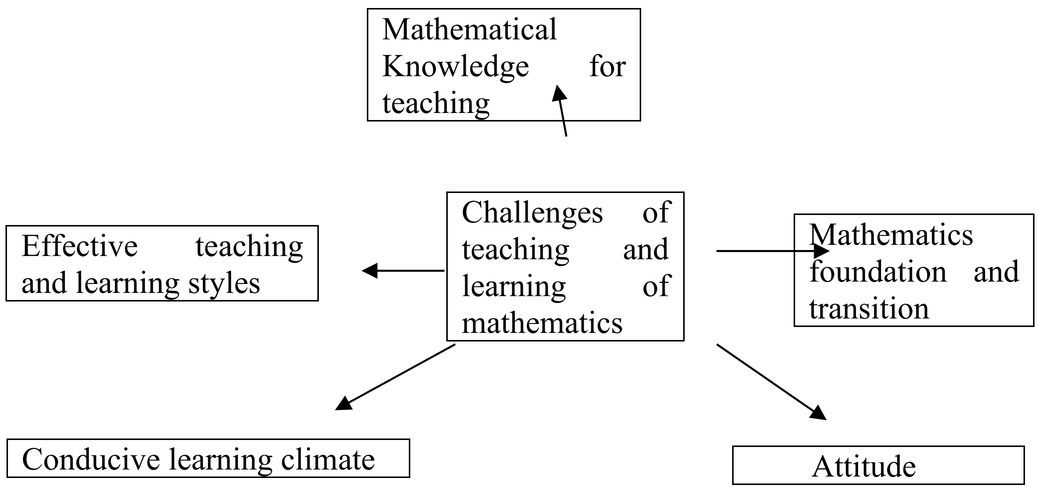
1.2.5 Creating a Conducive Learning Environment

A supportive learning environment is critical for effective education. Key factors include manageable class sizes, adequate infrastructure, access to resources, and curriculum coherence. As Schmidt (2005) notes, fragmented curricula hinder learning by failing to connect core concepts. Ensuring a cohesive and relevant curriculum, coupled with strong support systems, enhances educational quality and promotes student success.

1.2.6. Summary of the conceptual and theoretical framework.

The domains that have been discussed in here can be shown in the conceptual model that follows:

Figure 1.1: Conceptual model of challenges of teaching and learning mathematics



Creating a supportive learning environment and employing effective teaching strategies are crucial components of the educational process, particularly in mathematics. When these elements are in place, students' attitudes toward mathematics can improve, even for those who have historically struggled with the subject or find it challenging to transition from secondary school to university-level mathematics. Lecturers play an essential role in this process by applying their mathematical expertise and Pedagogical Content Knowledge (PCK). By delivering thoughtful instruction, they help students build strong foundational knowledge and foster a seamless progression through different levels of mathematics education.

1.3 Statement of the Problem

Mathematics is a core subject in Nigeria, underpinning various career paths, including sciences, technology, business, and medicine. Despite its critical role, poor performance in mathematics remains a persistent issue at all levels of education in the country (Nkoya, 2009).

At Plateau State University (PLASU), Bokkos, mathematics is integral to the curriculum, with students across faculties required to complete mathematics courses as part of their academic programs. Despite the subject's significance for curriculum fulfillment and graduation requirements, no prior research has investigated the challenges associated with teaching and learning mathematics at the university. This gap has motivated the researchers to explore these issues and propose strategies for improvement.

1.4 Justification/Significance of the Study

The findings of this study are expected to benefit lecturers, students, and department heads at Plateau State University, as well as stakeholders at other tertiary institutions across Nigeria. The insights will highlight the challenges in teaching and learning mathematics, offering a foundation for improving mathematics education nationwide.

The study's outcomes will also inform university management, academic planning units, and government bodies, including the State and Federal Ministries of Education, enabling them to address these challenges effectively and enhance the quality of mathematics education across all school levels.

Additionally, prospective students will benefit from understanding the demands of studying mathematics and mathematics-related courses at the university. More broadly, this research will contribute to the growing body of knowledge in mathematics education, advancing efforts to improve student outcomes and educational practices in Nigeria.

1.5 Objectives of the Study

The primary objectives of this research are to:

a) Identify the specific challenges encountered in the teaching and learning of mathematics at Plateau State University, Bokkos.
b) Examine the factors contributing to these challenges, including curriculum design, teaching methods, student attitudes, and resource availability.
c) Assess the impact of these challenges on student performance and retention in mathematics courses.
d) Develop strategies and recommendations to address these issues and enhance the teaching and

1.6 Limitations of the Study

This study was conducted solely at Plateau State University (PLASU) and focused on all mathematics lecturers and 100-level and 200-level students within the Department of Mathematics. The researchers distributed questionnaires to the students, ensuring confidentiality by not requiring names, which helped alleviate concerns about anonymity.

Organizing focus group discussions proved challenging due to the participants' busy schedules. However, almost all mathematics lecturers participated in the study, with only two absentees, which did not significantly impact the findings. Similarly, nearly 90% of the students returned the questionnaires, indicating strong engagement and participation.

Existing research provides valuable context and insights into the challenges of teaching and learning mathematics. This section begins by exploring the broader issues faced by universities and tertiary institutions before focusing specifically on Plateau State University Bokkos.

1.7. 1 Learning

Learning has long been a subject of study, with researchers examining human and animal behaviors. Burns (1995) defines learning as a relatively permanent change in behavior, encompassing observable activities and internal processes like thinking and emotions. Some theories view learners as passive recipients, while others emphasize active engagement. Post (1998) highlights the teacher’s role as either an instructor or a facilitator. Inana and Agbedeyi (2010) stress that effective mathematics learning requires active problem-solving, strategy exploration, and participation, particularly at the tertiary level.

1.7.2 Teaching

Effective mathematics teaching combines content knowledge and pedagogy. Beaton et al. (1996) highlight the importance of understanding subject matter, student learning processes, and effective teaching methods. Shulman (1986) underscores the need for deep knowledge of mathematical concepts like differentiation and integration. Pfund and Duit (2000) note that inadequate content knowledge can lead to misconceptions. Professional development improves teaching effectiveness, as emphasized by Ma (1999) and Ball (2005). Pedagogical knowledge is also essential, as noted by Koehler and Mishra (2007), for fostering student engagement and understanding.

1.7.3 Challenges in Mathematics Teaching and Learning

1.7.3.1 Challenges at Primary Levels

Primary education lays the foundation for mathematical understanding but faces challenges such as:

1. Limited foundational knowledge: Weak basic skills hinder progress.
2. Lack of resources: Insufficient textbooks, manipulatives, and technology.
3. Teacher preparation: Inadequate training impacts instruction quality.
4. Student engagement: Difficulty in motivating young learners.
5. Conceptual difficulties: Abstract concepts are hard to grasp without concrete examples.
6. Language barriers: Multilingual settings complicate instruction.
7. Assessment practices: Traditional methods may not accurately measure understanding.
8. Parental involvement: Limited support affects learning outcomes.
9. Cultural influences: Attitudes toward mathematics impact performance.
10. Individual learning differences: Diverse learning needs require tailored approaches.

1.7.3.2 Inadequate Numbers of Mathematics Teachers

A shortage of mathematics teachers hampers effective education, as noted by Farooq and Shah (2008).

1.7.3.3 Shortage of Qualified Mathematics Teachers

Abe and Adu (2013) highlight the link between teacher quality and student achievement. Many teachers lack relevant qualifications, leading to poor instruction and low performance.

1.7.3.4 Lack of Instructional Materials

Instructional materials enhance teaching but are often lacking. Abdullahi (2008) and Adewale (2011) emphasize their importance in capturing attention and improving understanding. Without them, students struggle with external exams and mathematical concepts.

1.7.3.5 Lack of Practice

Effective learning requires practice, but attitudes toward mathematics impede progress:

- Learner attitudes: Frustration and intimidation lead to disengagement (Mullis et al., 2020).
- Teacher attitudes: UNESCO (2020) notes dissatisfaction among teachers, affecting their performance.
- Government support: Insufficient resources exacerbate challenges.

1.7.3.6 Student Challenges

Students' fear of mathematics stems from its abstract nature and perceived irrelevance, as noted by Okafor and Anaduaka (2013). Many view mathematics as merely a prerequisite for higher education rather than a practical subject.

1.7.3.7 Curriculum Challenges

Azuka et al. (2013) argue that the curriculum often fails to address local needs. Its complexity and foreign nature contribute to students' fear and poor understanding.

1.7.3.8 Societal Challenges

Negative societal attitudes toward mathematics discourage students. Adults openly express their struggles with the subject, creating a cycle of demotivation and poor performance.

1.7.3.9 Funding Challenges

Inadequate funding from the government limits resources for mathematics education. Despite its importance, the education sector in Nigeria receives insufficient budgetary allocations, impacting the quality of teaching and learning.

2. METHODOLOGY AND RESEARCH DESIGN

This section examines previous research on the challenges of teaching and learning mathematics in tertiary institutions. It reviews the methods used for data collection and analysis, including research design, target population, data collection methods and techniques, sample size, sampling design, and data analysis techniques. The section concludes with an overview of the ethical aspects and limitations of the study.

2.1 Research Design: Research design outlines the plan and implementation strategies for a study to achieve its intended results, increasing the likelihood of obtaining information relevant to the real situation (Burns & Grove, 2001).

This study focuses on the challenges faced in teaching and learning mathematics at Plateau State University, Bokkos. The study adopts the descriptive research design, described by Collis and Hussey (2003) as aiming to describe phenomena as they exist, identifying and obtaining information on the characteristics of a specific problem or issue. Thus, the challenges faced by mathematics lecturers and learners will be thoroughly described.

Contextual research, as defined by Botes (1995), involves finding valid answers to a stated problem within the time, space, and value context of the study. This study will aim to capture the context and provide a holistic picture of mathematics teaching and learning at Plateau State University, Bokkos.

The research method includes qualitative, descriptive, and contextual approaches. According to Burns and Grove (2001), qualitative research is a systematic subjective approach used to describe life experiences and situations to give them meaning, focusing on the uniqueness of individuals' experiences.

In this study, the focus is on the participants' perspectives and experiences. A qualitative approach is chosen to allow for deep engagement and interaction with mathematics lecturers and students, enabling the researchers to determine and establish the problems encountered in teaching and learning mathematics at Plateau State University, Bokkos.

Additionally, a quasi-quantitative research method will be used to establish a cause-effect relationship from one variable to another.

2.2 Research Site: Plateau State University, Bokkos (PLASU) was established by an instrument of law in March 2005 and was recognized by the National Universities Commission (NUC) on April 29th of the same year as the 66th university in Nigeria and the 24th state-owned university in the country. It is situated in Diram Village, approximately 70 km from the state capital of Jos. The university initially started with four main faculties offering undergraduate courses specializing in science and art education. It has since expanded to nine faculties, including arts, management science, natural and applied science, social science, agricultural science, health science, law, environmental science, and postgraduate studies. Across these faculties, students can choose from 17 bachelor's degree programs, ranging from English to theatre arts, history to accountancy, and microbiology to political science.

2.3 Target Population: Population, as defined by Polit and Hungler (1999), is the aggregate or totality of all objects, subjects, or members that conform to a set of specifications. For this study, the target population includes all mathematics lecturers, students of the Department of Mathematics, and students taking courses that require a good understanding of mathematics at Plateau State University, Bokkos (PLASU).

2.4 Sample: Polit and Hungler (1999) defined a sample as a subset of a population selected to participate in a given study, representing a fraction of the whole population. For this study, all mathematics lecturers and all students in the department of mathematics will be included in the sample.

2.5 Sampling Design: Sampling, as described by Polit and Beck (2004), refers to the procedure of selecting a part of the population that conforms to a designated set of specifications to be studied. For this study, the purposive sampling method will be used.
According to Creswell (2003), purposive sampling involves intentionally seeking or selecting individuals or situations to gain a greater understanding of the phenomenon being investigated. In this case, participants must be willing to share their experiences or knowledge of the situation being studied. It is essential that the selected individuals have adequate information on the subject under investigation (Patton, 1990).
The lecturers and students of mathematics, as well as students taking courses that require a strong foundation in mathematics, are considered the best choice by the investigators. They are expected to provide a rich and valuable source of information regarding the problems encountered in the teaching and learning of mathematics at Plateau State University, Bokkos.

2.6 Triangulation: Triangulation, as described by Robson (2002), involves using different methods to collect data on the same topic, allowing findings to be compared and corroborated or questioned accordingly. Triangulation will be employed in the data collection for this study to determine the experiences, perceptions, and views of both lecturers and learners.
According to Neuman (1994), triangulation is the use of two or more methods of data collection techniques to examine the same variable, leading to greater validity through measurements from highly diverse methods. In this study, triangulation will be followed, with qualitative data gathered through questionnaires completed by both lecturers and learners, corroborated with interviews with the Heads of Departments and the Deans, as well as focus group discussions with the learners.

2.7 Data Collection Methods and Instruments
Different data collection methods and instruments shall be used:
2.7.1 Questionnaire One of the primary instruments used in this study to generate the required data is the questionnaire. Questionnaires are an efficient way of collecting information quickly.

According to Munn and Drever (1996), questionnaires offer several advantages to researchers. These advantages include efficient use of time, anonymity, the possibility of a high return rate, and standardization.

Two types of questionnaires will be developed for this study, containing open-ended, close-ended, and rating type questions and statements. One questionnaire will be administered to the students, while the other will be given to the lecturers to complete. Both questionnaires will include questions requiring a response on a 4-point Likert scale regarding general information such as gender, highest qualification, number of years of teaching mathematics at the university level, teaching methods used most often, the activities mathematics lecturers usually engage in while teaching, and the challenges they face while teaching mathematics at Plateau State University, Bokkos. For the students, the questionnaire will include general information such as gender, year of study, O' level result in mathematics, accommodation, activities their lecturers usually engage in while teaching mathematics, and the challenges they face as they learn mathematics.

2.7.2 Interviews: Interviews will be conducted to gather information from mathematics lecturers, lecturers teaching courses involving a high level of mathematics, Heads of Departments, the Dean of the Faculty of Natural and Applied Sciences, and other Deans of faculties offering courses that require a high level of mathematics at Plateau State University, Bokkos, as well as officers from the university library.

Semi-structured interviews will be adopted over structured interviews, as they provide a setting and atmosphere where the interviewer and interviewee can discuss the topic in detail. According to Creswell (2003), semi-structured interviews allow the interviewer to take advantage of cues and prompts the interviewee may present on the research topic area, thereby enabling the gathering of more in-depth and detailed data sets.

2.7.3 Focus Group Discussion Another method used to gather information from the students about their experiences learning mathematics is focus group discussions. This method involves bringing together a group of six to eight people to discuss a given event or phenomenon they have experienced (Creswell, 2003). Focus group discussions are useful in situations where individual interviews would be time-consuming or difficult to arrange. According to Scheurich (1997), focus group discussions are an economical method of collecting a large amount of verbal data, providing rich and in-depth insights.

2.8 Data Analysis Techniques Qualitative data will be analyzed using thematic analysis to identify and categorize the problems encountered in teaching and learning mathematics. Quantitative data will be analyzed using descriptive statistics and inferential analysis to measure the impact of these problems on student performance and retention rates.

For the quantitative data, statistical packages such as SPSS and Microsoft Excel will be utilized for analysis.

3. ANALYSIS OF DATA COLLECTED ONTHE TEACHING AND LEARNING OF MATHEMATICS AT PLASU

This section deals with the prevalent situations in the teaching and learning of Mathematics at the Plateau State University, Bokkos (PLASU). This section comprises of the qualification of lecturers teaching mathematics, availability of lectures for consultation the use of library by students, completion of syllabus by lecturers and an overview of how courses are assessed at the Plateau State University, Bokkos.

3.1.1 Qualifications of mathematics lecturers Table 3.1 presents the qualifications of the lecturers teaching mathematics at the Plateau State University, Bokkos.

Table 3.1: Qualifications of the lecturers teaching mathematics

Highest Qualification	Number of lecturers	Percentage of lecturers
B.Sc.	1	14.3
M.Sc.	2	28.6
M.Ed.	1	14.3
Ph.D.	3	42.9
Total	7	100

The Mathematics Department at Plateau State University, Bokkos (PLASU), comprises 11 lecturers. However, at the time of this study, two lecturers with M.Sc degrees were on study leave abroad, one lecturer with a Ph.D was on sabbatical outside the state, and another lecturer with an M.Sc was unavoidably absent. As a result, seven lecturers participated in the study.

Among these participants, one (14.3%) holds a B.Sc, two (28.6%) have M.Sc degrees, one (14.3%) holds an M.Ed, and three (42.9%) have Ph.D qualifications. This distribution highlights that a significant proportion of the mathematics lecturers at PLASU are well-qualified and experienced, underscoring the department's strong academic foundation.

3.1.2 Lecturers' perception of their teaching loads

Lecturers were asked if their teaching load was within the recommended bracket. Their responses are shown in Table 3.2.

Table: 3.2 Lecturers' perception of their teaching loads

My teaching load is within the recommended bracket	Number of lecturers	Percentage of lecturers
Strongly Disagree	1	14.3
Disagree	3	42.9
Agree	2	28.6
Strongly Agree	1	14.3
Total	7	100

Table 3.2 presents the perceptions of lecturers regarding their teaching loads. The findings indicate that 1 lecturer (approximately 14.3%) strongly disagreed that their teaching load falls within the recommended bracket, while 3 lecturers (approximately 42.9%) disagreed. Conversely, 2 lecturers (approximately 28.6%) agreed, and 1 lecturer (approximately 14.3%) strongly agreed that their teaching loads are within the recommended brackets.

Overall, the majority—4 lecturers (approximately 57.2%)—disagreed, suggesting that teaching loads in the Department of Mathematics at Plateau State University, Bokkos, exceed the recommended limits. This situation arises because some lecturers are on study leave or sabbatical, necessitating the redistribution of their workloads among the remaining staff. Consequently, these additional workloads are computed and compensated at the end of each academic year.

Figure 3.1: Lecturers' perception of their teaching loads

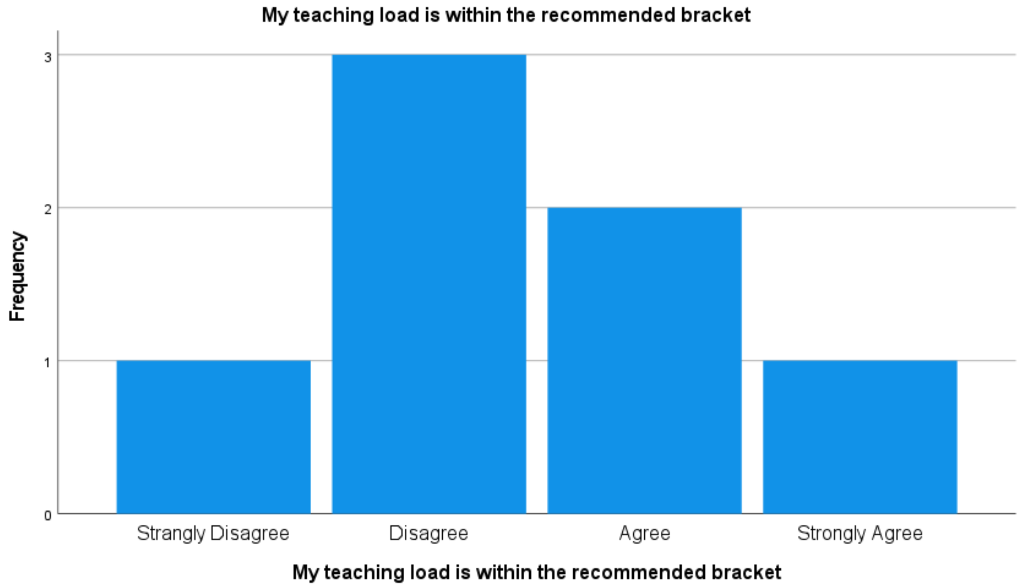


Figure 3.1 on lecturers' perception of their teaching loads clearly confirms what was obtained on the table. The figure shows that majority of lecturers disagree that their teaching loads are within the recommended brackets. Therefore, lecturers end up doing more work than the recommended brackets.

3.1.3 Mathematics tutorial Students were asked how often tutorials were conducted at PLASU. Their responses are shown in Table 4.3 below.

Table 3.3: Students' responses on frequency of tutorials in mathematics.

Level of study	Never (%)	Sometimes (%)	Often (%)	Always (%)	Total
100	1(3.1)	12(37.5)	9(28.1)	10(31.3)	32(100)
200	3(23.1)	10(76.9)	0(0)	0(0)	13(100)

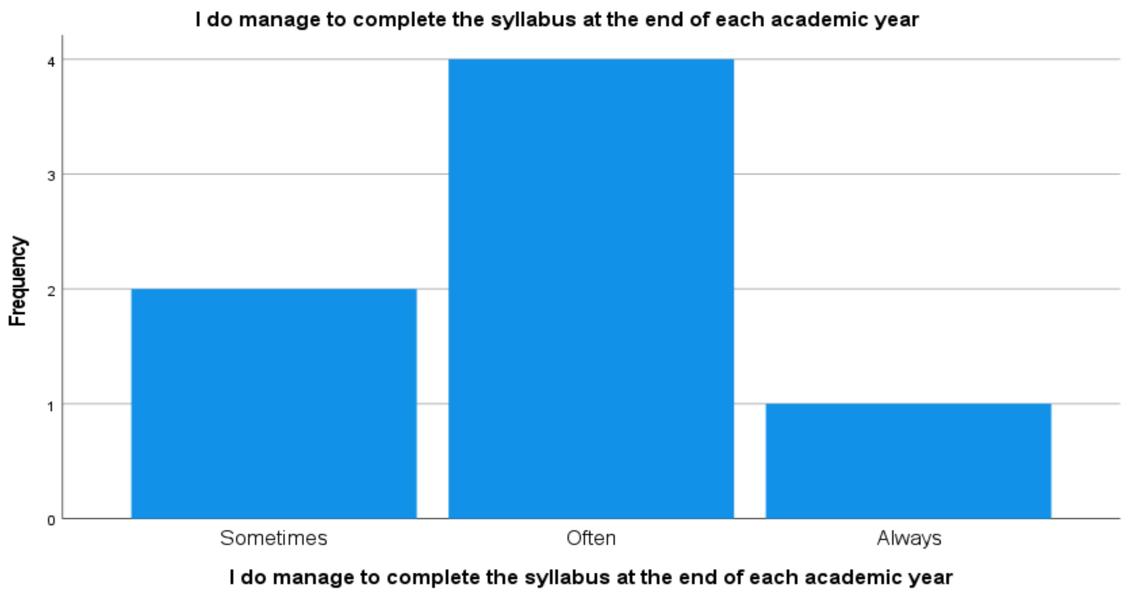
The table above presents the responses of students on the frequency of tutorials in Mathematics. Among the 100-level students, 32 responses were recorded regarding the frequency of tutorials. Of these, 1 student (approximately 3.1%) reported that tutorials were never conducted, 12 students (37.5%) indicated tutorials were sometimes conducted, 10 students (approximately 31.3%) stated tutorials were often conducted, and another 10 students (approximately 31.3%) noted tutorials were always conducted. Overall, the data suggests that 100-level students regularly attend tutorials for their mathematics courses.

For the 200-level students, out of 13 respondents, 3 students (23.1%) stated that tutorials were never conducted, while the majority, 10 students (76.9%), reported that tutorials were sometimes conducted. This indicates that although tutorials were held, they were not consistently conducted for 200-level students.

In summary, the findings from both 100-level and 200-level students confirm that tutorials are conducted at both levels. However, tutorials appear to be more consistently and intensively held for 100-level students compared to 200-level students.

3.1.4 Completing the syllabus at the end of each academic year Lecturers were asked if they managed to complete the syllabus at the end of each academic year. Their responses are shown in Figure 3.2 below.

Figure 3.2: Number of lecturers who complete the syllabus



From Figure 3.2, among the 7 lecturers who participated in the study, 2 reported that they sometimes complete their syllabuses by the end of each academic year, while 4 indicated that they always complete their syllabuses. One lecturer, who stands out as an exceptional educator, consistently completes the syllabus ahead of time. Overall, the results demonstrate that mathematics lecturers are diligent, as the majority successfully complete their syllabuses.

3.1.5 Availability of Lecturers for Consultations
Lecturers were asked about their availability for consultations, and responses were gathered from both lecturers and students.

i. Lecturers' Responses on Their Availability
During interviews, all lecturers affirmed that they are available for consultations with students, dedicating varying amounts of time to these interactions. Table 3.4 presents the responses of lecturers regarding their availability for consultations with students.

Table 3.4: Availability of Lecturers for consultation

Available	Lecturer
Yes	6
No	0
Total	6

Table 3.4 indicates that all six lecturers who responded to the question confirmed their availability for consultations with students.

When asked about the frequency of their availability, lecturers provided details on the number of times per week they are accessible for consultations. Table 3.5 summarizes these responses, showing the weekly availability of lecturers for student consultations.

Table 3.5: Number of times for consultation per week

Number of times	Frequency
Once a week	2
Twice a week	1
Thrice a week	1
Four times a week	1

Table 3.5 highlights the frequency of lecturers' availability for consultations with students. Among the five lecturers who responded, two indicated they were available once a week, one was available twice a week, another was available three times a week, and one was available four times a week. Despite their busy schedules, these lecturers consistently allocate time for student consultations.

Lecturers were also asked to estimate the average amount of time they spend with each student during consultations. Table 3.6 below presents the duration of these interactions.

Table 3.6: Time Spent with Students

How long	Lecturer
1 hour	1
15 minutes	1
25 minutes	1
30 minutes	1
It depends on the nature of the problem	1

From Table 3.6, five lecturers provided responses regarding the average time spent with each student during consultations. One lecturer reported spending 1 hour per student on average, another spent 15 minutes, one spent 25 minutes, one spent 30 minutes, and the final lecturer indicated that the time spent depends on the nature of the problem. This highlights the flexibility in consultation durations, as the complexity of the issues often dictates the actual time spent.

Lecturers were further asked if they have designated times for meeting with students. Table 3.7 below presents their responses.

Table 3.7: Specific Time with Students

Have specific time	Lecturer
Yes	0
No	5
Total	5

From Table 3.7, all five lecturers who responded indicated that they do not have specific times allocated for meeting with students. Instead, lecturers arrange consultations based on their availability, such as before or after lectures, before or after meetings, or during other free periods.

ii. Learners' Responses on the Availability of Lecturers for Consultations

Students were asked about the availability of their lecturers for consultations. Table 3.8 below presents the responses provided by the students.

Table 3.8: Availability of Lecturers for Consultation

Level of study		Frequency	Percentage
100	Yes	14	58.3
	No	10	41.7
200	Yes	5	41.7
	No	7	58.3

Table 3.8 contains the responses of learners when they were asked if lecturers are available for consultation.

For 100-level students, 14 respondents (58.3%) affirmed that their lecturers are available for consultation, while 10 respondents (41.7%) indicated otherwise. This shows that a majority of the 100-level students believe their lecturers are accessible for consultations.

For 200-level students, the trend is reversed. Only 5 respondents (41.7%) agreed that their lecturers are available for consultation, while 7 respondents (58.3%) disagreed. This indicates that most 200-level students perceive their lecturers as less available for consultation.

In summary, the responses from both 100- and 200-level students suggest that, overall, a majority of lecturers are considered available for consultation despite their demanding schedules. This reflects their effort to allocate time for student interactions.

The learners were also asked whether they are provided with specific consultation times. Table 3.9 below presents their responses.

Table 3.9: Consultation Time Given

Level of study		Frequency	Percentage
100	Yes	13	100
	No	0	0
200	Yes	0	0
	No	1	100

Table 3.9 summarizes the responses of learners who reported that their lecturers are available for consultations and were further asked whether specific consultation times are provided.

For 100-level students, 13 learners responded to this question, and all 13 (100%) confirmed that consultation times are provided to them.

For 200-level students, only one learner responded, and this respondent (100%) indicated that consultation times are not provided.

Overall, the majority of learners expressed that consultation times are generally not scheduled, even though lecturers are available for consultations. This suggests that lecturers accommodate students without requiring prior bookings.

3.1.6 Library Opening Hours

The main library operates from 9:00 AM to 3:00 PM on weekdays. Students are permitted to borrow books for a maximum of two weeks from the main collection and for three hours from the short-loan section.

3.1.7 Assessment of Coursework

Coursework assessments are comprised of continuous assessment (CA), which accounts for 40%, and the final examination, which contributes 60% of the total course grade. The CA includes tests, assignments, projects, practical work, and any other tasks assigned in each course. Each semester's CA includes at least two assessments.
Learners were asked whether they are permitted to sit for end-of-semester or end-of-session examinations regardless of their CA scores. Table 3.10 below provides the learners' responses.

Table 3.10: Examinations Allowed Irrespective of CA Score

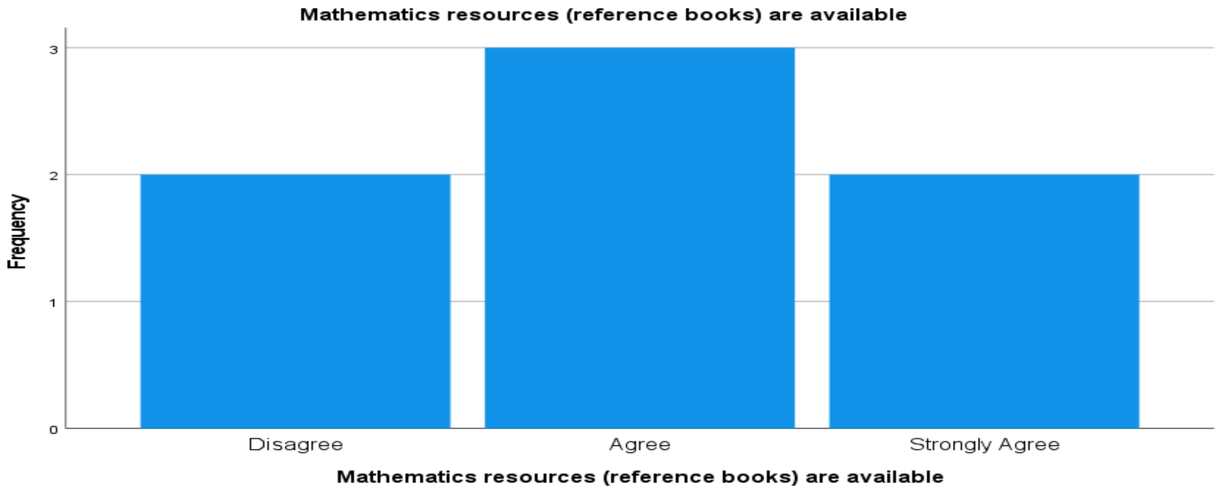
Level of study		Frequency	Percentage
100	Yes	19	86.4
	No	3	13.6
200	Yes	13	100
	No	0	0

The table above summarizes the responses of 100-level and 200-level mathematics students regarding whether they are allowed to sit for end-of-semester/session examinations regardless of their continuous assessment (CA) scores.
Among the 100-level respondents, 19 (86.4%) indicated they are allowed to sit for examinations irrespective of their CA scores, while 3 (13.6%) stated they are not permitted to do so, implying they must achieve a minimum score in CA to qualify for the examinations.
In the 200-level, all 13 respondents (100%) affirmed that they are permitted to take the end-of-semester/session examinations regardless of their CA scores.
Overall, in the Department of Mathematics at Plateau State University, Bokkos, students are generally allowed to sit for end-of-semester/session examinations regardless of their CA scores. The few students who answered "no" might have had experiences such as non-payment of school fees, which may have prevented them from taking examinations.

3.1.8 Lecturers' Perceptions of the Availability of Mathematics Resources

Lecturers were asked about the availability of mathematics resources, such as reference books, in the main library. Their responses concerning the availability of mathematics reference books are illustrated in Figure 3.3.

Figure 3.3: Perceptions on availability of mathematics resources



The figure above presents the responses of the seven lecturers who participated in the survey regarding the availability of mathematics resources in the library. Among them, 2 lecturers (28.6%) disagreed that mathematics resources are available, 3 lecturers (42.8%) agreed, and 2 lecturers (28.6%) strongly agreed that such resources are available. These results indicate that the majority of the lecturers, 5 out of 7 (71.4%), believe that mathematics resources are available in the library.

3.1.9 Students' Perceptions of the Availability of Mathematics Resources

Students were asked about the availability of relevant mathematics books in the main library. Their responses are summarized in Table 3.11.

Table 3.11: Availability of Mathematics Resources

Level of study	Strongly Disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)	Total
100	0(0)	5(15.6)	19(59.4)	8(25.0)	32(100)
200	0(0)	0(0)	6(46.2)	7(53.8)	13(100)

Table 3.11 above presents the responses of 100-level and 200-level students regarding the availability of relevant mathematics books in the main library.

For the 100-level students, 32 learners responded to this question. Among them, 5 (15.6%) disagreed, 19 (59.4%) agreed, and 8 (25.0%) strongly agreed that relevant mathematics books are available in the main library. This indicates that a majority, 27 students (84.4%), believe there are relevant mathematics books in the library.

For the 200-level students, 13 learners responded. Of these, 6 (46.2%) agreed, and 7 (53.8%) strongly agreed that relevant mathematics books are available in the library. This shows that all 13 respondents (100%) from the 200-level agreed that the library contains relevant mathematics books.

Overall, responses from students at both levels indicate that the majority believe relevant mathematics books are available in the library.

3.1.10 Teaching Methods Used by Lecturers

Lecturers were asked to specify the teaching methods they commonly use when teaching mathematics. They were free to list multiple methods. Table 3.12 summarizes their responses.

Figure 3.12: Teaching methods used by lecturers

Teaching Methods	Response	Frequency	Percentage
Discussion	Yes No	4 3	57.1 42.9
Direct Discovery	Yes No	2 5	28.6 71.4
Guided Discovery	Yes No	3 4	42.9 57.1
Free Discovery	Yes No	2 5	28.6 71.4
Lecture	Yes No	5 2	71.4 28.6
Questions and Answers	Yes No	3 4	42.9 57.1
Combination of Methods	Yes No	5 2	71.4 28.6

The table above summarizes the teaching methods employed by the seven lecturers in the department. Among them:4 lecturers (57.1%) use the Discussion method, 2 lecturers (28.6%) use the Directed Discovery method,3 lecturers (42.9%) use the Guided Discovery method, 2 lecturers (28.6%) use the Free Discovery method, 5 lecturers (71.4%) use the Lecture method, and 3 lecturers (42.9%) use the Questions and Answers method.
Additionally, 5 lecturers (71.4%) reported using a combination of methods to teach. This indicates that most lecturers employ more than one teaching method, which helps enhance students' understanding by addressing diverse learning needs.

3.1.10.1 Teaching Methods Preferred by Lecturers

Lecturers were presented with six teaching methods: Question and Answer, Lecture, Free Discovery, Guided Discovery, Directed Discovery, and Discussion. They were asked to indicate both the methods they typically use and the methods they enjoy using the most. The table below outlines their responses.

Table 3.13: Teaching Methods Preferred by Lecturers.

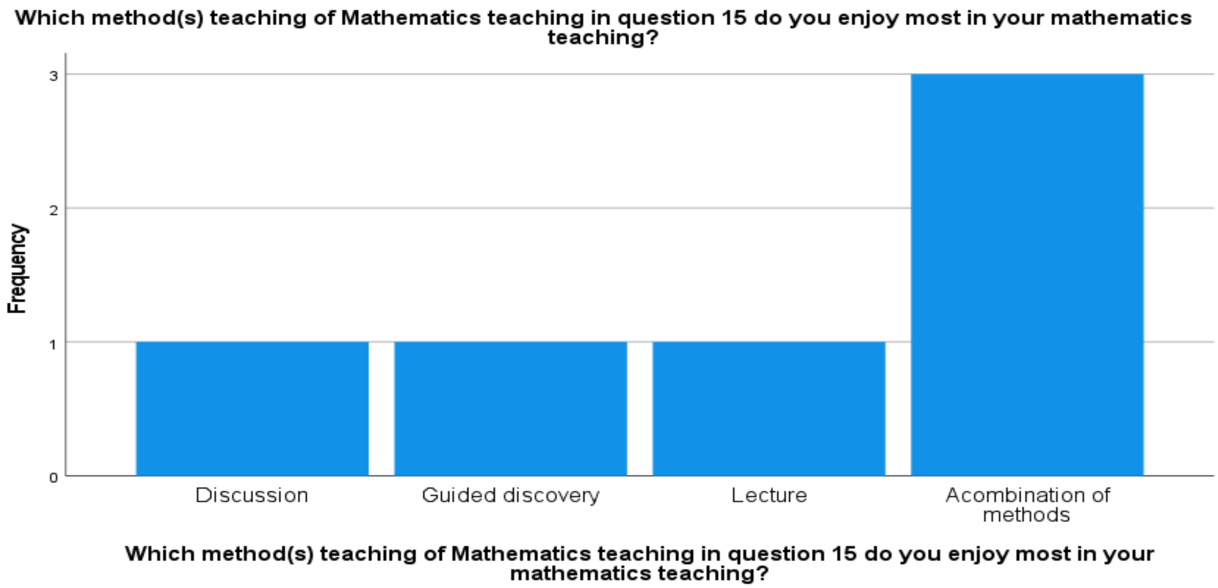
Method	Frequency	Percentage
Discussion	1	16.7
Guided Discovery	1	16.7
Lecture	1	16.7
Combination of Methods	3	50

Table 3.13 reveals that six lecturers participated in this survey question. Among them, one lecturer (16.7%) prefers the discussion method, another (16.7%) prefers the guided discovery method, and one more (16.7%) opts for the lecture method, while the majority, three lecturers (50%), favor a combination of teaching methods.

This indicates that, under normal circumstances, it is challenging to rely on a single teaching method to address the diverse needs of learners. As a result, most lecturers tend to adopt a mix of teaching methods, either consciously or unconsciously, to enhance learning outcomes.

The figure below illustrates the teaching methods preferred by the lecturers. These findings align with the observation that combining teaching methods is often more effective in accommodating varying learning styles and objectives.

Figure 3.4: Teaching Methods Preferred by Lecturers



3.1.10.2 Methods of teaching least enjoyed by lecturers.

Lecturers were asked which method(s) teaching of Mathematics do they enjoy least in teaching Mathematics. Table 3.13 below presents their responses.

Table 3.13: Teaching methods Least Enjoyed by Lecturers.

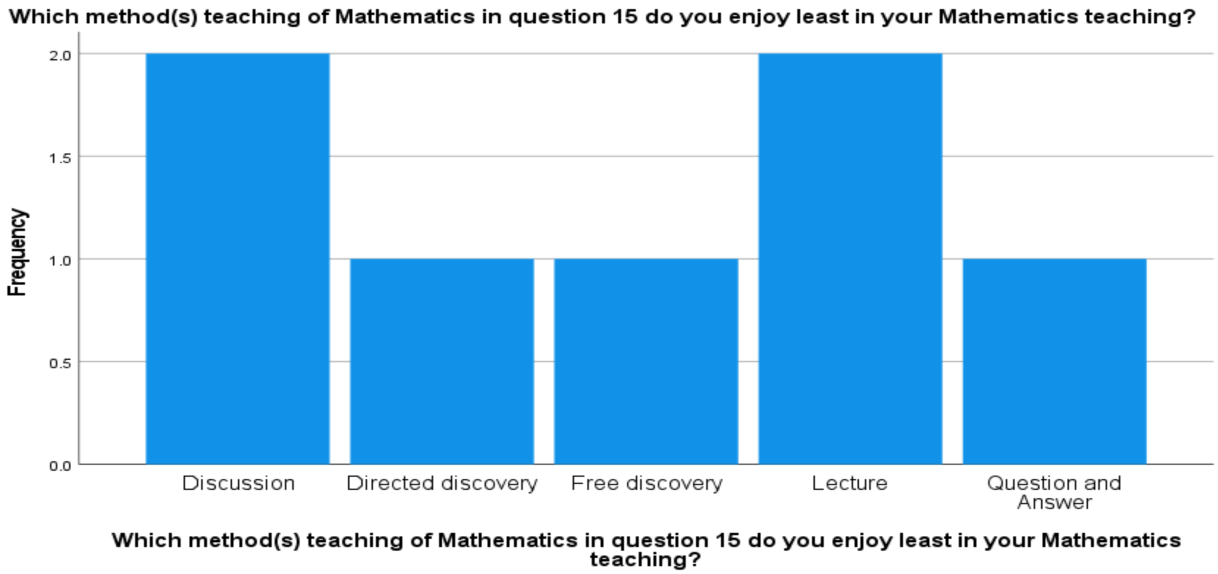
Method	Frequency	Percentage
Discussion	2	28.6
Direct Discovery	1	14.3
Free Discovery	1	14.3
Lecture	2	28.6
Questions and Answers	1	14.3

The table above presents the responses of lecturers regarding the teaching methods they least enjoy. The results indicate that 2 lecturers (approximately 28.6%) least enjoy the discussion method, 1 lecturer (approximately 14.3%) least enjoys the direct discovery method, another 1 lecturer (approximately 14.3%) least enjoys the free discovery method, 2 lecturers (approximately

28.6%) least enjoy the lecture method, and 1 lecturer (approximately 14.3%) least enjoys the questions-and-answers method.

Figure 3.5 below further corroborates the findings from Table 3.13. It illustrates that 2 lecturers least enjoy the discussion method, 1 lecturer least enjoys the direct discovery method, 1 lecturer least enjoys the free discovery method, 2 lecturers least enjoy the lecture method, and 1 lecturer least enjoys the questions-and-answers method. These results highlight the rationale behind most lecturers adopting a combination of teaching methods to effectively meet the diverse needs of their students.

Figure 3.5: Teaching Methods Least Enjoyed by Lecturers



3.1.10.3 Lecturers' activities while teaching.

Lecturers were presented with a list of teaching activities they might engage in during their sessions, including working out questions on the board, giving instructions, listening to students' explanations, commenting on students' questions, answering students' questions, asking questions to students, and explaining facts. They were asked to indicate which activities they typically performed. The responses are summarized in Table 3.14.

Table 3.14: Lecturers' activities while teaching

Activities	Response	Frequency	Percentage
Explaining facts (talking)	Yes No	3 4	42.9 57.1
Asking questions	Yes No	3 4	42.9 57.1
Answering questions from students	Yes No	5 2	71.4 28.6
Commenting on students' questions	Yes No	2 5	28.6 71.4

Listening to students' explanations	Yes No	2 5	28.6 71.4
Working out questions on the board	Yes No	5 2	71.4 28.6
Giving instructions	Yes No	4 3	57.1 42.9

Table 3.14 highlights the activities that lecturers engage in while teaching. The results show that 3 lecturers (42.9%) engage in explaining facts, while 4 (57.1%) do not. Similarly, 3 lecturers (42.9%) ask questions, while 4 (57.1%) do not. A majority, 5 lecturers (71.4%), answer students' questions, while 2 (28.6%) do not. In terms of commenting on students' questions, only 2 lecturers (28.6%) engage in this activity, while 5 (71.4%) do not. Likewise, 2 lecturers (28.6%) listen to students' explanations, while 5 (71.4%) do not. Conversely, 5 lecturers (71.4%) work out questions on the board, while 2 (28.6%) do not. Lastly, 4 lecturers (57.1%) give instructions, while 3 (42.9%) do not.

These results clearly indicate that lecturers do not rely on a single activity when teaching. Instead, they combine various activities to enhance lecture delivery and promote effective learning.

3.1.10.4 Teaching Practices as Observed by Students

Teaching practices observed in mathematics classrooms may involve activities such as writing notes without explanation, working out questions on the board, listening to students' explanations, commenting on students' questions, giving instructions, answering questions from students, asking students questions, and explaining facts. Learners were asked to indicate which activities their lecturers typically performed during teaching sessions. Their responses are summarized in Table 3.15.

Table 3.15: Lecturers' activities while teaching as observed by learners

Level of Study	Activities	Response	Frequency	Percentage
100	Explaining facts (talking)	Yes No	25 7	78.1 21.9
	Asking questions	Yes No	14 18	43.75 56.25
	Answering questions from students	Yes No	22 10	68.75 31.25
	Giving instructions	Yes No	10 22	31.25 68.75
	Listening to students' explanations	Yes No	13 19	40.6 59.4
	Commenting on students' questions	Yes No	16 16	50.0 50.0
	Working out questions on the board	Yes No	25 7	78.1 21.9

200	Explaining facts (talking)	Yes No	9 4	69.2 30.8
	Asking questions	Yes No	5 8	38.5 61.5
	Answering questions from students	Yes No	8 5	61.5 38.5
	Giving instructions	Yes No	4 9	30.8 69.2
	Listening to students' explanations	Yes No	4 9	30.8 69.2
	Commenting on students' questions	Yes No	3 10	23.1 76.9
	Working out questions on the board	Yes No	12 1	92.3 7.7

Table 3.15 presents the responses of 100-level and 200-level students regarding their observations of lecturers' activities while teaching.

100-Level Students
Among the 100-level students, 25 (78.1%) agreed that lecturers engaged in explaining facts, while 7 (21.9%) disagreed. Fourteen students (43.75%) observed that lecturers asked questions, whereas 18 (56.25%) did not. A majority of 22 students (68.75%) noted that lecturers answered students' questions, while 10 (31.25%) did not. Regarding giving instructions, 10 students (31.25%) agreed that lecturers engaged in this activity, while 22 (68.75%) disagreed. Thirteen students (40.6%) believed that lecturers listened to students' explanations, whereas 19 (59.4%) did not. An equal number of students, 16 (50%), observed that lecturers commented on students' questions, while the other 16 (50%) disagreed. Finally, 25 students (78.1%) agreed that lecturers worked out questions on the board, while 7 (21.9%) did not.

200-Level Students
For the 200-level students, 9 (69.2%) observed that lecturers engaged in explaining facts, while 4 (30.8%) did not. Five students (38.5%) noted that lecturers asked questions, whereas 8 (61.5%) disagreed. Eight students (61.5%) agreed that lecturers answered students' questions, while 5 (38.5%) did not. Regarding giving instructions, 4 students (30.8%) observed that lecturers engaged in this activity, while 9 (69.2%) did not. Similarly, 4 students (30.8%) believed that lecturers listened to students' explanations, while 9 (69.2%) disagreed. Only 3 students (23.1%) observed that lecturers commented on students' questions, whereas 10 (76.9%) disagreed. Finally, 12 students (92.3%) agreed that lecturers worked out questions on the board, while 1 (7.7%) did not. These observations by students highlight that lecturers employ a variety of activities to ensure effective teaching of mathematics in the Department of Mathematics at Plateau State University, Bokkos.

3.1.11 Students' Activities While Learning Mathematics

Students may engage in various activities while learning mathematics, such as listening to fellow students' explanations, copying notes, asking fellow students questions, asking the lecturer questions, answering fellow students' questions, answering the lecturer's questions, and listening to the lecturer's explanations. Students were asked to indicate the activities they typically engaged in while learning mathematics. Their responses are summarized in Table 3.16.

Table 3.16: Students' activities while learning

Level of Study	Activities	Response	Frequency	Percentage
100	Listening to lecturers explanations	Yes No	30 2	93.75 6.25
	Answering lecturer's questions	Yes No	18 14	56.25 43.75
	Answering fellow students' question	Yes No	6 26	18.75 81.25
	Asking lecturers questions	Yes No	24 8	75.0 25.0
	Asking fellow students' questions	Yes No	9 23	28.1 71.9
	Copying note	Yes No	17 15	53.1 46.9
	Listening to fellow student' explanation	Yes No	3 29	9.4 90.6
200	Listening to lecturers explanations	Yes No	13 0	100 0
	Answering lecturer's questions	Yes No	8 5	61.5 38.5
	Answering fellow students' question	Yes No	4 9	30.8 69.2
	Asking lecturers questions	Yes No	7 6	53.8 46.2
	Asking fellow students' questions	Yes No	3 10	23.1 76.9
	Copying note	Yes No	3 10	23.1 76.9
	Listening to fellow student' explanation	Yes No	13 0	100 0

The table above summarizes the responses of 100-level and 200-level students regarding their activities while learning mathematics.

100-Level Students

Among the 100-level students:30 students (93.75%) agreed that they listen to lecturers' explanations, while 2 (6.25%) disagreed, 18 students (56.25%) reported answering questions from lecturers, while 14 (43.75%) did not. Only 6 students (18.75%) indicated that they answer questions from fellow students, while 26 (81.25%) did not. A majority of 24 students (75%) said they ask lecturers questions, while 8 (25%) did not.9 students (28.1%) agreed that they ask fellow students questions, while 23 (71.9%) disagreed.17 students (53.1%) said they copy notes, while 15 (46.9%) did not. Lastly, only 3 students (9.4%) reported listening to fellow students' explanations, while 29 (90.6%) did not.

200-Level Students

For the 200-level students: All 13 students (100%) agreed that they listen to lecturers' explanations.8 students (61.5%) indicated that they answer questions from lecturers, while 5 (38.5%) did not.4 students (30.8%) said they answer questions from fellow students, while 9 (69.2%) disagreed.7 students (53.8%) reported asking lecturers questions, while 6 (46.2%) did not.3 students (23.1%) said they ask fellow students questions, while 10 (76.9%) disagreed. Similarly, 3 students (23.1%) agreed that they copy notes, while 10 (76.9%) did not. Finally, 3 students (23.1%) reported listening to fellow students' explanations, while 10 (76.9%) did not.
These findings demonstrate that students engage in a variety of activities to enhance their understanding of mathematics.

3.1.12 Budgetary Allocation to the School

Information about the funds allocated to different faculties in the university was unavailable. However, the Department of Mathematics and the Faculty of Natural Sciences indicated that the budgetary allocation was insufficient to purchase reference books for the departmental library and other necessary resources. According to the Dean of the Faculty, the limited budget has hindered the acquisition of up-to-date materials and resources for teaching. This issue has also contributed to overcrowded lecture rooms and inadequate conveniences, which negatively impact the learning environment.

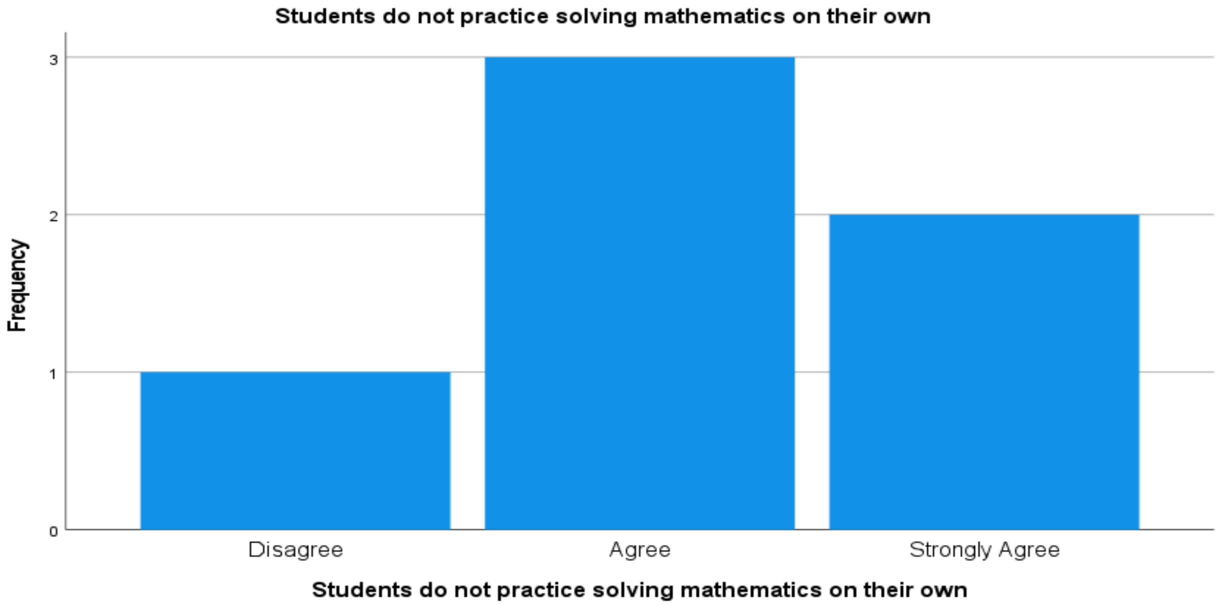
3.2 Challenges Faced by PLASU Mathematics Lecturers When Teaching

This section outlines the challenges faced by mathematics lecturers at Plateau State University (PLASU). A total of seven mathematics lecturers (N=7) participated in the study. The section begins with an exploration of lecturers' perceptions of students' study patterns in mathematics and the availability of mathematics resources. It then examines lecturers' views on students' attitudes, their foundational knowledge in mathematics, and their preparedness for studying mathematics at the university level.

3.2.1 Students' Practices in Mathematics

Lecturers were asked whether they believed that students do not practice solving mathematics problems independently during their study time. The responses are illustrated in **Figure 3.6**.

Figure 3.6: Students do not practice solving problems on their own

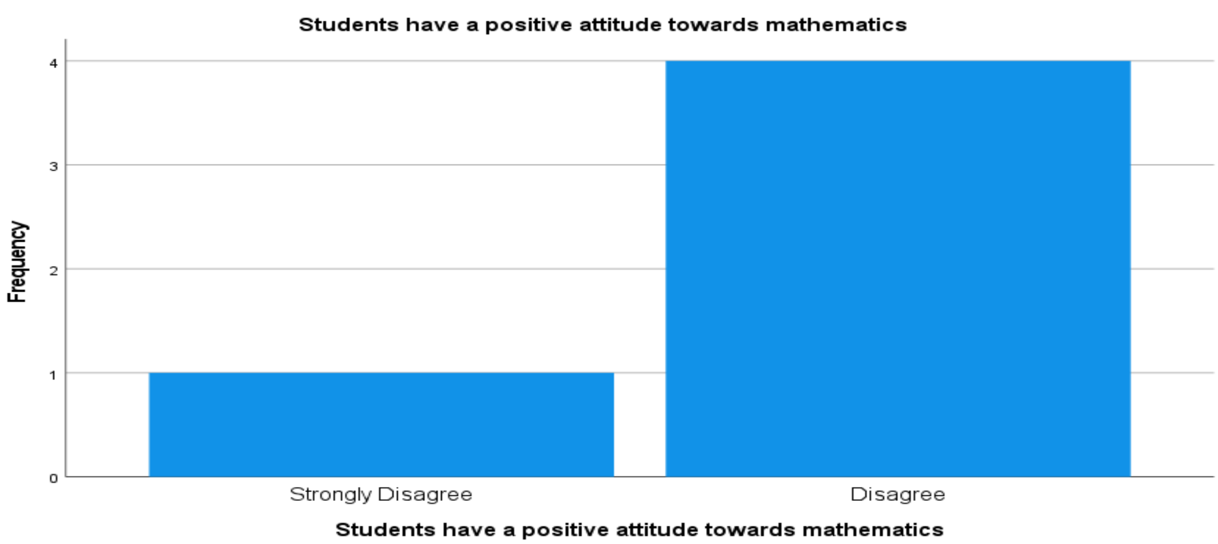


From the figure above, out of the 6 lecturers that responded to this question, 1 disagreed which means he/she believes that students practice solving mathematics questions on their own, 3 greed that students do not practice solving mathematics on their own and 2 strongly agreed that students do not practice solving mathematics on their own. Here, majority of lecturers believe that students do not practice solving mathematics on their own.

3.2.2 Attitude of students towards Mathematics

Lecturers were asked about their perception on the attitude of their students towards mathematics. Their perceptions of the statement "Students have a positive attitude towards mathematics" are shown in Figure 3.7.

Figure 3.7: Lecturers' perception on whether students have a positive attitude



The figure above illustrates the responses of five lecturers regarding their perceptions of students' attitudes toward mathematics. Among the lecturers, one strongly disagreed that students have a positive attitude toward mathematics, while the remaining four disagreed. These findings suggest that students generally do not exhibit a positive attitude toward mathematics. This negative attitude could stem from the fact that most students enrolled in the mathematics program at PLASU did not initially apply for the course; instead, they were assigned mathematics as their field of study and had no alternative options.

3.2.3 Foundation in Mathematics of students from secondary school

The lecturers' perception of the statement "Students have a poor foundation in mathematics from secondary school" are summarized in figure 3.8. The majority of the lecturers agreed with this statement as shown.

Figure 3.8: Lecturers' perception on whether students have a poor foundation

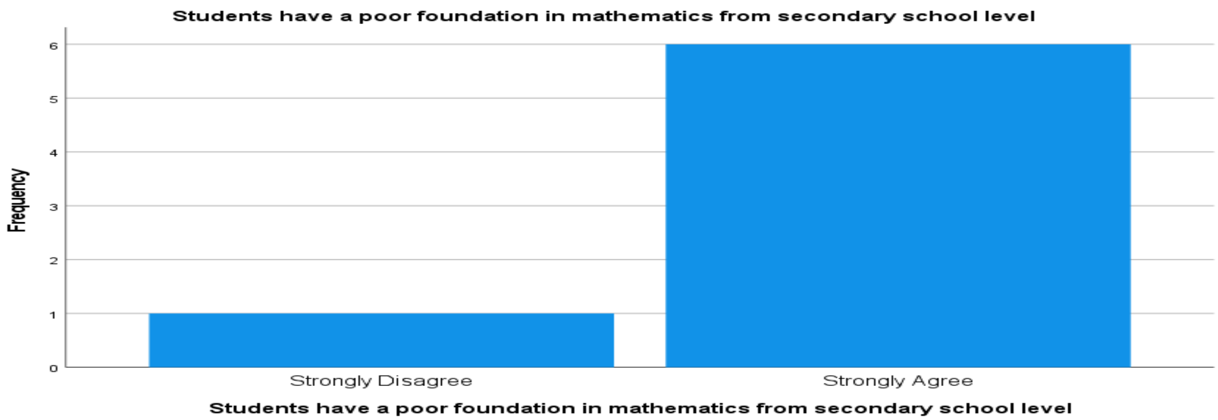
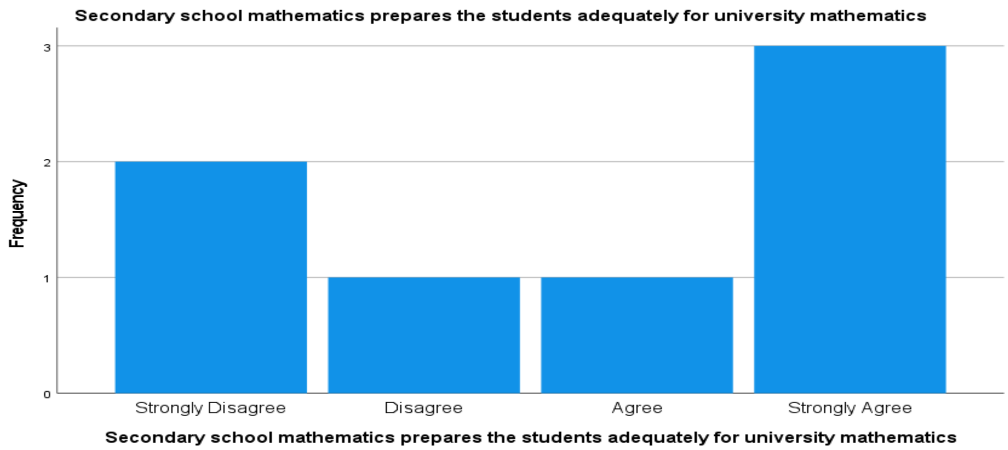


Figure 3.8 presents the perceptions of seven lecturers regarding whether students have a poor foundation in mathematics from their secondary school education. Of the seven lecturers, only one strongly disagreed with the statement that students have a poor foundation in mathematics at this level. Conversely, six lecturers strongly agreed, highlighting the prevalence of weak foundational knowledge among students. This outcome aligns with observations within the Mathematics Department at PLASU, where many students demonstrate insufficient preparation in mathematics from their secondary school experience.

3.2.4 Preparedness to Study University Mathematics

Lecturers were also asked to express their views on whether secondary school mathematics sufficiently prepared students for the challenges of university-level mathematics. Their perceptions of the statement, "Secondary school mathematics prepared students adequately for university mathematics," are illustrated in Figure 3.9.

Figure 3.9: Secondary school mathematics prepared students adequately



The figure above illustrates the perceptions of seven lecturers on whether secondary school mathematics adequately prepares students for university mathematics. Among them, two lecturers strongly disagreed, one disagreed, one agreed, and three strongly agreed with the statement. Overall, three out of the seven lecturers disagreed, while four agreed, indicating a divided opinion on the adequacy of secondary school mathematics in preparing students for university-level challenges.

3.3 Challenges Faced by PLASU Students in Learning Mathematics

This section examines the challenges students encounter while learning mathematics at PLASU. It begins with an analysis of students' attitudes toward mathematics, the classroom environment, and the impact of the lack of on-campus accommodation on their mathematics studies. The section concludes by exploring the activities lecturers and students engage in during mathematics lessons and highlighting challenges specific to first-year students.

3.3.1 Attitude of Students towards Mathematics

This subsection presents the responses provided by students to three statements concerning their attitudes toward mathematics. The detailed responses to these statements are summarized in Table 3.17.

Table 3.17: Attitudes of students towards mathematics

Level of study	Attitude	Strongly Disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)
100	Mathematics is for selected few	9(28.1)	5(15.6)	15(46.9)	3(9.4)
	I am not naturally good in Mathematics	6(18.8)	6(18.8)	19(59.4)	1(3.1)
	I am confident in a Mathematics class	1(3.1)	5(15.6)	20(62.5)	6(18.8)
200	Mathematics is for selected few	3(23.1)	2(15.4)	2(15.4)	6(46.2)
	I am not naturally good in Mathematics	1(7.7)	7(53.8)	2(15.4)	3(23.1)
	I am confident in a Mathematics class	2(15.4)	1(7.7)	7(53.8)	3(23.1)

The table below presents the attitudes of students from 100 level, 200 level towards mathematics. Starting with the 100-level students, their responses to the statement that mathematics is for a selected few were as follows: 9 students (28.1%) strongly disagreed, 5 (15.6%) disagreed, 15 (46.9%) agreed, and 3 (9.4%) strongly agreed. In total, 18 students (56.3%) agreed that mathematics is for a selected few. Additionally, regarding the statement that they are not naturally good at mathematics, 6 students (18.8%) strongly disagreed, 6 (18.8%) disagreed, 19 (59.4%) agreed, and 1 (3.1%) strongly agreed. Here, a majority of the learners, 20 (62.5%), agreed that they are not naturally good at mathematics. Finally, in response to the statement that they are confident in mathematics class, 1 student (3.1%) strongly disagreed, 5 (15.6%) disagreed, 20 (62.5%) agreed, and 6 (18.8%) strongly agreed. Overall, 26 students (81.3%) expressed a lack of confidence in mathematics class.
For the 200-level students, 3 students (23.1%) strongly disagreed, 2 (15.4%) disagreed, 2 (15.4%) agreed, and 6 (46.2%) strongly agreed that mathematics is for a selected few. Here, the majority, 8 students (61.6%), agreed with this statement. Regarding the statement that they are not naturally good at mathematics, 1 student (7.7%) strongly disagreed, 7 (53.8%) disagreed, 2 (15.4%) agreed, and 3 (23.1%) strongly agreed. In this case, the majority, 8 students (61.5%), disagreed with the statement. Lastly, in response to the statement about confidence in mathematics class, 2 students (15.4%) strongly disagreed, 1 (7.7%) disagreed, 7 (53.8%) agreed, and 3 (23.1%) strongly agreed. Overall, 10 students (76.9%) indicated a lack of confidence in mathematics class.

3.3.2 Transition and Mathematics Foundation

This section begins by examining the preparedness of first-year mathematics students to undertake university-level mathematics and concludes by discussing the teaching and learning environment at the university.

3.3.2.1 Preparedness to Study University Mathematics

Students were asked to indicate whether the mathematics they learned in secondary school adequately prepared them for the challenges of university mathematics. The responses to the statement, “Secondary school mathematics prepared me adequately for university mathematics,” are presented in Table 3.18.

Table 3.18: Preparation of secondary school mathematics

Level of study	Strongly Disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)
100	4(12.5)	6(18.8)	14(43.8)	8(25.0)
200	1(7.7)	2(15.4)	6(46.2)	4(30.8)

Table 3.18 summarizes the responses of 100-level and 200-level students when asked whether secondary school mathematics adequately prepared them for university mathematics. Among the 32 students in 100 level who participated, 4 students (12.5%) strongly disagreed, 6 (18.8%) disagreed, 14 (43.8%) agreed, and 8 (25%) strongly agreed. The majority, 22 students (68.8%), agreed that secondary school mathematics prepared them adequately for university mathematics.
For the 13 students in 200 level who responded, 1 student (7.7%) strongly disagreed, 2 (15.4%) disagreed, 6 (46.2%) agreed, and 4 (30.8%) strongly agreed. Similarly, the majority, 10 students (77%), agreed that their secondary school mathematics education adequately prepared them for the rigors of university mathematics.

3.3.3 Teaching and Learning Environment at University

When students transition to university, they often experience a newfound “freedom” that allows them to engage in activities previously restricted in secondary school. Table 3.19 presents the responses to the statement, “Freedom at university interferes with my studies in mathematics.

Table 3.19: Freedom at university interferes with studies

Level of study	Never (%)	Sometimes (%)	Often (%)	Always (%)
100	11(42.3)	12(46.2)	3(11.5)	0(0)
200	4(36.4)	7(63.6)	0(0)	0(0)

Table 3.19 presents the responses of 100-level and 200-level students when asked whether the freedom experienced at university interferes with their study of mathematics.
Among the 26 100-level students who responded, 11 students (42.3%) stated that freedom at the university has never interfered with their studies, 12 (46.2%) indicated that it sometimes interfered, and 3 (11.5%) reported that it often interfered.
For the 11 200-level students who answered this question, 4 students (36.4%) said that freedom at the university never interfered with their studies, while 7 students (63.6%) noted that it sometimes interfered.
Overall, a majority of students across both levels acknowledged that freedom at the university has, at some point, interfered with their studies. However, 200-level students appeared to be less affected by such distractions compared to 100-level students, possibly due to their greater familiarity with and adjustment to university life.

3.3.3.1 Learning in a Large Class

Students were also asked if they feel intimidated when learning in large classes. Their responses are summarized in Table 3.20.

Table 3.20: Intimidated by learning in a large class

Level of study	Never (%)	Sometimes (%)	Often (%)	Always (%)
100	4(12.5)	17(53.1)	4(12.5)	7(21.9)
200	4(30.8)	7(53.8)	1(7.7)	1(7.7)

Table 3.20 summarizes the responses of 100-level and 200-level students regarding whether they feel intimidated when learning in large classes.
Among the 100-level respondents, 4 students (12.5%) indicated that they never feel intimidated learning in a large class, 17 students (53.1%) reported sometimes feeling intimidated, 4 students (12.5%) stated they often feel intimidated, and 7 students (21.9%) said they always feel intimidated in such settings.

For the 200-level students, 4 respondents (30.8%) said they never feel intimidated, 7 students (53.8%) reported sometimes feeling intimidated, while 1 student (7.7%) each stated that they often or always feel intimidated in large classes.

3.3.3.2 Physical Classroom Environment

Students were asked about the adequacy of classroom furniture and whether they could clearly hear their lecturers from any seating position in the classroom while learning mathematics. Table 3.21 presents their responses.

Table 3.21: Physical classroom environment

Level of study	Statement	Never (%)	Sometimes (%)	Often (%)	Always (%)
100	There are enough furniture	22(68.8)	7(21.9)	1(3.1)	2(6.3)
	I could hear clearly	5(15.6)	22(68.8)	2(6.3)	3(9.4)
200	There are enough furniture	10(76.9)	2(15.4)	0(0)	1(7.7)
	I could hear clearly	4(30.8)	7(53.8)	1(7.7)	1(7.7)

The table above summarizes the responses of 100-level and 200-level students when asked about the availability of furniture in their lecture halls and their ability to hear clearly from various parts of the classroom.
Among the 100-level respondents, 22 students (68.8%) reported that there was never enough furniture, 7 students (21.9%) said there was sometimes enough furniture, 1 student (3.1%) stated there was often enough furniture, and 2 students (6.3%) noted that there was always enough furniture. Regarding their ability to hear clearly, 5 students (15.6%) stated that they never hear clearly, 22 (68.8%) said they sometimes hear clearly, 2 (6.3%) mentioned they often hear clearly, and 3 (9.4%) noted they always hear clearly.
For the 200-level students, 10 respondents (76.9%) indicated that there was never enough furniture, 2 (15.4%) said there was sometimes enough furniture, and 1 (7.7%) noted that there was always enough furniture. Concerning their ability to hear clearly, 4 students (30.8%) stated that they never hear clearly, 7 (53.8%) mentioned they sometimes hear clearly, 1 (7.7%) said they often hear clearly, and 1 (7.7%) noted they always hear clearly.
In general, the responses from both levels highlight significant challenges regarding the availability and condition of furniture in classrooms. Many students also reported difficulties

hearing their lecturers clearly from different parts of the class, exacerbating the learning challenges.

3.3.3.3 Availability of Accommodation on Campus

Students were asked whether they were accommodated on campus. Table 3.22 displays the number of students accommodated on campus and those who were not, with respective percentages indicated in brackets. The responses are presented according to the year of study, providing insights into which year group was most affected by the lack of accommodation.

Table 3.22: Students accommodation on campus

Level of study	Statement	Yes (%)	No (%)
100	I am accommodated on campus	9(29.0)	22(71.0)
	Lack of accommodation affect my study of Mathematics	5(23.8)	16(76.2)
200	I am accommodated on campus	6(46.2)	7(53.8)
	Lack of accommodation affect my study of Mathematics	4(57.1)	3(42.9)

The table above summarizes the responses of 100-level and 200-level students regarding the availability of on-campus accommodation and its impact on their study of mathematics.
Among the 100-level students, 9 respondents (29%) indicated that they were not accommodated on campus, while 22 (71%) said they were. When asked if the lack of accommodation affected their study, 5 students (23.8%) said yes, while 16 (76.2%) said no. At PLASU, all 100-level students are entitled to hostel accommodation, and those who were not accommodated on campus likely chose not to stay there. The results suggest that for most 100-level students, the lack of on-campus accommodation does not significantly impact their study of mathematics.
For the 200-level students, 6 respondents (46.2%) reported not being accommodated on campus, while 7 (53.8%) stated they were. When asked if the lack of accommodation affected their study, 4 students (57.1%) said yes, while 3 (42.9%) said no. Unlike the 100-level students, 200-level students are not guaranteed on-campus accommodation but can be accommodated based on space availability.

3.3.4.1 Students' Practices in Mathematics

Students were asked whether they practiced solving mathematics problems independently and whether they practiced solving mathematics problems in groups with their course mates. Table 3.23 presents their responses.

Table 3.23: Solving mathematics problems

Level of study	Statement	Never (%)	Sometimes (%)	Often (%)	Always (%)
100	I practice solving Math problems on my own	3(9.4)	6(18.8)	4(12.5)	19(59.4)
	I practice solving Math problems in groups	4(12.5)	11(34.4)	8(25.0)	9(28.1)
200	I practice solving Math problems on my own	0(0)	3(23.1)	1(7.7)	9(69.2)
	I practice solving Math problems in groups	1(7.7)	9(69.2)	1(7.7)	2(15.4)

The table above summarizes the responses of 100-level and 200-level students when asked about their practices in solving mathematics problems, both individually and in groups.
Among the 100-level students, when asked if they practice solving mathematics problems on their own, 3 students (9.4%) stated they never do, 6 students (18.8%) said they sometimes do, 4 students (12.5%) mentioned they often do, and 19 students (59.4%) reported they always do. When asked about practicing in groups, 4 students (12.5%) said they never do, 11 students (34.4%) said they sometimes do, 8 students (25%) indicated they often do, and 9 students (28.1%) said they always do. These responses suggest that a significant number of 100-level students actively engage in both individual and group practices for solving mathematics problems.
For the 200-level students, when asked about practicing mathematics problems on their own, 3 students (23.1%) said they sometimes do, 1 student (7.7%) said they often do, and 9 students (69.2%) stated they always do. Regarding practicing in groups, 1 student (7.7%) said they never do, 9 students (69.2%) mentioned they sometimes do, 1 student (7.7%) indicated they often do, and 2 students (15.4%) said they always do. These results also indicate that most 200-level students actively practice solving mathematics problems both individually and in groups.

3.3.4.2 Students' Participation in Class

Students were asked whether they are allowed to ask questions freely in class, especially when they need clarification, and whether they can voice their opinions freely. Table 3.24 presents their responses.

Table 3.24: Students' participation in class

Level of study	Statement	Never (%)	Sometimes (%)	Often (%)	Always (%)
100	Allowed to asked questions in class freely	0(0)	6(18.8)	3(9.4)	23(71.9)
	Allowed to voice opinion in class freely	4(12.5)	9(28.1)	3(9.4)	16(50.0)
200	Allowed to asked questions in class freely	0(0)	4(30.8)	0(0)	13(69.2)
	Allowed to voice opinion in class freely	0(0)	7(53.8)	3(23.1)	3(23.1)

The table above shows the responses of 100-level and 200-level students when asked if they are allowed to ask questions and voice their opinions freely in class.

Among the 100-level students, 6 respondents (18.8%) said they are sometimes allowed to ask questions freely in class, 3 (9.4%) said they are often allowed to ask questions, and 23 (71.9%) said they are always allowed to ask questions. When asked if they are allowed to voice their opinions freely in class, 4 students (12.5%) said they are never allowed, 9 students (28.1%) said they are sometimes allowed, 3 (9.4%) said they are often allowed, and 16 (50%) said they are always allowed to voice their opinions. Overall, a majority of 26 students (81.3%) reported being allowed to ask questions, while 19 students (59.4%) said they are allowed to voice their opinions freely in class.

For the 200-level students, 4 respondents (30.8%) said they are sometimes allowed to ask questions freely, while 13 (69.2%) said they are always allowed to ask questions. Regarding voicing their opinions, 7 students (53.8%) said they are sometimes allowed to voice their opinions, 3 (23.1%) said they are often allowed, and 3 (23.1%) said they are always allowed. The results show that a larger proportion of 200-level students (69.2%) are allowed to ask questions freely, though fewer (46.8%) reported being allowed to voice their opinions freely.

3.3.4.3 Respect for the Student

Students were asked if they feel respected by their lecturers as learners. Their responses to the statement "Lecturer respects me as a learner" are shown in Table 3.25 below.

Table 3.25: Lecturer respects me as a learner

Level of study	Strongly Disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)
100	1(3.2)	1(3.2)	17(54.8)	12(38.7)
200	1(7.7)	1(7.7)	8(61.5)	3(23.1)

Table 3.25 presents the responses of 100-level and 200-level students when asked if they feel respected by their lecturers as learners.

For the 100-level students, 1 student (3.2%) strongly disagreed, 1 student (3.2%) disagreed, 17 students (54.8%) agreed, and 12 students (38.7%) strongly agreed that lecturers respect them as students.

For the 200-level students, 1 student (7.7%) strongly disagreed, 1 student (7.7%) disagreed, 8 students (61.5%) agreed, and 3 students (23.1%) strongly agreed that lecturers respect them as students.

In general, the majority of students at both levels agreed that they are respected by their lecturers. For the few students who did not agree, it is likely that they had a negative experience with a particular lecturer. However, overall, it can be concluded that lecturers in the Department of Mathematics at PLASU do respect their students as learners.

4. FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This section explores the findings of the study, which examines the teaching and learning conditions of mathematics at PLASU, and the challenges faced by both lecturers and students. The discussion is organized according to the research objectives, specifically: the teaching and learning conditions, the challenges faced by lecturers, and those faced by students.

4.1. Findings

4.1.1. Teaching and Learning Conditions at PLASU

1. **Qualifications of Mathematics Lecturers:** The study found that most mathematics lecturers at PLASU were well-qualified, with several having over fifteen years of teaching experience and possessing master's-level degrees. However, there was a notable shortage of staff in specialized areas like Real Analysis and Algebra, which posed challenges in effectively covering the full curriculum.
2. **Mathematics Tutorials:** While PLASU provided tutorials for first-year students, the large class sizes of over 80 students negatively impacted their effectiveness. The lack of small-group sessions reduced the opportunities for individual engagement and feedback, which are crucial for improved academic performance.
3. **Teaching Load and Syllabus Completion:** The study revealed that while most lecturers managed to complete the syllabus by the end of the academic year, some struggled due to heavy teaching loads. This issue was compounded by the fatigue of long teaching hours, which left little time for research, professional development, or student consultations.
4. **Student Consultations:** Consultations between lecturers and students were found to be beneficial for individual academic progress. Lecturers reported that these sessions helped students clarify doubts and build rapport, contributing positively to the learning process.
5. **Library and Resources:** PLASU's library provided essential resources, but access was difficult for off-campus students due to safety concerns. The shortage of up-to-date mathematics reference books and journals hindered both lecturers and students in their academic work, forcing reliance on outdated materials.
6. **Assessment Practices:** The study found that while coursework assessments were intended to include two tests per term, many first-year students only took one. This reduced the effectiveness of assessment as a tool for providing feedback and guiding student progress.
7. **Teaching Methods:** The lecture method dominated the teaching approach at PLASU, often limiting student participation and engagement. While effective in delivering content, the lecture method was criticized for its passive nature, which hindered active learning and critical thinking.
8. **Budgetary Constraints:** The study found that insufficient funding affected the department's ability to update resources, such as acquiring new textbooks and subscribing to online journals, which limited the scope of teaching materials available to both lecturers and students.

4.1.2. Challenges Faced by Lecturers

1. **Student Practices and Attitudes:** Lecturers reported that students did not engage in sufficient independent or group-based problem-solving. The lack of practice was compounded by students' negative attitudes and low confidence in their mathematical abilities, making teaching more difficult.
2. **Mathematics Foundation and Preparedness:** Lecturers identified a weak foundation in mathematics among students from secondary school, leading to difficulties in teaching higher-level mathematics. This gap in knowledge was a significant challenge, especially in foundational courses.

4.1.3. Challenges Faced by Students

1. **Transition and Freedom:** The transition from secondary school to university was challenging for first-year students, who experienced a new level of independence and freedom. This shift often resulted in reduced academic discipline and difficulty adjusting to the self-directed nature of university learning.
2. **Mathematics Foundation and Preparedness:** Many students reported that their secondary school mathematics did not adequately prepare them for university-level courses. This lack of preparation made it difficult for students to keep up with the pace of university mathematics.
3. **Physical Classroom Environment:** Students faced challenges such as poor seating arrangements, inadequate ventilation, and difficulty hearing lecturers, especially in larger classrooms. These physical constraints negatively impacted the learning environment.
4. **Accommodation and Commuting:** A significant number of students lived off-campus, which led to difficulties in accessing the campus library and participating in evening study sessions. The time and energy spent commuting affected their academic performance.
5. **Class Participation:** A substantial portion of students felt that they were not respected in class or were discouraged from asking questions during lectures, which affected their engagement and learning experience.

4.2. Conclusions

The study concludes that while PLASU has a qualified teaching staff and basic infrastructure, several factors hinder effective teaching and learning. These include inadequate staffing in specialized areas, large class sizes, lack of resources, and outdated teaching methods. Additionally, the challenges faced by both lecturers and students, including students' lack of practice and poor mathematical foundation, need to be addressed to improve the overall teaching and learning experience.

4.3. Recommendations

1. **Improvement of Resources:** PLASU should invest in acquiring up-to-date mathematics reference materials, journals, and software. Additionally, the university should consider expanding access to library resources and enhancing the physical infrastructure, including lecture halls and hostels.
2. **Revised Teaching Methods:** A shift towards more interactive and student-centered teaching methods, such as group discussions and problem-solving activities, is recommended. This would help engage students more actively and improve their understanding of mathematical concepts.
3. **Reduction of Class Sizes:** To improve the effectiveness of tutorials and individual attention, the university should consider reducing class sizes, particularly for introductory mathematics courses, and increase the number of staff in underrepresented areas like Algebra and Real Analysis.
4. **Support for Student Transition:** The university should provide more support for first-year students to help them adjust to the new academic environment. This can include orientation programs, mentoring, and academic counseling to address issues related to their transition from secondary school.

5. **Improvement of Physical Environment:** The physical learning environment should be improved by adding more seating, improving ventilation, and ensuring that lecture halls are equipped with the necessary technological support, such as public address systems.
6. **Campus Accommodation:** The university should explore solutions to accommodate more students on-campus to reduce the negative impact of commuting and encourage peer study groups.

4.4. Further Research

Future studies could replicate this research at other tertiary institutions in Nigeria to provide a broader understanding of the challenges faced in teaching and learning mathematics across different contexts.

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