International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Paghaw as Sang Kalisod Uncovering the Challenges and Experiences Encountered By Teachers in Teaching Geometry

Kevin John B. Illazar

LPT, MAED, PhD Ed-Math Student, Iloilo State University of Fisheries Science and Technology, Philippines, Senior High School Teacher 3, Department of Education Of Aklan Province, Philippines

Abstract

This descriptive qualitative study examined the challenges and experiences faced by teachers in teaching geometry. The participants in the study were four mathematics teachers with over five years of experience teaching geometry. They were interviewed to share their insights on the challenges, teaching strategies, and significant experiences in teaching the subject. The data collected from the respondents were analyzed using thematic analysis. Key challenges identified by the teachers included students' weak foundational knowledge and lack of conceptual understanding. To address these issues, the teachers employed strategies such as reinforcing foundational concepts and incorporating videos in their teaching. Additionally, geometry teachers had difficulties with curriculum congestion and the difficulty with textbook content within the K-12 geometry curriculum.

Keywords: Challenges in Teaching Geometry, Difficulties in Geometry, Geometry Teachers

1. INTRODUCTION

Geometry is a fundamental branch of mathematics that plays a vital role in our daily lives. It creates connection between everyday experiences and mathematical applications in real life, making it necessary to apply the concepts of mathematics in real life situations (Retnawati, Arlinwibowo & Sulistyaningsih, 2017). Weak understanding on concepts in geometry is a great contributor to student's difficulty in answering geometric-related problems, because basic knowledge in geometry has not been understood by many students (Cesaria & Herman, 2019). In 2022, Philippines once again joined in the Proramme for International Student Assessment (PISA) and the performance of Filipino students in mathematics was at the same with 2018. It is alarming to know that the performance of low-achievers in mathematics becomes stronger, while the performance of high-achievers in mathematics remains the same (OECD, 2023). Filipino students ranked the lowest globally in PISA assessment (Trinidad, 2020). It was observed that students of Lilo-an National High School have poor academic performance in Geometry as reflected in their formative and summative assessments. Moreover, it has also become a challenge to teachers to teach geometry because it requires a high level of abstract reasoning, involves ability to visualize objects, and allows students to picture and manipulate geometric figures in their minds. With the significant role of mathematics in the real-world, it is alarming to know that students' performance is geometry is very low (Adolphus, 2011).

Many studies in teaching geometry have highlighted that the strategies employed by teachers in teaching geometry is ineffective. Addressing this problem to education is very vital. The problem starts with

teacher's difficulty in connecting geometry its application in the real-world. Moreover, they also face challenges in processing information in geometry according to (Sunzuma & Maharaj, 2019).

The role of teachers on giving support to students is important, especially to those who are really struggling in understanding different contexts and reasoning in geometry. This support is highly needed to help student's overcome these difficulties in learning. (Cesaria & Herman, 2019).

This study is intended to uncover teachers' challenges in teaching geometry. In addition, it aimed to improve geometry teaching in school. It would help teachers to employ effective teaching strategies to enhance students' performance in geometry. Moreover, this study would give insights to curriculum developers to take necessary measure to decongest geometry as a subject.

The purpose of this study was to uncover teacher's challenges in teaching geometry. Specifically, it seeks answer to the following problems:

1. What are the experiences of teachers in teaching geometry?
2. What are the difficulties encountered by teachers in teaching geometry?
3. How do teachers help students overcome difficulties in geometry?
4. What are the suggested approaches by geometry teachers in teaching geometry?
5. What are the approaches used by teachers in teaching geometry?

2. Methodology

The participants in this study are four (4) teachers who are currently teaching geometry at Lilo-an National High School. These teachers were selected based on their direct involvement in the delivery of geometry lessons. They are teachers who were teaching geometry for more than 5 years. A questionnaire was developed to gather information regarding the challenges and difficulties these teachers face in teaching geometry. To ensure the validity of the instrument, the questionnaire underwent a validation process by a panel consisting of the school's mathematics coordinator, mathematics teachers, and an English language expert. This step was essential to guarantee the validity of the instrument.

This study employed a qualitative research design, specifically a descriptive qualitative approach. The reason for selecting this method was that it allows an in-depth exploration of the participants' experiences which are best captured through written or verbal expressions. By using a qualitative approach, the study aimed to explore and describe the challenges and difficulties that geometry teachers are facing. (Teherani, et. al, 2015) stated that qualitative research approach involves a systematic investigation of social phenomena within their natural contexts. These phenomena encompass a range of topics, including individuals' life experiences, behaviors of individuals or groups, organizational functioning, and the ways in which interactions influence relationships. In qualitative research, the researcher serves as the primary instrument for data collection, exploring the reasons behind events, understanding what transpires, and interpreting the significance of these events for the participants involved.

To collect data, the researcher conducted semi-structured interviews with the participants. This method allowed for flexible, open-ended responses, encouraging teachers to elaborate on their experiences and provide detailed insights into the specific encounters they face while teaching geometry. The interview data was transcribed and analyzed using thematic analysis.

In identifying and analyzing themes and patterns within the data in a qualitative research, thematic analysis is widely used. This method allowed the researcher to explore systematically the responses of the participants, categorize most occurring themes, and create meaningful insights about participants' experiences in teaching geometry. The findings were presented as key themes that reflect the participants'

shared experiences, as well as any differences in the challenges faced by individual teachers. The results were presented as themes that represents teachers' challenges faced in teaching geometry, as well as their shared significant experiences in teaching, in general.

This methodology provided a comprehensive understanding of the obstacles that teachers face in teaching geometry, thus contributing to potential improvements in teaching practices and curriculum design.

3. Results and Discussions

Results and Discussion of this study were divided into five (5) parts. (1) Challenges and Difficulties Faced by Teachers in Teaching geometry, (2) How Teachers Address Student's Difficulty in Geometry, and (3) Various Teaching Approaches Employed by Teachers in Teaching (4) Suggested Approaches by Geometry Teachers in Teaching Geometry (5) Experiences of Teachers in K to 12 Curriculum.

Challenges and Difficulties Faced by Teachers in Teaching Geometry

The five (5) challenges and difficulties encountered by teachers were identified as (1) Weak Foundational Knowledge, (2) Challenges in Reasoning and Visualization, (3) Difficulty in Proving Theorems, (4) Students' Readiness and Engagement and (5) Lack of Conceptual Understanding.

Weak Foundation in Geometry

Teachers mentioned that students are having problems in proving theorems and understanding basic topics in geometry. These gaps hinder them to obtain the correct answer in solving problems in geometry. Likewise, they have difficulty in understanding higher concepts in geometry like theorems and proofs.

Teacher B mentioned: "The topics that I have difficulty in teaching are the following: Theorems and proving. In theorems and proving, maybe because they lack understanding of basic concepts, they were not that good at logical reasoning and struggled to visualize and connect theorems to practical applications. "Teacher D added: "Lack of basics, since proving applies higher mathematics".

Mathematics teachers identified that students are having difficulty realizing the basic concepts mathematics. This learning gap hinders them to develop skills in reasoning, perceiving and connecting between the topics and their knowledge while solving problems in geometry. The low performance of students in mathematics in all levels remains a critical concern to educators. The low-level mathematical achievement among high school students is very evident particularly in Grade 8 students according to (Rabab'h, Veloo and & Perumal, 2015).

Challenges in Logical Reasoning and Visualization

Most students have difficulty in dealing with logical reasoning and visualization. With that, teachers are struggling in teaching geometric proofs and theorems. Teaching becomes more challenging when students cannot appreciate the connection of geometry knowledge and its practical application in the real-world.

Teacher C asserted "students often struggle with analyzing the given information, formulating clear statements and reasons, and organizing their thoughts to ultimately reach a valid conclusion".

Teacher B highlighted: "In theorems and proving, maybe because they lack understanding of basic concepts, they were not that good at logical reasoning and struggled to visualize and connect theorems to practical applications. "

Gal & Linchevski (2010) asserted that the mental representation of an object in the observer's mind is constructed through the process of mental "cuttings" or decompositions of the original physical object. These mental decompositions break the object into distinct parts. The way students perceive and interpret mental images has a vital role in students' skill to solve geometric problems correctly.

Difficulty with Proving Theorems

Proving theorems emerges as a challenge to mathematics teachers. Students find it difficult to analyze given information, formulate valid statements, and organize their reasoning to reach logical conclusions. This results in challenges for teachers in guiding students through the process of geometric proof.

Teacher B mentioned: "In theorems and proving, maybe because they lack understanding of basic concepts, they were not that good at logical reasoning and struggled to visualize and connect theorems to practical applications."

According to Teacher C: "Students often struggle with analyzing the given information, formulating clear statements and reasons, and organizing their thoughts to ultimately reach a valid conclusion".

Jones & Tzekaki (2016) found that students who were new in deductive proof in geometry often struggled with understanding the overall logical structure of proofs. Specifically, low performing students focus on repeating the steps from previous examples, rather than understanding the underlying principles. As a result, these students were unable to effectively apply their knowledge when constructing proofs.

Recently, dealing geometric proofs has become as a significant challenge for students who appear to have difficulty developing this skill. Students struggle with analyzing the geometric properties presented in the form of theorems. Moreover, several studies have shown that students' ability to verify geometric proofs has not yet reached the expected level, and they continue to face difficulties in constructing formal proofs (Perbowo, 2019).

Students' Readiness and Engagement

Teachers face challenges related to students' preparedness for learning complex geometric topics. Students' lack of patience and insufficient basic mathematical skills, particularly in relation to proofs, make it difficult to engage them fully in more advanced topics. Additionally, proving theorems requires analytical thinking and extended solutions, which students may find difficult and overwhelming.

Teacher B highlighted: "Students are not ready to proceed to the next lesson in geometry because they have difficulty."

Teacher D asserted: "the readiness of the students in learning the topics".

As emphasized by Boland (2015), it is crucial to recognize that there are different levels of geometric thinking, and that teachers can play a significant role in guiding students through these levels. Teachers should allow students more time to reason through problems, rather than quickly providing solutions. It is not only important for students to be able to solve problems, but also essential that they can articulate the reasoning behind their answers. Providing students with opportunities to explore, discuss, reason, and make sense of concepts is vital, especially when offering rich, kinesthetic experiences that encourage students to discover mathematical procedures and rules, rather than merely memorizing them.

Lack of Conceptual Understanding

Teachers mentioned that their own understanding of basic geometric concepts, including logical reasoning and connecting theorems to real-world applications, can impact their ability to effectively teach geometry, particularly in areas like proving theorems. This theme highlights how foundational knowledge affects both teaching and learning in geometry.

Teacher B stated: "The topics that I have difficulty in teaching are the following: Theorems and proving. In theorems and proving, maybe because They lacked understanding of basic concepts, wasn't that good at logical reasoning and struggled to visualize and connect theorems to practical applications.

Teacher A mentioned: "Students are having problems with the basic concepts in geometry. Therefore, they have difficulty in understanding the basic concepts of geometry."

The difficulties students face in geometry can be attributed to several factors. These include a lack of solid understanding of concepts relevant to geometric and other mathematical problems, as well as a weak ability to extract insights in geometry. Additionally, students often struggle to fully utilize the information provided in geometry problems and experience difficulties in visualizing the intent or insights of the test questions. Another challenge is students' limited ability to apply geometric concepts to similar cases or previously encountered problems. Furthermore, students often face confusion when attempting to integrate different geometric concepts, and many rely heavily on rote memorization of formulas (Retnawati & Arlinwibowo, 2017).

How Teachers Address Students' Difficulty in Geometry

How teachers address difficulty of students in geometry was divided into five (5) parts. This includes (1) Peer-teaching, (2) The Use of Video in teaching Geometry, (3) Building Strong Foundation, and (4) Mastery Before Progression.

Peer-teaching

Teachers utilize peer-tutoring and peer-teaching strategies to foster active engagement and mutual support among students. By encouraging students to collaborate and discuss concepts, teachers help them reinforce their understanding and learn from one another.

When asked about how do they address students' difficulty in geometry,

Teacher A said: "Peer-tutoring, actively engaged learners in the discussion."

Teacher D stated: "Applying more knowledgeable approach which is peer teaching)".

Peer teaching promotes student accountability in their learning process, fostering the development of self-regulation. This approach has the potential to enhance learning outcomes, as it involves tasks that require active student engagement and encourages reflection on the quality of their work, leading to continuous improvement (Omar, Shahrill & Sajali, 2018).

The use Videos in Teaching Geometry

Teachers make use of external resources, such as video tutorials on platforms like YouTube, to provide additional explanations and alternative approaches to geometric concepts. This shows a commitment to supplementing traditional instruction with accessible, self-paced learning tools.

Teacher C stated: "I do watch video tutorials on YouTube".

Teacher B added: "Also, if the topics are really hard for students to understand, I incorporate videos in teaching."

The study conducted by Abu & Abidin (2013) found that the use of video in teaching geometry significantly enhance students' academic performance in the subject. This improvement was evident in the increase in their geometry scores following the integration of video-based instruction.

Building Strong Foundations

Teachers emphasize the importance of laying a strong foundation in basic geometric principles, particularly theorems and postulates. They focus on simplifying complex concepts by breaking them down into manageable steps and providing ample opportunities for students to practice through examples.

Teacher C mentioned: "By building a strong foundation about theorems and postulates".

Teacher D said: "Going back to basic is one way to help students understand the concepts of geometry."

Students' progress through developmental stages, initially building intuitive and perceptually-based competencies, which they later articulate through various techniques that bridge verbal and abstract thinking. This process helps them develop integrated concrete knowledge of geometry and spatial reasoning. Over time, it becomes not only appropriate but essential to introduce, expand, and guide

students through this learning process (Clements, et.al, 2018).

Mastery Before Progression

Teachers address difficulties by ensuring that students master a topic before moving on to the next. They avoid rushing through content and prioritize mastery of fundamental concepts to ensure that students have a solid understanding before advancing to more complex topics.

Teacher D said: "Not proceeding to the next topic not unless it is not mastered by many students."

Teacher A highlighted: "Making sure that students comprehend the previous lessons before going to the next lessons."

It is crucial to address the mathematics gaps within the middle school curriculum to ensure that all students acquire the necessary knowledge to succeed in geometry. The concepts and topics taught must be clearly understood by students to prevent gaps in the curriculum that could impede their success (Diaz-Reyes, 2024).

Teacher's Approaches Employed in Teaching Geometry

Teacher's approaches used in teaching geometry was divided into five (5) parts. (1) Structured and Logical Instruction, (2) Real-World Connections, (3) Visual and Interactive Learning, (4) Collaborative and Active Learning, (5) Reinforcement Through Practice.

Structured and Logical Instruction. This encompasses the use of the deductive method, where teachers guide students through logical steps and reasoning to arrive at conclusions, fostering a clear and systematic understanding of geometric principles.

When asked about the approaches they use in teaching geometry,

Teacher A responded: "by deductive method."

Teacher D said: "drill and practice, deductive method".

Morales, Rojas & Arnaiz (2022) stated that logical and structured instruction plays a crucial role in developing students' conceptual understanding, judgment, and reasoning in geometry. The application of logical procedures linked to geometric representations has been designed to enhance students' logical thinking skills, specifically through exercises that require them to demonstrate content knowledge in geometry

Real-World Connections. This highlights the use of real-world applications and examples to make geometry relevant and applicable to students' everyday lives, helping them connect abstract concepts to tangible situations.

Teacher B answered: "By using real-world applications, visual aids".

Teacher C said: Use of real-world examples, collaborative teaching, Visual representation Method

Within the field of mathematics, geometry is considered to have the most direct applications to students' real-life experiences. Rumanova and Svecova (2012) suggest that an effective way to engage students is by exploring mathematics in their everyday surroundings. Students should be encouraged to identify mathematical properties, patterns, and geometric shapes in various environments, and in nature (Vidermanova & Vallo, 2015).

Visual Presentation Method. This emphasizes the importance of visual aids, visual representation methods, and interactive learning techniques (such as diagrams, models, and digital tools) in helping students grasp geometric concepts more effectively.

Teacher B said: "by using visual aids."

Teacher C mentioned: Used of real-world examples, collaborative teaching, visual representation method.

In the context of geometrical visualization and visual thinking, research indicates that while the role of

visual processes is crucial in the teaching and learning of space and geometry and it continues to be a significant interest in exploring visual processes, particularly in relation to geometric proving and problem-solving, with a special focus on the use of gestures as a component of visualization according to (Jones & Tzekaki, 2016).

Collaborative and Active Learning. This focuses on the integration of collaborative teaching approaches, where students work together to solve problems, share insights, and learn from one another, promoting deeper understanding and engagement.

Teacher C mentioned: “By collaborative teaching method”.

Teacher D said: “By collaborative approach”.

"Thinking beyond the box" is rarely implemented in practice. However, mathematics teachers are increasingly adopting progressive teaching methods. Collaborative teaching and learning foster a shift in pedagogical approaches by altering teachers' perceptions and enhancing students' ability to work together for more meaningful learning experiences. In this context, progressive education facilitates meaningful learning, helping students achieve desired pedagogical outcomes (Shrestha, 2022).

Reinforcement through Practice. This covers the use of drill and practice methods, which help reinforce geometric concepts through repetition and mastery, ensuring that students solidify their understanding and skills over time.

Teacher D mentioned: “By drill and practice”.

Teacher A said: “giving more examples to students to solve”.

As mentioned by Yazdani & Zebrowski (2006), considering the substantial evidence supporting the effectiveness of reinforcement, it is strongly recommended that teachers must incorporate this feature in teaching geometry. Additionally, in designing student assignments, the teacher must consider integrating this approach.

Suggestions of Teachers to Enhance Instruction in Teaching Geometry

Teachers’ suggestions to enhance Instruction in Geometry was divided into three (3) parts, namely (1) Contextualizing through Real-Life Application, (2) Employing Different Engaging Learning Methods, and (3) Combining Fun with Learning.

Contextualizing through Real-Life Application

Teachers emphasize the importance of helping students visualize geometric concepts by linking lessons to real-life situations. This approach aids in making the material more relatable and tangible, enhancing students' understanding and engagement through problem-solving activities.

Teacher A said: “Help students visualize geometry by contextualizing the lessons. Integration of the lesson in real life situation and through problem solving. Make the lessons engaging through games because when students are having fun, they are more likely to be attentive and motivated.”

Teacher D said: “Integrate materials which are familiar to students in teaching geometry. This will help them understand the application of geometry.”

Contextual teaching and learning are considered one of the most effective methods for helping students make connections between classroom lessons and real-world applications. It is defined as the use of various real-life situations that students encounter in their daily lives to facilitate the transfer of course content. This approach enables students to see the relevance of what they learn and enhances their ability to apply knowledge in practical contexts (Yildiz & Baltaci, 2016).

Employing Different Engaging Learning Methods

Making lessons more engaging through interactive strategies, such as incorporating games, is seen as a

key approach to increasing student attention and motivation. When students enjoy the learning process, they are more likely to stay focused and participate actively.

Teacher C mentioned: "it is always important to incorporate strategies that make lessons more engaging, and foster a deeper understanding and appreciation of the subject among students."

Teacher B said: "Teacher should apply various teaching strategies to help students appreciate the importance of geometry in real life. Games, localization, video-based teaching will help students a lot."

Realistic mathematics education adopts a fundamentally different approach to teaching, focusing on helping students develop their own mathematical understanding. It is grounded in real-world problems, encouraging students to create their own strategies for problem-solving. This approach develops discussions among students, making the learning of geometry more engaging and meaningful. By connecting mathematical concepts to real-life contexts, students are better able to see the relevance of their learning and apply it in practical situations (Vidermanova & Vallo, 2015).

Combining Fun with Learning

Integrating enjoyable elements, such as games, into lessons is considered essential to prevent boredom, especially given the perceived difficulty and weight of the subject matter. This approach not only makes learning more enjoyable but also fosters a positive attitude toward the subject.

Teacher A mentioned: "Make the lessons engaging through games because when students are having fun, they are more likely to be attentive and motivated."

Teacher D said: "Integrate games because the topics are heavy and might cause boredom."

Technological advancements have significantly impacted various aspects of life, including the development of instructional games and their benefits in mathematics education. Instructional electronic games play a crucial role in high school education, offering students opportunities to explore and expand their imagination. These games encourage active student engagement, develop social interaction, and promote the development of scientific thinking, thereby enhancing the learning experience (Almohtadi, Aldarabah, & Jwaifell, 2019).

Experiences of Teachers in K to 12 Curriculum

The experiences of teachers with k to 12 Curriculum is consist of five (5 parts). (1) Curriculum Congestion, (2) Difficulty in Adjusting to Quarterly Change, (3) Engagement Through Activities, (4) Difficulty with the Textbook Content, (5) Real-World Application and Practical Learning (6) Comparison with Previous Curriculum.

Curriculum Congestion

Congestion of topics in the K to 12 curriculum is evident, which makes it difficult to teachers to cover all content within the given time.

Teacher A expressed: "K to 12 curriculum is congested because there so many topics given and it cannot be finished with the given time."

Teacher C mentioned: "There are so many topics in geometry and I cannot finish it all."

Study of Martinovic & Manizade (2018) stated that in teaching geometry, it is essential to engage students through interactive methods such as creating impactful classroom displays, suspending geometric models from the ceiling, and involving students in hands-on activities that encourage imagination and creativity. Teachers should also encourage students to participate in defining geometric concepts and exploring their logical consequences. With these many activities, teachers must ensure that students will not feel the congestion of topics in geometry.

Difficulty in Adjusting to Quarterly Change

K to 12 curriculum offers different topics per quarter and it is difficult for students to adjust.

Teacher A asserted: "In K to 12 Curriculum, the lesson per quarter is different and students find it difficult and they cannot easily adjust on this abrupt shift."

Teacher B said: "While in K to 12 Curriculum, there are different topics per quarter."

Erstad & Voogt (2018) asserted that the emergence of the knowledge society, along with advancements in information and communication technologies, has led to the evaluation of the role and function of the curriculum. These developments are viewed not only as a rationale for redefining curriculum but also as tools to support its practical implementation. Over the past few decades, the primary focus across various countries and cultures has been on establishing core curriculum content standards and examining how curriculum shapes educational models and practices.

Engagement through Activities

Teachers share the engaging nature of the K to 12 Curriculum, especially its focus on hands-on activities. These activities are seen as effective in capturing student interest, particularly in subjects like geometry.

Teacher C highlighted: "It consists of many activities which can help awake interest of students."

Teacher D mentioned: "It offers activities that helps students experience the application of geometry in real world. But the topics per quarter are different."

Students expressed increased levels of interest and enthusiasm during lessons, which they attributed to the opportunity to interactively manipulate geometric figures and explore them within immersive environments. Additionally, the incorporation of gamification elements enhanced motivation, as students found the competitive and playful aspects of learning both exciting and stimulating (Schmid & Korenova, 2024).

Difficulty with Textbook Content

Teachers point out that the content of K to 12 Curriculum presented in the textbooks can be difficult for students to understand. The challenge lies in the way topics are discussed, which might be too complex or not aligned with students' capabilities.

Teacher A asserted: "The approach in the geometry book in K to 12 curriculum is heavy for students."

Teacher B mentioned: "The books in k to 12 curriculum is not detailed. It lacks activities."

As stated by Blasabas & Sumaljag (2020), when teachers were asked about the challenges, they faced in implementing the K-12 curriculum, two key issues emerged from their responses: a scarcity of essential materials and the low quality of the available materials.

Real-World Application and Practical Learning

Teachers appreciate the practical aspects of the curriculum, especially in geometry, where students can apply concepts to real-world situations.

Teacher D said: "K to 12 curriculum offers activities that helps students experience the application of geometry in real world. But the topics per quarter are different."

Teacher A mentioned: "K to 12 offers activities that are very engaging to students."

Tasks that required students to manipulate environments significantly enhanced their ability to visualize spatial relationships and comprehend geometric properties from various perspectives. Furthermore, the iterative design tasks and problem-solving activities fostered advanced geometric thinking, as students engaged in systematic, step-by-step exploration and verification of geometric constructions (Schmid & Korenova, 2024).

Comparison with Previous Curriculum

Teachers emphasize a clear difference between the K to 12 curriculum and the Basic Education Curriculum (BEC), particularly on content and the structure of the topics.

Teacher B said: "K to 12 curriculum is more difficult compare to Basic education Curriculum. In Basic education Curriculum, there is focus topics per year level. While in K to 12 Curriculum, there are different topics per quarter."

According to Adarlo & Jackson (2016), the Philippines has made significant progress in its efforts to expand access to quality education. Recent policies and curricular reforms in the country have been driven by two main objectives. First, the shift from the 10-year basic education program to the K-12 system aims to better prepare Filipinos, particularly those from poor backgrounds, for integration into the labor market and to enhance their economic productivity. It is expected to create opportunities for improving their quality of life. Second, these reforms serve as a measure to promote globalization, promoting a "globalization-from-below" approach. This strategy emphasizes the personal and social transformation of oppressive structures and practices, with the ultimate goal of achieving greater equity within society.

4. Conclusion

Students are having difficulty in geometry particularly in theorems and geometric proofs. This is due to weak foundation in geometric concepts and knowledge and their difficulty with visualization and reasoning.

To address these gaps, teachers must employ various strategies. It must include (1) make sure that students comprehend the lesson before proceeding to the next topic, (2) create more activities that will reinforce mastery among learners (3) make real-life connections, (4) ensure interactive learning, and (5) employ collaborative approach. These strategies help link abstract concepts and real-world applications of geometry, developing a deep understanding in geometry.

Curriculum congestion, time frame given to finish all the topics in geometry, content on textbooks were some of the significant experiences and concerns of geometry teachers in teaching geometry.

The role of teacher in guiding the students in their developmental stages in understanding geometric concepts is important. By connecting the lessons in the real-life situation, as well as contextualizing the examples can help students overcome difficulties that obstruct them in their success in the subject.

References

1. Abu, M. S., & Abidin, Z. Z. (2013). Improving the levels of geometric thinking of secondary school students using geometry learning video based on Van Hiele theory. International Journal of Evaluation and Research in Education (IJERE), 2(1), 16-22.
2. Adarlo, G., & Jackson, L. (2016). For whom is K-12 education: A critical look into twenty-first century educational policy and curriculum in the Philippines. In Educating for the 21st century: Perspectives, policies and practices from around the world (pp. 207-223). Singapore: Springer Singapore.
3. Adolphus, T. (2011). Problems of teaching and learning of geometry in secondary schools in Rivers State, Nigeria. International Journal of Emerging Sciences, 1(2), 143-152.
4. Almohtadi, R., Aldarabah, I. T., & Jwaifell, M. (2019). Effectiveness of instructional electronic games in acquisition of geometry concepts among kindergarten children. Research on Humanities and Social Sciences, 9(12), 144-150.
5. Blasabas, R. J., & Sumaljag, M. V. (2020). Philippine K to 12 Implementation: Difficulties and Coping

Strategies of Public Elementary School Administrators. SLONGAN, 5(1).
6. Boland, M. (2015). Assessing geometric readiness for the middle school student.
7. Cesaria, A. N. N. A., & Herman, T. A. T. A. N. G. (2019). Learning obstacle in geometry. Journal of engineering science and technology, 14(3), 1271-1280.
8. Clements, D. H., Sarama, J., Swaminathan, S., Weber, D., & Trawick-Smith, J. (2018). Teaching and learning geometry: Early foundations. Quadrante, 27(2), 7-31.
9. Diaz Reyes, Y. (2024). A Content Analysis of the Mathematics Curriculum Progression for Students Taking Algebra I and Geometry Honors Before High School.
10. Erstad, O., & Voogt, J. (2018). The twenty-first century curriculum: issues and challenges. Springer International Handbooks of Education, 19-36.
11. Gal, H., & Linchevski, L. (2010). To see or not to see: analyzing difficulties in geometry from the perspective of visual perception. Educational studies in mathematics, 74, 163-183.
12. Govender, R. G., & Govender, D. W. (2019). Learning geometry online: A creative individual learning experience. International Journal of eBusiness and eGovernment Studies, 12(2), 151-165.
13. Jones, K., & Tzekaki, M. (2016). Research on the teaching and learning of geometry. The second handbook of research on the psychology of mathematics education, 109-149.
14. Kariyana, I., & A. Sonn, R. (2016). Teaching Methods and Learners' Concept Formation, Development and Integration in Geometry: Assessing the Relationship. International Journal of Educational Sciences, 12(1), 75-88.
15. Kwadwo, A. E., & Asomani, W. D. (2021). Investigating colleges of Education students' difficulty in understanding circle geometry. ADRRI Journal of Physical and Natural Sciences, 4(3 (4) October-December), 1-27.
16. Maarif, S., Perbowo, K. S., Noto, M. S., & Harisman, Y. (2019, October). Obstacles in constructing geometrical proofs of mathematics-teacher-students based on boero's proving model. In Journal of Physics: Conference Series (Vol. 1315, No. 1, p. 012043). IOP Publishing.
17. Mainali, B. (2019). Investigating the Relationships between Preferences, Gender, Task Difficulty, and High School Students' Geometry Performance. International Journal of Research in Education and Science, 5(1), 224-236.
18. Martinovic, D., & Manizade, A. G. (2018). The challenges in the assessment of knowledge for teaching geometry. ZDM, 50, 613-629.
19. Morales Molina, Y., Rojas Angel Bello, R. T., & Arnaiz Barrios, I. (2022). The formation of logical thinking in the teachinglearning process of Geometry. Mendive-Revista de Educacion, 20(4).
20. Niyukuri, F., Nzotungicimpaye, J., & Ntahomvukiye, C. (2020). Pre-Service Teachers' Secondary School Experiences in Learning Geometry and Their Confidence to Teach It. EURASIA Journal of Mathematics, Science and Technology Education, 16(8).
21. OECD (2023), PISA 2022 Results (Volume I): The State of Learning and Equity in Education, PISA, OECD Publishing, Paris, https://doi.org/10.1787/53f23881-en
22. OECD (2023), PISA 2022 Results (Volume II): Learning During – and From – Disruption, PISA, OECD Publishing, Paris, https://doi.org/10.1787/a97db61c-en
23. Omar, S. N. P., Shahrill, M., & Sajali, M. Z. (2018). The use of peer assessment to improve students' learning of geometry. European Journal of Social Science Education and Research, 5(2), 187-206.
24. Rabab'h, B. S. H., Veloo, A., & Perumal, S. (2015, May). The role of difficulty and gender in numbers, algebra, geometry and mathematics achievement. In AIP Conference Proceedings (Vol. 1660, No. 1).

AIP Publishing.
25. Retnawati, H., Arlinwibowo, J., & Sulistyaningsih, E. (2017). The students' difficulties in completing geometry items of national examination. International Journal, 8(4), 03.
26. Shrestha, D. K. (2022). Collaborative Approaches in Teaching and Learning Geometry (Doctoral dissertation, Kathmandu University School of Education).
27. Schmid, A., & Korenova, L. (2024, October). Enhancing Geometry Learning with GeoGebra: A Study. In European Conference on e-Learning (Vol. 23, No. 1, pp. 487-496).
28. Sulistiowati, D. L., Herman, T., & Jupri, A. (2019, February). Student difficulties in solving geometry problem based on Van Hiele thinking level. In Journal of Physics: Conference Series (Vol. 1157, No. 4, p. 042118). IOP Publishing.
29. Sunzuma, G., & Maharaj, A. (2019). In-service teachers' geometry content knowledge: Implications for how geometry is taught in teacher training institutions. International Electronic Journal of Mathematics Education, 14(3), 633-646.
30. Teherani, A., Martimianakis, T., Stenfors-Hayes, T., Wadhwa, A., & Varpio, L. (2015). Choosing a qualitative research approach. Journal of graduate medical education, 7(4), 669-670.
31. Trinidad, J. E. (2020). Material resources, school climate, and achievement variations in the Philippines: Insights from PISA 2018. International Journal of Educational Development, 75, 102174.
32. Tutak, F. A., & Adams, T. L. (2015). A study of geometry content knowledge of elementary preservice teachers. International Electronic Journal of Elementary Education, 7(3), 301-318.
33. Vidermanova, K., & Vallo, D. (2015). Practical geometry tasks as a method for teaching active learning in geometry. Procedia-Social and Behavioral Sciences, 191, 1796-1800.
34. Yazdani, M. A., & Zebrowski, E. (2006). Spaced reinforcement: An effective approach to enhance the achievement in plane geometry. Journal of Mathematical Sciences and Mathematics Education, 1(3), 37-43.
35. Yildiz, A., & Baltaci, S. (2016). Reflections from the Analytic Geometry Courses Based on Contextual Teaching and Learning through GeoGebra Software. Online Submission, 6(4), 155-166.