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NUMERICAL EXPERTISE AND INSTRUCTIONAL PRACTICES OF TEACHERS IN PANABO DISTRICT

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Abstract. The study unfolded the extent of numerical expertise and instructional practices of teachers in Panabo District, Panabo City Division. The study used non-experimental descriptive-correlational research design, where it utilized adapted survey instrument to gather responses from the randomly selected teacher-respondents. Data gathered were treated using Mean scores with descriptive interpretation, Pearson r and Simple Linear Regression Analysis. Findings revealed that teachers' numerical expertise in terms of importance of teacher-student relationship, importance of student engagement, importance of problem-solving, use of real-world examples and importance of application is oftentimes extensive, while, instructional practices in the use of manipulatives, differentiated instruction, technology, problem-based learning collaborative learning is moderately extensive. There is a significant relationship between numerical expertise and instructional practices. Indicators of numerical expertise in terms of importance of application, use of real-world examples, importance of problem-solving, importance of student engagement, and importance of teacher-student relationship significant influential over instructional practices. Future research may conduct research to recognize the significance of numerical expertise by prioritizing it in the hiring process and evaluating teachers' performance. During teacher recruitment, assess candidates' mathematical knowledge and pedagogical content knowledge to ensure they possess a strong foundation in numerical concepts. In performance evaluations, include measures that assess teachers' instructional practices and their ability to foster numerical understanding among students.

KEY WORDS

1. numerical expertise 2. instructional practices

1. Introduction

Recent years have seen increasing attention paid to the relationship between teachers' beliefs about mathematics and their instructional practices across the world. Researchers and educators have focused on identifying the underlying factors that shape teachers' beliefs and practices, as well as exploring the impact of these beliefs and practices on student learning outcomes. One important trend in the international situation is the recognition of the influence of cultural factors on teachers' beliefs and practices. For example, in their study conducted in Taiwan, Hsieh, Chen, and Liang (2018) found that Confucianism, which emphasizes rote learning and memorization, continues to shape mathematics teaching practices in the country, despite recent curriculum reforms promoting more student-centered approaches. Similarly, in a study conducted in Ghana, Mensah and Owusu-Ansah (2020) found that cultural beliefs about gender roles and social expectations can shape teachers' beliefs about the capabilities of male and female students in mathematics. Another significant trend in the international situation is the growing emphasis on teacher professional development as a means of improving instructional practices. For example, in their study conducted in Brazil, Costa, Ferreira, and Pucci (2019) found that a professional development program that emphasized a problem-based learning approach helped to improve teachers' instructional practices in mathematics, leading to improved student learning outcomes. Similarly, in their study conducted in Japan, Yamada and Kuroda (2018) found that participation in a professional development program that focused on mathematical problem solving and communication skills helped to improve teachers' instructional practices and led to better student performance. Finally, there is an increasing recognition of the importance of incorporating technology into mathematics instruction to support effective instructional practices. For example, in their study conducted in Malaysia, Yusof, Shukor, and Yusof (2021) found that the use of a mobile application to support mathematical problem solving helped to improve teachers' instructional practices and led to better student learning outcomes. Similarly, in their study conducted in Spain, Ceballos, Carreira, and Martínez-García (2022) found that the use of an online platform to support collaborative learning and problem solving helped to improve teachers' instructional practices and led to better student performance. The Philippines is a country that has been struggling with improving its students' performance in mathematics for years. A crucial factor that affects the quality of mathematics education in the Philippines is the beliefs and instructional practices of teachers. A study conducted by Barraquio, Verzosa, and Lagumbay (2018) investigated the teachers' beliefs about mathematics and its relation to their instructional practices. The study found that teachers in the Philippines hold a positive belief about mathematics, which affects their instructional practices positively. However, the study also found that teachers have a limited understanding of the concepts and principles of mathematics, which affects the quality of instruction. Cabrera and Ramos (2020) aimed to explore the correlation between teachers' beliefs about mathematics and their instructional practices. The study found that teachers' beliefs about mathematics positively influenced their instructional practices. Teachers who believed that mathematics is important and relevant to everyday life were more likely to use student-centered instructional practices. Rojas and Abasolo (2021) investigated the factors that affect teachers' beliefs about mathematics in the Philippines. The study found that teachers' beliefs about mathematics were influenced by their mathematics background, teaching experience, and professional development. The study suggested that providing more opportunities for professional development in mathematics could improve teachers' beliefs and instructional practices. Dapar and Rañola Jr. (2022), the authors explored the use of technology in teaching mathematics and its relation to teachers' beliefs and instructional practices in the Philippines. The study found that teachers who had positive beliefs about technology in mathematics education were more likely to use technology in their instructional practices. The study suggested that providing professional development on technology integration could improve teachers' instructional practices. In conclusion, teachers' beliefs about mathematics and instructional practices are critical factors that affect the quality of mathematics education in the Philippines. The studies cited in this essay show that teachers in the Philippines generally hold positive beliefs about mathematics but have limited understanding of its concepts and principles. Moreover, the studies suggest that providing opportunities for professional development, including technology

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integration, could improve teachers' beliefs and instructional practices. Therefore, it is essential for policymakers and educators to focus on improving teachers' beliefs and instructional practices to improve the quality of mathematics education in the Philippines. Thus, this study is conducted.

1.1. Theoretical and Conceptual Framework—Teachers' beliefs about mathematics play a significant role in shaping their instructional practices. Studies have shown that teachers' beliefs about the nature of mathematics, its purpose, and their own roles as teachers can impact the instructional strategies they use and the outcomes of their students (Earnest Paulson, 1991; Cramer et al., 2002). One of these is the theory of teacher cognition, which suggests that teachers' beliefs, knowledge, and experiences shape their thinking and decision-making processes (Calderhead, 1996). This theory emphasizes that teachers' beliefs about mathematics can influence the instructional strategies they use, the content they teach, and the classroom environment they create. For example, teachers who believe that mathematics is best learned through memorization may emphasize drill and practice exercises, while teachers who believe in the importance of problem-solving may use more open-ended and inquiry-based approaches. Another theory that explains the relationship between teachers' beliefs and instructional practices is the theory of planned behavior (Ajzen, 1991). This theory suggests that teachers' intentions to use certain instructional strategies are influenced by their attitudes towards the strategy, their perceived control over its use, and their subjective norms regarding its appropriateness. Teachers who have positive attitudes towards using manipulatives in mathematics, for example, may be more likely to incorporate them into their instruction if they feel they have the necessary resources and support from their colleagues and administration. A third theory that explains the relationship between teachers' beliefs and instructional practices is the theory of teacher efficacy (Bandura, 1997). This theory suggests that teachers' beliefs about their ability to teach mathematics effectively can impact their instructional practices and the outcomes of their students. Teachers who have high levels of efficacy may be more likely to use student-centered approaches that promote active engagement and problem-solving, while teachers with low levels of efficacy may rely more on teacher-directed approaches and rote learning strategies. Empirical studies have provided support for the relationship between teachers' beliefs about mathematics and their instructional practices. For example, Sowell and Diefes-Dux (2012) found that teachers who believed in the effectiveness of using manipulatives in mathematics were more likely to use them in their instruction. Similarly, Voskoglou and Karamanis (2013) found that teachers who believed in the value of technology in mathematics education were more likely to use it in their instruction. Hiebert and Grouws (2007) found that teachers' beliefs about the importance of problem-solving were strongly related to the amount of time they spent on problem-solving activities in the classroom. Teachers' beliefs about mathematics can have a significant impact on their instructional practices and the outcomes of their students. The relationship between teachers' beliefs and instructional practices can be explained by several theories, including teacher cognition, planned behavior, and teacher efficacy. Empirical evidence has supported the relationship between teachers' beliefs and instructional practices, highlighting the importance of understanding teachers' beliefs and attitudes towards mathematics in improving mathematics education. By understanding the relationship

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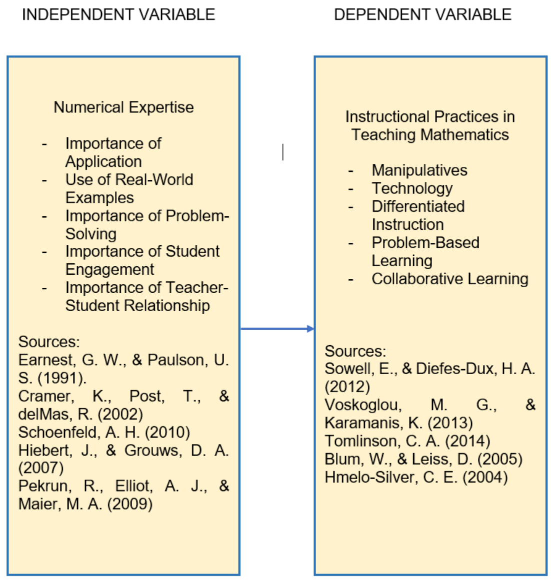

Fig. 1. Conceptual Framework of the Study

between teachers' beliefs and instructional practices, educators and policymakers can develop effective strategies to support teachers in developing more effective instructional practices and improving student outcomes. Figure 1 below shows the association between the mentioned variables. In this study, teachers' belief explains indicators such as the importance of memorization, the use of real-world examples, the importance of problem-solving, the importance of student engagement and the importance of teacher-student relationship; likewise, the dependent variable, instructional practices in teaching math in terms of the use of manipulatives, use of technology, differentiated instruction, problem-based learning and collaborative learning are also presented to support the claims of the variables used under study.

1.2. Statement of the Problem—The study was purposely conducted to determine numerical expertise and instructional practices of teachers in Panabo District, Panabo City Division. This, specifically sought to answer the following statement of the problem:

(1) What is the extent of numerical expertise in terms of;
   (1) importance of application;
   (2) use of real-world examples
   (3) importance of problem-solving
   (4) importance of student engagement; and,
   (5) importance of teacher-student relationship
(2) What is the extent of instructional practices among teachers in the use of;
   (1) manipulatives;
   (2) technology;
   (3) differentiated instruction;
   (4) problem-based learning; and
   (5) collaborative learning
(3) Is there a significant relationship between numerical expertise and instructional practices?

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(4) Which among the indicators of numerical expertise that significantly influence instructional practices?

1.3. Hypothesis—To provide empirical evidence given the posed theoretical and conceptual frameworks as claim by the study, null hypotheses were tested at 0.05 alpha level of significance, stating:

(1) Ho 1: There is no significant relationship between numerical expertise and instructional practices.
(2) Ho 2: None from among the indicators of numerical expertise that significantly influence instructional practices.

The study on teachers' beliefs about mathematics and their instructional practices has significant implications for various stakeholders, including school principals, teachers, parents, and significant others. Below are some of the possible implications for each stakeholder. School Principals. School principals can use the findings of the study to identify teachers' beliefs about mathematics and their instructional practices. This information can be used to provide targeted professional development opportunities to teachers to help them improve their instructional practices. Furthermore, school principals can use the findings to create a positive school culture that supports the development of teachers' beliefs and instructional practices. Teachers. Teachers can benefit from the study by gaining a better understanding of how their beliefs about mathematics influence their instructional practices. This knowledge can be used to reflect on and improve their teaching practices. Teachers can also use the findings to identify areas where they need to improve their beliefs and practices, and to seek support from colleagues, mentors, and professional development opportunities. Parents. Parents can use the findings of the study to better understand the beliefs and practices of their children's mathematics teachers. This knowledge can help parents to support their children's mathematics learning at home by reinforcing the same beliefs and practices that are being taught at school. Significant Others. Significant others, such as policymakers, curriculum developers, and researchers, can use the findings of the study to inform their decision-making processes. For example, policymakers can use the findings to develop policies that support the development of teachers' beliefs and instructional practices. Curriculum developers can use the findings to design curriculum materials that align with teachers' beliefs and practices. Researchers can use the findings to generate new research questions and to develop theories that can be tested in future studies. The study of teachers' beliefs about mathematics and their instructional practices has significant implications for various stakeholders. By understanding how teachers' beliefs influence their instructional practices, school principals, teachers, parents, and significant others can work together to create a positive school culture that supports the development of effective mathematics teaching practices.

This study laid out the terms that is conceptually and operationally defined to set up better understanding and reference when discussions of results will be taken up in the preceding chapters of the study.

Numerical Expertise refers to their personal and subjective views, attitudes, and perceptions regarding the nature of mathematics, how it is learned and taught, and its role in education. These beliefs are shaped by various factors such as their own educational background, teaching

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experiences, cultural and social background, and the wider societal views about mathematics. Teachers' beliefs can influence their instructional practices, as they may choose to teach in a way that aligns with their beliefs about mathematics. Therefore, understanding teachers' beliefs about mathematics is important for improving their instructional practices and promoting better student learning outcomes.

Instructional practices of teachers in teaching mathematics refer to the strategies, methods, and techniques used by teachers to deliver mathematics instruction to students. These practices may include the selection of appropriate instructional materials, the use of various teaching strategies such as direct instruction, inquiry-based learning, and problem-based learning, the use of technology and manipulatives, and the implementation of formative and summative assessments to monitor student progress. Effective instructional practices in mathematics teaching are critical for promoting student learning outcomes, such as increased mathematical knowledge, problem-solving skills, and critical thinking abilities. By understanding effective instructional practices, teachers can design and implement effective lessons that help students achieve success in mathematics.

2. Method

This chapter contains the discussion of the methodical process in the conduct of the study. This includes the process in the selection of the design of the study, the respondents and its sampling method, the research instruments to be used in data gathering, the procedure, and the ethical consideration and lastly, the data analysis. These steps are considered essentials to assume appropriateness and correctness in the conduct of the methodical steps.

2.1. Research Design—Descriptive-correlational research design is a type of research that aims to describe the relationship between two or more variables. This type of research design does not involve any intervention or manipulation of variables but rather aims to determine the strength and direction of the relationship between variables. Descriptive-correlational research design is often used in social science research, including educational research, as it allows researchers to examine patterns and relationships among variables that cannot be manipulated for ethical or practical reasons. According to Creswell (2014), descriptive-correlational research design is used to describe and explain the relationship between two or more variables. The main goal of this type of research design is to identify the relationship between variables, and it can be used to make predictions about future events. Descriptive-correlational research design is often used in exploratory studies or when researchers are interested in establishing the existence of a relationship between variables. In conclusion, descriptive-correlational research design is a valuable research tool in educational research as it allows researchers to examine the relationship between variables and make predictions about future events. This research design provides valuable information that can help educators and researchers to develop interventions and programs that can improve educational outcomes. In this context the use of descriptive-correlational research design can provide valuable insights into the relationship between numerical expertise and their instructional practices. Such studies can help educators and policymakers better understand the factors that contribute to effective mathematics teaching and inform the development of professional development programs to improve teachers' instructional practices.

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2.3. Research Instrument—This research study used a self-made survey instrument. Items were adapted from the contents of the reviewed literatures. There are two parts of the survey questionnaire which consists of the indicators of numerical expertise in terms of importance of application, use of real-world examples, importance of problem-solving, importance of student engagement and importance of teacher-student relationship. On the other hand, the second part of the survey is the extent of teachers' instructional practices in terms of the use of manipulatives, use of technology, differentiated instruction, problem-based learning and collaborative learning. Further, the survey statements were subjected to a test-retest or validity and reliability testing using Cronbach Alpha at .05 level of confidence and generated an alpha Cronbach of 0.85.9 which means that 859 percent level of confidence of the validity and reliability of the survey statement constructs. (Pallant 2010).

The questionnaire used a 5-point Likert scale to determine the numerical expertise. Scale, descriptive rating and interpretation are provided below:

Scale, Descriptive Rating, and Interpretation of Numerical Expertise

Scale	**Descriptive Rating**	**Interpretation**
4.20 – 5.00	Very Extensive	The numerical expertise is always manifested
3.40 – 4.19	Extensive	The numerical expertise is oftentimes manifested
2.60 – 3.39	Moderately Extensive	The numerical expertise is sometimes manifested
1.80 – 2.59	Less Extensive	The numerical expertise is rarely manifested
1.00 – 1.79	Not Extensive	The numerical expertise is not manifested

Meanwhile, to determine the extent of teachers' instructional practices, a 5-point Likert scale was used in this study, as presented below;

Scale, Descriptive Rating, and Interpretation of Instructional Practices

Scale	**Descriptive Rating**	**Interpretation**
4.20 – 5.00	Very Extensive	The instructional practices is always manifested
3.40 – 4.19	Extensive	The instructional practices is oftentimes manifested
2.60 – 3.39	Moderately Extensive	The instructional practices is sometimes manifested
1.80 – 2.59	Less Extensive	The instructional practices is rarely manifested
1.00 – 1.79	Not Extensive	The instructional practices is not manifested

2.4. Data Gathering Procedure—The preceding statements explains the data gathering procedure steps where the researcher must comprehensively consider and follow. The statements of the are based on the policies and guidelines of the Rizal Memorial Colleges and the existing guidelines of the IATF to ensure safe and lower risks in the gathering of pertinent data. Permission to conduct the study. Before collecting data, the researcher must obtain permission from the appropriate authorities, such as the research adviser and the Dean of the

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Rizal Memorial Colleges and the top management of DepEd Davao City Division through channel. This permission-seeking process typically involves submitting a research proposal that includes information about the study design, procedures, and potential risks and benefits. The researcher will provide information about the purpose and goals of the study, and how the data will be collected, analyzed, and reported. In addition, researchers must ensure that all participants are fully informed about the study and their rights, and that they provide informed consent before participating. Distribution and retrieval of the questionnaire. To ensure the accuracy and completeness of data, the distribution and retrieval of questionnaires should be conducted in a standardized and systematic manner. This may involve the following conditions: 1. Identifying the target population: The researcher identified the appropriate target population of the study, and ensure that the questionnaire is distributed only to individuals who meet the inclusion criteria. 2. Obtaining consent: The researcher obtained informed consent from all participants before distributing the questionnaire. This may involve providing information about the purpose and goals of the study, as well as any potential risks and benefits. 3. Ensuring anonymity and confidentiality: The researcher ensured that the questionnaire is anonymous, meaning that respondents are not identified by name or other personal information. The researcher also ensured that the data collected is kept confidential and only used for the purposes of the study. 4. Standardizing the distribution process: The researcher standardized the process for distributing the questionnaire, to ensure that all participants receive the same instructions and have the same opportunity to complete the questionnaire. 5. Allowing sufficient time for completion: Participants were given sufficient time to complete the questionnaire, and were allowed to ask any questions they may have about the process. 6. Collecting the completed questionnaires: The researcher collected the completed questionnaires in a timely and organized manner, to ensure that data is not lost or misplaced. Collation and statistical treatment of data. The following are the general conditions that should be followed for collation and statistical treatment of data as part of the data gathering procedure: 1. Accuracy: The data should be accurate and free from errors. This means that the data should be checked and validated to ensure that it is correct. 2. Completeness: The data should be complete, meaning that all necessary information has been collected. This is important because incomplete data can lead to incorrect conclusions. 3. Consistency: The data should be consistent, meaning that there are no contradictions or discrepancies in the data. Inconsistencies can lead to confusion and inaccuracies. 4. Relevance: The data should be relevant to the research question or problem being investigated. Irrelevant data can lead to incorrect conclusions. 5. Timeliness: The data should be collected and analyzed in a timely manner. Delayed or outdated data may not be useful or accurate. 6. Objectivity: The data should be objective, meaning that it is free from bias or personal opinions. This is important because biased data can lead to incorrect conclusions. 7. Validity: The data should be valid, meaning that it measures what it is supposed to measure. This is important because invalid data can lead to incorrect conclusions. 8. Reliability: The data should be reliable, meaning that it can be replicated or reproduced. This is important because unreliable data can lead to incorrect conclusions. 9. Statistical treatment: The data should be subjected to appropriate statistical analysis to identify patterns, trends, and relationships. Statistical analysis can help to reveal important insights and relationships in the data.

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2.5. Ethical Considerations—The researcher sought guidance and advise from the thesis adviser. This resulted to proper authorization and consent were obtained from the respondents of the study, to ensure that all their rights would be fully protected, specifically in handling the data, however, not limited to: Voluntary Participation. All participants in this study were informed that their participation is voluntary and that they may withdraw from the study at any time without penalty. Additionally, participants were informed that their decision to participate or not participate will not impact any future interactions with the researchers or the institution. To ensure that participants fully understand the voluntary nature of their participation, a written consent form was provided and participants were given adequate time to review and consider it before providing their informed consent (American Psychological Association, 2020). Privacy and Confidentiality. To protect the privacy and confidentiality of participants in this study, all data collected were kept strictly confidential and will only be accessible to the research team. Participant data was identified only by a unique identification number to ensure anonymity. Additionally, data were stored in a secure location with limited access to ensure confidentiality. Participants were informed of the measures being taken to protect their privacy and confidentiality in the informed consent process. Any published or presented results will not identify participants by name or any other identifying information. Informed Consent Process. All participants in this study will be provided with a clear explanation of the research procedures and goals, and any potential risks or benefits associated with participation. Participants will be informed that their participation is voluntary and that they may withdraw from the study at any time without penalty. Additionally, participants will be informed that their decision to participate or not participate will not impact any future interactions with the researchers or the institution. To ensure that participants fully understand the study procedures and their rights, a written informed consent form will be provided, which will include all necessary information. Participants will be given adequate time to review and consider the consent form before providing their informed consent. Risks. All participants in this study will be informed of any potential risks associated with their participation in the study. The risks associated with this study include [insert specific risks here]. To minimize these risks, [insert steps being taken to minimize risks here]. Participants will be informed that they may withdraw from the study at any time without penalty and that they should report any adverse effects to the research team as soon as possible. Benefits. Participants in this study may benefit from the results and implications of the study, such as first hand data and information. In addition, participants will have the opportunity to contribute to the advancement of scientific knowledge in the facilitation of kinder classes. Any personal information obtained from participants will be kept confidential and will only be used for research purposes. Participants will also be given the opportunity to receive a summary of the study findings upon request. Plagiarism. To maintain the integrity of this study, all research conducted will be original and free of plagiarism. Any material that is taken directly or indirectly from other sources will be properly cited in accordance with the appropriate style guide (e.g. APA, MLA). The research team will take measures to ensure that all cited sources are accurately referenced and that all direct quotations are placed in quotation marks. The use of previously published or unpublished work without proper attribution will not be tolerated and could result in the retraction of the research. Fabrication. All research conducted in this study will be accurate and truthful. No data will be fabricated or falsified in any way. Research team members will take

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measures to ensure that all data is collected and analyzed using appropriate methods and that all findings are reported accurately. Any errors or omissions in the research process will be reported to the appropriate parties as soon as possible. Falsification. All research conducted in this study will be accurate and truthful. No data will be falsified or manipulated in any way. Research team members will take measures to ensure that all data is collected and analyzed using appropriate methods and that all findings are reported accurately. Any errors or omissions in the research process will be reported to the appropriate parties as soon as possible. Conflict of Interest. To maintain the integrity of this study, any potential conflicts of interest must be disclosed and addressed prior to the commencement of the research. This includes any financial, personal, or professional relationships that could potentially influence the research outcomes. If a conflict of interest is identified, the research team will take measures to minimize its impact on the research process and outcomes. This may include disclosing the conflict of interest in any publications or presentations of the research. Deceit. Deceit or the use of deceptive practices in the research process is not allowed. Any information about the research that is provided to participants or stakeholders will be truthful and accurate. Participants will not be deceived or misled about the nature, purpose, or potential outcomes of the research. If deception is necessary for the research, the research team will provide a debriefing to participants after the study has concluded to explain the nature and purpose of the deception. Permission from the Organization/Location. Before conducting any research, permission must be obtained from the organization or location where the research will take place. This includes obtaining permission from the appropriate authorities to access the research site, to interact with participants, and to collect data. The researcher ensured that any data collected is kept confidential and secure, and that any necessary permissions or approvals have been obtained prior to the release or publication of any research findings. Authorship. Authorship must be based on a significant contribution to the research project. All individuals who have made substantial contributions to the research must be included as authors. Authorship credit should also be based on the fulfillment of the following criteria: (a) conception and design, or analysis and interpretation of data; (b) drafting or critically revising the article for important intellectual content; and (c) final approval of the version to be published. Any individuals who do not meet the criteria for authorship but have contributed to the research in some way should be acknowledged in the manuscript or publication.

2.6. Data Analysis—Mean scores and standard deviation was used to address statement problems posed in number one (1) on the extent of numerical expertise, and statement problem number two (2) on the extent of instructional practices. Pearson Product Moment Correlation Coefficient or Pearson-r was used to determine its strength / direction significant relationship between numerical expertise and Instructional practices in Panabo District Scools, Panabo City. Linear Regression analysis was used to address statement problem number 4, on the indicators of numerical expertise that significantly influence instructional practices in Panabo District Scools, Panabo City. All data processing and analysis were treated using the Jeffrey's Statistics Amazing Program (JASP) version 0.12.20. Discussions and interpretations then followed when results yield.

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3. Results and Discussion

This chapter deals with the presentation, analysis, and interpretation of data gathered. Tabular and textual presentation is presented to make more meaningful in the analysis and drawing out of implications. This further shows evidence to support the claim posed in the hypothesis.

3.1. Teachers' Numerical Expertise— Teachers' numerical expertise is crucial in the field of education, particularly in subjects such as mathematics and science that heavily rely on quantitative concepts. Numerical expertise refers to a teacher's proficiency in understanding, explaining, and effectively teaching numerical concepts and skills to students. It encompasses various aspects, including mathematical knowledge, pedagogical content knowledge, and instructional strategies. Firstly, a teacher's own mathematical knowledge and understanding are fundamental to their numerical expertise. Teachers need a deep understanding of mathematical concepts, theories, and procedures to effectively teach them to students. This includes not only knowing the content itself but also understanding the underlying principles and connections within and across mathematical topics. A strong foundation in mathematics allows teachers to explain concepts clearly, address student misconceptions, and provide appropriate challenges to promote student learning. In addition to mathematical knowledge, teachers also need pedagogical content knowledge (PCK) specific to numerical concepts. PCK involves understanding how students think about and learn mathematics, as well as the most effective ways to teach these concepts. It includes knowledge of common student misconceptions, strategies for addressing them, and the ability to anticipate and diagnose student difficulties. Teachers with strong PCK can create meaningful learning experiences, design appropriate tasks and assessments, and provide targeted feedback to guide students' mathematical development. Furthermore, teachers' instructional strategies play a crucial role in fostering numerical expertise among students. Effective teachers employ a range of instructional techniques, including hands-on activities, problem-solving tasks, mathematical discussions, and the use of technology, to engage students and deepen their understanding. They provide opportunities for students to explore, reason, and communicate mathematically, encouraging them to develop conceptual understanding rather than just memorizing procedures. Skilled teachers also differentiate instruction to meet the diverse needs of their students, providing support or extension activities as necessary. Moreover, teachers' numerical expertise extends beyond the classroom. They should possess the ability to connect mathematical concepts to real-world contexts and other subject areas, helping students see the relevance and application of mathematics in everyday life. Teachers who can make these connections inspire students' interest in numerical concepts and motivate them to become critical thinkers and problem solvers. It is important for teachers to continually develop their numerical expertise through professional development opportunities and staying updated with current research and best practices in mathematics education. By enhancing their own knowledge and pedagogical skills, teachers can effectively support their students' numerical understanding and promote their success in mathematics and related fields.

Table 1 shows the extent of teachers' numerical expertise in terms of importance of application. The result is focused on the highest and lowest mean ratings of indicators which are as follows: Teachers emphasize application as an important component of Mathematics instruction believe that it can help students

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become more confident and efficient in their mathematical work (3.40), and Teachers view standardized testing as a key measure of student achievement may place greater emphasis on memorization in their instruction (3.40) are oftentimes manifested, while, Teachers value application believe that it can help students develop efficient problem-solving techniques and increase their ability to reason mathematically (3.30) and Teachers prioritize application as a learning strategy believe that it can help students recognize patterns and relationships in mathematical concepts (3.15) are sometimes manifested, meanwhile, Teachers come from these traditions or who work with students from these backgrounds may place greater emphasis on application in their Mathematics instruction as a way of honoring and preserving cultural values (2.12) is rarely manifested. The overall mean rating of 3.07 denotes extent of teachers' numerical expertise in terms of importance of application is sometimes manifested, thus, moderately extensive.

Table 1. Extent of teachers' numerical expertise in terms of importance of application

No	Importance of Application	Mean	Descriptive Equivalent
1	Teachers prioritize application as a learning strategy believe that it can help students recognize patterns and relationships in mathematical concepts	3.15	Moderately Extensive
2	Teachers value application believe that it can help students develop efficient problem-solving techniques and increase their ability to reason mathematically.	3.30	Moderately Extensive
3	Teachers emphasize application as an important component of Mathematics instruction believe that it can help students become more confident and efficient in their mathematical work.	3.40	Extensive
4	Teachers view standardized testing as a key measure of student achievement may place greater emphasis on memorization in their instruction.	3.40	Extensive
5	Teachers come from these traditions or who work with students from these backgrounds may place greater emphasis on application in their Mathematics instruction as a way of honoring and preserving cultural values.	2.12	Less Extensive
Overall Mean		3.07	Moderately Extensive

Application has been a fundamental aspect of learning Mathematics for centuries. While the effectiveness of application in Mathematics education has been debated for decades, it remains a crucial component of teachers' beliefs about Mathematics in many parts of the world. Chang, Sun, and Yuan (2021) examined the beliefs of Chinese Mathematics teachers about the role of application in Mathematics education. The study found that Chinese

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Mathematics teachers place great emphasis on application as a learning strategy, and consider it to be an effective way for students to understand and retain mathematical concepts. Similarly, a study by Kim and Yoon (2020) in South Korea found that application is still considered an important learning strategy in Mathematics education, and that South Korean Mathematics teachers view application as a means of building students' confidence in their problem-solving abilities. In the Philippines, teachers' beliefs about mathematics learning have been an essential aspect of teaching practices. The importance of application as a component of teachers' beliefs about mathematics has been a subject of research, particularly in the past few years. Serquina and Quijano (2019) explored the beliefs of Filipino mathematics teachers about the role of application in mathematics learning. The study involved 120 mathematics teachers from different schools in the National Capital Region. The researchers used a survey questionnaire to collect data and analyzed the results using descriptive statistics. The findings revealed that most Filipino mathematics teachers believed that application played a significant role in mathematics learning. They believed that it helped students remember formulas and procedures that are necessary in solving mathematical problems. Finally, a study by Cruz (2019) explored the beliefs of Filipino mathematics teachers about the use of application in mathematics learning through a qualitative approach. The study involved 12 mathematics teachers from a public school in the Philippines. The findings showed that the teachers believed that application played a significant role in mathematics learning, particularly in the recall of formulas and procedures. However, they also believed that it was not the only component necessary for successful mathematics learning. They emphasized the importance of understanding mathematical concepts and developing problem-solving skills. In conclusion, the importance of application as a component of teachers' numerical expertise learning has been a subject of research in the Philippines. The studies reviewed in this essay have shown that Filipino mathematics teachers have varied beliefs about the role of application in mathematics learning. Some believed that it played a significant role in the recall of formulas and procedures, while others believed that it hindered the development of problem-solving skills. However, most teachers acknowledged that application was not the only component necessary for successful mathematics learning. These studies provide insight into the beliefs of Filipino mathematics teachers and contribute to the ongoing discussion on effective mathematics teaching practices in the Philippines.

Table 2 extent of teachers' numerical expertise in terms of use of real-world examples. The result is focused on the highest and lowest mean ratings of indicators which are as follows: Teachers who use real-world examples in their instruction believe that it can help students develop their analytical and problem-solving skills, as well as their ability to communicate and justify their mathematical reasoning (4.00) and Teachers who incorporate real-world examples into their instruction believe that it can help students develop a positive attitude toward Mathematics and increase their motivation to learn (3.40) are oftentimes manifested, while, Teachers who value the use of real-world examples believe that it can help students see Mathematics as an integrated part of their education, rather than as a separate and isolated subject (3.35), Teachers who value real-world examples believe that it can help students see the practical applications of Mathematics in the world around them (3.10) and Teachers who emphasize the use of real-world examples believe that it can help students develop a deeper and more flexible understanding of Mathematics (3.00) are sometimes manifested. The overall mean rating of 3.37 denotes extent of teachers' numerical

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expertise in terms of use of real-world examples is sometimes manifested, thus, moderately extensive. Alajmi and Aldhafiri (2020) in Kuwait found that teachers' beliefs about using real-world examples were influenced by their own mathematics experiences as students. Teachers who had positive experiences with mathematics were more likely to believe in the importance of using real-world examples in teaching. Additionally, the study found that teachers who believed in the importance of real-world examples were more likely to use them in their teaching practices. Moussa (2019) in Egypt found that teachers' beliefs about the importance of real-world examples were influenced by their own beliefs about the nature of mathematics. Teachers who saw mathematics as a tool for solving real-world problems were more likely to use real-world examples in their teaching.

Table 2. Extent of teachers' numerical expertise in terms of using real-word examples

No	Use of Real-world Examples	Mean	Descriptive Equivalent
1	Teachers who value real-world examples believe that it can help students see the practical applications of Mathematics.	3.10	Moderately Extensive
2	Teachers who incorporate real-world examples into their instruction believe that it can help students develop a positive attitude toward Mathematics and increase their motivation to learn.	3.40	Extensive
3	Teachers who emphasize the use of real-world examples believe that it can help students develop a deeper understanding of Mathematics.	3.00	Moderately Extensive
4	Teachers who value the use of real-world examples believe that it can help students see Mathematics as an integrated part of their education.	3.35	Moderately Extensive
5	Teachers who use real-world examples in their instruction believe that it can help students develop their analytical and problem-solving skills.	4.00	Extensive
Overall Mean		3.37	Moderately Extensive

Similarly, a study by Shi and Qian (2019) in China found that teachers' beliefs about the importance of real-world examples were influenced by their beliefs about the role of mathematics in society. Teachers who saw mathematics as an important tool for solving real-world problems were more likely to use real-world examples in their teaching. In another study, Thwe and Tun (2020) in Myanmar found that teachers' beliefs about the importance of real-world examples were also influenced by their own experiences with using real-world examples in their mathematics education. Teachers who had positive experiences with using real-world examples in their own mathematics education were more likely to use them in their teaching practices. Table 3 shows the extent of teachers' numerical expertise in terms of importance of problem-solving. The result is focused on the highest and lowest mean ratings of indi-

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cators which are as follows: Teachers who value problem-solving believe that it can help students develop their analytical and logical reasoning skills, as well as their ability to communicate and justify their mathematical thinking (4.20) is always manifested; while, Teachers who prioritize problem-solving as a learning strategy believe that it can help students develop the ability to apply Mathematics in practical contexts (4.00), and Teachers who emphasize problem-solving as a key component of Mathematics instruction believe that it can help students develop a flexible and adaptive mindset that they can use in a variety of contexts (3.40) are oftentimes manifested, while, Teachers who view Mathematics instruction as preparation for future careers believe that problem-solving is a key skill that students need to develop (3.38) is sometimes manifested, and Teachers who prioritize problem-solving as a learning strategy believe that it can help students develop a positive attitude toward Mathematics and increase their motivation to learn (2.00) is rarely manifested. The overall mean rating of 3.39 denotes extent of teachers' numerical expertise in terms of importance of problem-solving is sometimes manifested, thus, moderately extensive.

Table 3. Extent of teachers' numerical expertise in terms of importance of problem solving

No	Problem Solving	Mean	Descriptive Equivalent
1	Teachers who prioritize problem-solving as a learning strategy believe that it can help students develop the ability to apply Mathematics in practical contexts.	4.00	Extensive
2	Teachers who value problem-solving believe that it can help students develop their analytical and logical reasoning skills, as well as their ability to communicate and justify their mathematical thinking.	4.20	Very Extensive
3	Teachers who emphasize problem-solving as a key component of Mathematics instruction believe that it can help students develop a flexible and adaptive mindset that they can use in a variety of contexts.	3.40	Extensive
4	Teachers who view Mathematics instruction as preparation for future careers believe that problem-solving is a key skill that students need to develop.	3.38	Moderately Extensive
5	Teachers who prioritize problem-solving as a learning strategy believe that it can help students develop a positive attitude toward Mathematics and increase their motivation to learn.	2.00	Less Extensive
Overall Mean		3.39	Extensive

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Problem-solving is considered an essential component of Mathematics education. Teachers' beliefs about problem-solving can influence their instructional practices and students' learning outcomes. Man et al. (2019) in Hong Kong investigated primary school Mathematics teachers' beliefs about problem-solving. The authors found that most teachers believed that problem-solving skills were crucial for students' future success and that their role was to facilitate students' problem-solving processes. However, some teachers lacked confidence in teaching problem-solving and believed that their students did not have the ability to solve complex problems. Tsigilis and Kontadakis (2019) in Greece investigated Mathematics teachers' beliefs about problem-solving in the context of the national curriculum. The authors found that teachers' beliefs about problem-solving were influenced by their teaching experience, professional development, and perceived effectiveness of the curriculum. Teachers with more teaching experience and professional development were more likely to believe that problem-solving was essential for Mathematics education. A study conducted by Zodape and Hujare (2020) in India investigated the impact of teachers' beliefs about problem-solving on their instructional practices. The authors found that teachers who believed problem-solving was essential for Mathematics education were more likely to use problem-solving tasks in their classrooms. However, teachers who lacked confidence in teaching problem-solving tended to use more traditional teaching methods. Akkoç and Şenol (2021) in Turkey investigated Mathematics teachers' beliefs about problem-solving and their classroom practices. The authors found that most teachers believed problem-solving was essential for Mathematics education and that they had a responsibility to develop their students' problem-solving skills. However, some teachers lacked confidence in their ability to teach problem-solving and tended to use teacher-centered approaches in their classrooms. Table 4 shows the extent of teachers' numerical expertise in terms of importance of student engagement. The result is focused on the highest and lowest mean ratings of indicators which are as follows: Teachers who prioritize student engagement believe that it can help students develop their analytical and problem-solving skills, as well as their ability to communicate and justify their mathematical reasoning (4.00) and Teachers who prioritize student engagement believe that it can help students develop their social and emotional skills, as well as their ability to work in teams (3.40) are oftentimes manifested, while, Teachers who prioritize student engagement believe that it can help students develop a positive attitude toward Mathematics and increase their motivation to learn (3.20) and Teachers who prioritize student engagement believe that it can help students develop a deeper understanding of Mathematics by actively participating in the learning process (3.10) are sometimes manifested, and Teachers who prioritize student engagement believe that it can help students connect Mathematics to their interests, experiences, and goals (2.30) is rarely manifested. The overall mean rating of 3.20 denotes extent of teachers' numerical expertise in terms of importance of student engagement is sometimes manifested, thus, moderately extensive. According to research, student engagement is a crucial component in teaching and learning mathematics. Teachers' beliefs about student engagement in mathematics can have a significant impact on students' learning outcomes and attitudes towards the subject.

Arifin and Shahrill (2019) examined the relationship between teachers' beliefs and practices regarding student engagement in mathematics. The study found that teachers who be-

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Table 4. Extent of teachers' numerical expertise in terms of importance of student engagement

No	Student Engagement	Mean	Descriptive Equivalent
1	Teachers who prioritize student engagement believe that it can help students develop a deeper understanding of Mathematics by actively participating in the learning process.	3.10	Moderately Extensive
2	Teachers who prioritize student engagement believe that it can help students develop a positive attitude toward Mathematics and increase their motivation to learn.	3.20	Moderately Extensive
3	Teachers who prioritize student engagement believe that it can help students connect Mathematics to their interests, experiences, and goals.	2.30	Less Extensive
4	Teachers who prioritize student engagement believe that it can help students develop their social and emotional skills, as well as their ability to work in teams.	3.40	Extensive
5	Teachers who prioritize student engagement believe that it can help students develop their analytical and problem-solving skills, as well as their ability to communicate and justify their mathematical reasoning.	4.00	Extensive
Overall Mean		3.20	Moderately Extensive

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lieved in the importance of student engagement were more likely to incorporate active learning strategies such as problem-based learning and cooperative learning in their classrooms. Similarly, a study by Liu et al. (2021) found that teachers who valued student engagement were more likely to use technology-based tools, such as online games and simulations, to enhance students' learning experiences. Huang and Liang (2020) investigated the effects of student-centered instruction on student engagement and achievement in mathematics. The results showed that teachers who implemented student-centered instruction and believed in its effectiveness had higher levels of student engagement, which, in turn, led to improved academic performance. Similarly, a study conducted by Mendezabal et al. (2020) explored the relationship between teachers' beliefs about student engagement and their instructional practices in mathematics. The study found that teachers who believed in the importance of student engagement were more likely to use differentiated instruction and collaborative learning strategies in their classrooms, which promoted active participation and engagement among students.

Table 5 shows the extent of teachers' numerical expertise in terms of importance of teacher-student relationship. The result is focused on the highest and lowest mean ratings of indicators which are as follows: Teachers who prioritize teacher-student relationships believe that it can help create a more engaging and meaningful learning environment where students feel inspired to learn (4.45) is always manifested, Teachers who prioritize teacher-student relationships believe that it can help create a collaborative learning environment where students feel valued and respected (3.60) and Teachers who prioritize teacher-student relationships believe that it can help create a safe and supportive learning environment where students feel comfortable taking risks and making mistakes (3.55) are oftentimes manifested while, Teachers who prioritize teacher-student relationships believe that it can help create a more caring and supportive learning environment where students feel empowered to take ownership of their learning (3.15) and Teachers who prioritize teacher-student relationships believe that it can help create a more inclusive and responsive learning environment where students feel seen and heard (2.65) are sometimes manifested. The overall mean rating of 3.48 denotes extent of teachers' numerical expertise in terms of importance of teacher-student relationship is sometimes manifested, thus, moderately extensive. The teacher-student relationship is a crucial component of teaching and learning in Mathematics. It is believed that a positive relationship between teachers and students can enhance student engagement, motivation, and achievement in Mathematics. A study conducted by Stipek et al. (2019) examined the relationship between teachers' beliefs about the importance of positive teacher-student relationships and student engagement in Mathematics. The study found that teachers who believed in the importance of positive teacher-student relationships had students who were more engaged in Mathematics. Lee and Bobis (2020) investigated the impact of teacher-student relationships on student achievement in Mathematics. The study found that positive teacher-student relationships were associated with higher student achievement in Mathematics.

Furthermore, a study conducted by Costa et al. (2021) examined the role of teacher-student relationships in promoting critical thinking skills in Mathematics. The study found that teachers who had positive relationships with their students were better able to facilitate crit-

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Table 5. Extent of teachers' teachers' numerical expertise in terms of importance of teacher-student relationship

No	Teacher-Student Relationship	Mean	Descriptive Equivalent
1	Teachers who prioritize teacher-student relationships believe that it can help create a safe and supportive learning environment where students feel comfortable taking risks and making mistakes.	3.55	Extensive
2	Teachers who prioritize teacher-student relationships believe that it can help create a collaborative learning environment where students feel valued and respected.	3.60	Extensive
3	Teachers who prioritize teacher-student relationships believe that it can help create a more inclusive and responsive learning environment where students feel seen and heard.	2.65	Moderately Extensive
4	Teachers who prioritize teacher-student relationships believe that it can help create a more engaging and meaningful learning environment where students feel inspired to learn.	4.45	Very Extensive
5	Teachers who prioritize teacher-student relationships believe that it can help create a more caring and supportive learning environment where students feel empowered to take ownership of their learning.	3.15	Moderately Extensive
Overall Mean		3.48	Moderately Extensive

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ical thinking skills in Mathematics. According to recent studies, the relationship between teachers and students has a significant impact on learning outcomes, especially in mathematics. In the Philippine setting, there is growing recognition of the importance of fostering positive teacher-student relationships to promote student engagement and achievement in mathematics. Javiniar and Lumang (2019) examined the beliefs and practices of mathematics teachers in the Philippines regarding teacher-student relationships. The results showed that teachers who prioritize building relationships with their students have a more positive attitude towards mathematics and are more likely to implement student-centered instructional practices. Additionally, students who have positive relationships with their mathematics teachers are more motivated and engaged in the subject, leading to better academic performance. Loria and Diestro (2020) focused on the role of teacher-student relationships in enhancing problem-solving skills in mathematics. The findings revealed that positive teacher-student relationships contribute to a supportive learning environment that fosters risk-taking and experimentation, which are essential for developing problem-solving skills in mathematics. The study emphasizes the importance of teachers building rapport with their students and providing emotional support to help them overcome anxiety and develop confidence in their problem-solving abilities.

Table 6 shows the summary of the extent of teachers' numerical expertise. The result is focused on the highest and lowest mean ratings of indicators which are as follows: importance of teacher-student relationship (4.00) and importance of student engagement (3.45) are oftentimes manifested, while, importance of problem-solving (3.39), use of real-world examples (3.37) and importance of application (3.07) are sometimes manifested. The overall mean rating of 3.45 denotes that extent of teachers' numerical expertise is oftentimes manifested, thus, extensive.

Table 6. Summary of the extent of teachers' numerical expertise

No	Teachers' Numerical Expertise	Mean	Descriptive Equivalent
1	Importance of application	3.07	Moderately Extensive
2	Use of real-world examples	3.37	Moderately Extensive
3	Importance of problem-solving	3.39	Moderately Extensive
4	Importance of student engagement	3.45	Extensive
5	Importance of teacher-student relationship	4.00	Extensive
Overall Mean		3.45	Extensive

Teachers' beliefs about Mathematics have been a subject of interest in educational research for many years. These beliefs have been found to influence teaching practices, instructional decisions, and student outcomes. In the international setting, researchers have conducted numerous studies on teachers' beliefs about Mathematics to understand the impact of these beliefs on teaching and learning. Several studies have been conducted in the international setting on teachers' beliefs about Mathematics. In a study conducted by Siti Nurhayati et al. (2019) in Indonesia, the researchers investigated the beliefs of primary school teachers about Mathematics teaching and learning. The study found that teachers' beliefs about Math-

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ematics were influenced by their prior experiences as students, their cultural background, and their beliefs about teaching and learning. The researchers recommended that teachers should be provided with professional development opportunities to improve their beliefs and practices in Mathematics teaching. Pehkonen et al. (2020) in Finland, the researchers investigated the beliefs of secondary school Mathematics teachers about problem-solving. The study found that teachers' beliefs about problem-solving influenced their instructional practices and the types of problems they assigned to students. The researchers recommended that teacher education programs should focus on developing teachers' beliefs about problem-solving to improve their instructional practices.

Instructional Practices Mathematics is a subject that is often challenging for students, and teachers play a critical role in helping their students learn and understand the subject. In recent years, there has been a growing interest in exploring effective instructional practices in Mathematics that can help students succeed. One instructional practice that has been found to be effective in Mathematics is the use of technology. According to Devaraj et al. (2020), integrating technology into Mathematics instruction can improve student engagement and achievement. Similarly, a study by Ramadhani et al. (2019) found that the use of digital technology in Mathematics instruction can enhance students' problem-solving skills.

Table 7 shows the extent of instructional practices in the use of manipulatives. The result is focused on the highest and lowest mean ratings of indicators which are as follows: Teachers who use manipulatives believe that they can help students engage with Mathematics in a hands-on way, building their confidence and autonomy in their learning (4.50) and Teachers who use manipulatives believe that they can help students develop a more relevant and meaningful understanding of Mathematics, increasing their motivation and interest in the subject (4.20) are always manifested, while, Teachers who use manipulatives believe that they can help create a more inclusive and responsive learning environment, where all students can access and engage with Mathematics in a way that works for them (3.45) and Teachers who use manipulatives believe that they can help students visualize and manipulate mathematical concepts, making them more tangible and accessible (3.40) are oftentimes manifested, while, Teachers who use manipulatives believe that they can help students develop a more holistic and immersive learning experience, enhancing their memory and retention of mathematical concepts (3.30) is sometimes manifested. The overall mean rating of 3.77 denotes that extent of instructional practices in the use of manipulatives is oftentimes manifested, thus, extensive. In recent years, there has been growing interest in the use of manipulatives in mathematics education, and many studies have investigated the beliefs of mathematics teachers regarding the use of manipulatives in the classroom.

One study conducted by Ma and Xu (2020) examined the beliefs of 297 mathematics teachers in China regarding the use of manipulatives. The findings of the study showed that the majority of the teachers held positive beliefs towards the use of manipulatives and believed that the use of manipulatives could enhance students' understanding of mathematical concepts. Karadag and Guney (2020) investigated the beliefs of 52 mathematics teachers in Turkey regarding the use of manipulatives. The results of the study indicated that the teachers held positive beliefs towards the use of manipulatives and believed that manipulatives could help students to visualize mathematical concepts. Similarly, a study conducted by Tsiaparikou and Vosniadou

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Table 7. Extent of instructional practices in the use of manipulatives

No	Manipulatives	Mean	Descriptive Equivalent
1	Teachers who use manipulatives believe that they can help students visualize and manipulate mathematical concepts, making them more tangible and accessible.	3.40	Extensive
2	Teachers who use manipulatives believe that they can help students develop a more holistic and immersive learning experience, enhancing their memory and retention of mathematical concepts.	3.30	Moderately Extensive
3	Teachers who use manipulatives believe that they can help students engage with Mathematics in a hands-on way, building their confidence and autonomy in their learning.	4.50	Very Extensive
4	Teachers who use manipulatives believe that they can help create a more inclusive and responsive learning environment, where all students can access and engage with Mathematics in a way that works for them.	3.45	Extensive
5	Teachers who use manipulatives believe that they can help students develop a more relevant and meaningful understanding of Mathematics, increasing their motivation and interest in the subject.	4.20	Very Extensive
Overall Mean		3.77	Extensive

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(2021) examined the beliefs of 54 mathematics teachers in Greece regarding the use of manipulatives. The study found that the teachers had positive beliefs towards the use of manipulatives and believed that manipulatives could help students to develop a deeper understanding of mathematical concepts. Zhu, Zhao, and Lei (2020) investigated the beliefs of 155 mathematics teachers in China regarding the use of manipulatives. The study found that the teachers held positive beliefs towards the use of manipulatives and believed that the use of manipulatives could promote students' mathematical thinking and enhance their problem-solving skills. Nguyen and Nguyen (2019) examined the beliefs of 51 mathematics teachers in Vietnam regarding the use of manipulatives. The results of the study indicated that the teachers held positive beliefs towards the use of manipulatives and believed that manipulatives could help students to understand mathematical concepts more deeply. In the Philippines, Amoloza and de la Cruz (2019) aimed to investigate the use of manipulatives in teaching mathematics among Filipino teachers. The study involved 30 participants who were mathematics teachers from different public schools in the Philippines. The results showed that most of the teachers used manipulatives in their teaching, particularly in the teaching of geometry and fractions. The teachers believed that the use of manipulatives helped students understand mathematical concepts better and improved their problem-solving skills.

Table 8 shows the extent of instructional practices in the use of technology. The result is focused on the highest and lowest mean ratings of indicators which are as follows: Teachers who use technology believe that it can help create a more differentiated and responsive learning environment, where all students can achieve success (3.60) and Teachers who use technology believe that it can help students develop a more relevant and meaningful understanding of Mathematics, increasing their motivation and interest in the subject (3.40) are oftentimes manifested, while, Teachers who use technology believe that it can help students visualize and understand complex concepts, making them more accessible and engaging (3.30) and Teachers who use technology believe that it can help students develop their social and emotional skills, as well as their ability to work in teams (3.15) and (3.10) are sometimes manifested. The overall mean rating of 3.31 denotes that extent of instructional practices in the use of technology is sometimes manifested, thus, moderately extensive. The integration of technology in mathematics education is becoming increasingly popular in many countries worldwide. It is believed that technology can enhance students' understanding of mathematical concepts and promote more interactive and engaging learning experiences. However, the use of technology in mathematics education is still a controversial topic among educators, with some believing that it may hinder students' conceptual understanding of mathematical concepts.

Several recent studies have investigated teachers' beliefs about the use of technology in mathematics education in different countries. For instance, a study by Huang and Li (2021) explored teachers' beliefs about the integration of technology in mathematics education in China. The authors found that teachers' beliefs about the use of technology were positively associated with their attitudes towards technology use and their perceived pedagogical efficacy. The authors suggested that teacher education programs should focus on developing teachers' technology competencies and promoting positive attitudes towards technology use. Similarly, a study by Jurdak and Cakiroglu (2021) investigated teachers' beliefs about the use of technol-

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Table 8. Extent of instructional practices in the use of technology

No	Technology	Mean	Descriptive Equivalent
1	Teachers who use technology believe that it can help students visualize and understand complex concepts, making them more accessible and engaging.	3.30	Moderately Extensive
2	Teachers who use technology believe that it can help students take an active role in their learning, increasing their motivation and engagement.	3.10	Moderately Extensive
3	Teachers who use technology believe that it can help create a more differentiated and responsive learning environment, where all students can achieve success.	3.60	Extensive
4	Teachers who use technology believe that it can help students develop their social and emotional skills, as well as their ability to work in teams.	3.15	Moderately Extensive
5	Teachers who use technology believe that it can help students develop a more relevant and meaningful understanding of Mathematics, increasing their motivation and interest in the subject.	3.40	Extensive
Overall Mean		3.31	Moderately Extensive

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ogy in mathematics education in Turkey. The authors found that teachers who had positive beliefs about technology use were more likely to use technology in their teaching practices. The authors also suggested that teacher education programs should focus on enhancing teachers' beliefs about technology use to promote more effective use of technology in mathematics education. Another study by Chen, Yang, and Lu (2019) investigated teachers' beliefs about the use of technology in mathematics education in Taiwan. The authors found that teachers who had positive beliefs about technology use were more likely to use technology in their teaching practices. The authors also suggested that teacher education programs should focus on developing teachers' technology competencies and promoting positive attitudes towards technology use.

Table 9 shows the extent of instructional practices in the use of differentiated instruction. The result is focused on the highest and lowest mean ratings of indicators which are as follows: Teachers who use differentiated instruction in Mathematics may use a range of assessment strategies, such as performance tasks, formative assessments, and self-assessment, to gather data on student learning and adjust instruction accordingly (4.25) is always manifested, Teachers who use differentiated instruction in Mathematics may group students based on factors such as prior knowledge, learning style, or interest, to provide targeted instruction and support (4.15) and Teachers who use differentiated instruction in Mathematics may use a range of materials, such as manipulatives, technology, and real-world examples, to support student learning (4.10) are oftentimes manifested, while, Teachers who use differentiated instruction in Mathematics may implement strategies such as culturally responsive teaching, social-emotional learning, and Universal Design for Learning (UDL), to create an inclusive and responsive learning environment for all students (3.20) and Teachers who use differentiated instruction in Mathematics may provide individualized instruction, such as additional practice, extra support, or enrichment activities, to help each student achieve their learning goals (3.00) are sometimes manifested. The overall mean rating of 3.74 denotes that extent of instructional practices in the use of differentiated instruction is oftentimes manifested, thus, extensive. Differentiated instruction is an approach in teaching that recognizes the diverse learning needs of students and adapts instruction to meet those needs. In the context of mathematics, differentiated instruction involves providing opportunities for students to engage with math concepts and skills in multiple ways, using various materials and approaches that cater to their individual needs. Teachers who embrace differentiated instruction believe that it can help increase student engagement, motivation, and achievement in math. Pacheco and Bautista (2020) aimed to investigate the perceptions of mathematics teachers in the Philippines on differentiated instruction. The study found that teachers recognized the importance of differentiation in meeting the diverse needs of their students. However, the teachers also faced challenges in implementing differentiated instruction, such as limited resources and time constraints. Despite these challenges, the study concluded that differentiated instruction was viewed as a promising approach for improving student learning in mathematics. Özgen and Ataman (2021) investigated the beliefs and practices of mathematics teachers in Turkey regarding differentiated instruction. The study found that the majority of the teachers believed that differentiated instruction was necessary for meeting the diverse learning needs of their students. However, the study also revealed that some teachers faced challenges in implementing differentiated instruction due to a lack of knowledge and training. The study concluded that professional development opportunities for teachers could help promote the ef-

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fective use of differentiated instruction in mathematics classrooms. In the Philippines, Tandoy and Sarmiento (2020) investigated the beliefs of 55 mathematics teachers in the Philippines about differentiated instruction. The authors found that the teachers had a positive attitude towards differentiated instruction and believed that it could address the diverse learning needs of students. However, they also noted that the teachers had limited knowledge about differentiated instruction strategies and lacked training in implementing them.

Table 9. Extent of instructional practices in the use of differentiated instruction

No	Differentiated Instruction	Mean	Descriptive Equivalent
1	Teachers who use differentiated instruction in Mathematics may use a range of materials, such as manipulatives, technology, and real-world examples, to support student learning.	4.10	Extensive
2	Teachers who use differentiated instruction in Mathematics may group students based on factors such as prior knowledge, learning style, or interest, to provide targeted instruction and support.	4.15	Extensive
3	Teachers who use differentiated instruction in Mathematics may provide individualized instruction, such as additional practice, extra support, or enrichment activities, to help each student achieve their learning goals.	3.00	Moderately Extensive
4	Teachers who use differentiated instruction in Mathematics may use a range of assessment strategies, such as performance tasks, formative assessments, and self-assessment, to gather data on student learning and adjust instruction accordingly.	4.25	Very Extensive
5	Teachers who use differentiated instruction in Mathematics may implement strategies such as culturally responsive teaching, social-emotional learning, and Universal Design for Learning (UDL), to create an inclusive and responsive learning environment for all students.	3.20	Moderately Extensive
Overall Mean		3.74	Extensive

Nunez, Garcia, and Reyes (2021) explored the beliefs of 47 mathematics teachers in the Philippines about differentiated instruction in the context of teaching algebra. The authors found that the teachers had a positive attitude towards differentiated instruction and believed that it could improve students' understanding of algebra. However, the teachers also identified several challenges to implementing differentiated instruction, including the lack of resources and the difficulty of creating individualized learning activities. Camarillo and Artajo

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(2019) examined the beliefs of 12 mathematics teachers in the Philippines about differentiated instruction in the context of teaching geometry. The authors found that the teachers had a positive attitude towards differentiated instruction and believed that it could address the diverse learning needs of students. However, they also noted that the teachers faced challenges in implementing differentiated instruction, such as time constraints and the need for additional training. Overall, the studies suggest that mathematics teachers in the Philippines have a positive attitude towards differentiated instruction and believe that it can improve student learning. However, they also face challenges in implementing the approach, such as limited knowledge about strategies and lack of resources. The findings highlight the need for teacher training and support to effectively implement differentiated instruction in the mathematics classroom.

Table 10 shows the extent of instructional practices in the use of problem-based learning. The result is focused on the highest and lowest mean ratings of indicators which are as follows: Teachers who use problem-based learning in Mathematics encourage students to take ownership of their learning, explore multiple solutions, and work collaboratively to solve problems (4.00) and Teachers who use problem-based learning in Mathematics ask students to generate their own questions, investigate solutions, and reflect on their learning to deepen their understanding of mathematical concepts and skills (3.50) are oftentimes manifested, while, Teachers who use problem-based learning in Mathematics may use problems that reflect real-world situations, such as financial planning, environmental issues, or engineering challenges, to provide students with a meaningful and engaging context for learning (3.20) and Teachers who use problem-based learning in Mathematics encourage students to reflect on their learning, evaluate their solutions, and assess their progress towards achieving learning goals. Teachers may use a variety of assessment strategies, such as self-assessment, peer assessment, and rubrics, to evaluate student learning and adjust instruction accordingly (3.10) are sometimes manifested, and Teachers who use problem-based learning in Mathematics encourage students to explore problems from multiple perspectives, including mathematical, social, and ethical perspectives, to develop a more holistic understanding of complex issues (2.30) is rarely manifested. The overall mean rating of 3.22 denotes that extent of instructional practices in the use of problem-based learning is sometimes manifested, thus, moderately extensive. Problem-based learning (PBL) is an approach to teaching and learning that emphasizes critical thinking, problem solving, and collaboration. It involves presenting students with real-world problems or challenges and guiding them through the process of investigating and solving the problem. In recent years, there has been a growing interest in the use of PBL in mathematics education.

Dang and Lee (2019) in Vietnam investigated the impact of PBL on the development of mathematical thinking skills among high school students. The study found that PBL was effective in enhancing students' critical thinking and problem-solving skills, and that students who participated in PBL activities had higher achievement in mathematics compared to those who did not. In the Philippines, the implementation of PBL in mathematics classrooms has gained traction in recent years, with teachers incorporating this approach into their instructional practices. Caballero and De Vera (2020), they examined the perceptions and practices of mathematics teachers in implementing PBL in the Philippines. The researchers conducted inter-

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Table 10. Extent of instructional practices in the use of problem-based learning

No	Problem-based Learning	Mean	Descriptive Equivalent
1	Teachers who use problem-based learning in Mathematics may use problems that reflect real-world situations, such as financial planning, environmental issues, or engineering challenges, to provide students with a meaningful and engaging context for learning.	3.20	Moderately Extensive
2	Teachers who use problem-based learning in Mathematics encourage students to take ownership of their learning, explore multiple solutions, and work collaboratively to solve problems.	4.00	Extensive
3	Teachers who use problem-based learning in Mathematics ask students to generate their own questions, investigate solutions, and reflect on their learning to deepen their understanding of mathematical concepts and skills.	3.50	Extensive
4	Teachers who use problem-based learning in Mathematics encourage students to explore problems from multiple perspectives, including mathematical, social, and ethical perspectives, to develop a more holistic understanding of complex issues.	2.30	Less Extensive
5	Teachers who use problem-based learning in Mathematics encourage students to reflect on their learning, evaluate their solutions, and assess their progress towards achieving learning goals. Teachers may use a variety of assessment strategies, such as self-assessment, peer assessment, and rubrics, to evaluate student learning and adjust instruction accordingly.	3.10	Moderately Extensive
Overall Mean		3.22	Moderately Extensive

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views with 15 mathematics teachers from public and private schools, and the results showed that teachers had a positive perception of PBL and recognized its potential in enhancing students' problem-solving skills. However, teachers also reported challenges in implementing PBL, such as lack of resources, time constraints, and students' low motivation. Similarly, in a study by Castañeda and Soriano (2019), the researchers investigated the effects of PBL on the academic performance and motivation of Grade 10 students in mathematics. The study involved two groups of students, one of which received instruction through traditional methods, while the other was taught using PBL. The results showed that students in the PBL group had significantly higher scores in mathematics compared to the control group. Moreover, students in the PBL group reported higher levels of motivation and engagement in the learning process. Gonzaga, Magtibay, and Malabag (2020), they examined the implementation of PBL in a Grade 10 mathematics classroom. The study involved the use of PBL modules that incorporated real-life situations, such as budgeting, construction, and measurement. The results showed that PBL positively impacted students' problem-solving abilities and attitudes towards mathematics. Moreover, the researchers found that the use of PBL modules encouraged student collaboration, creativity, and critical thinking. Table 11 shows the extent of instructional practices in the use of collaborative learning. The result is focused on the highest and lowest mean ratings of indicators which are as follows: Teachers who use collaborative learning in Mathematics create opportunities for students to share their ideas, perspectives, and approaches to problem-solving, to deepen their understanding of mathematical concepts and skills (3.50) is oftentimes manifested, and Teachers who use collaborative learning in Mathematics encourage students to work together, share ideas, and support each other to achieve a common goal (3.30), and Teachers who use collaborative learning in Mathematics may assign group projects, collaborative problem-solving tasks, or group discussions to facilitate student learning (3.10) are sometimes manifested, while, Teachers who use collaborative learning in Mathematics create opportunities for students to work with peers from diverse backgrounds, experiences, and abilities, and encourage students to value and respect each other's perspectives and ideas (2.30) and Teachers who use collaborative learning in Mathematics create opportunities for students to reflect on their learning, evaluate their group's performance, and provide constructive feedback to their peers, to promote deeper learning and growth (2.10) are less manifested. The overall mean rating of 2.86 denotes that extent of teachers' instructional practices in the use of collaborative learning is sometimes manifested, thus, moderately extensive.

Collaborative learning is a strategy that promotes learning through group work, interactions, and cooperation among learners. Collaborative learning has been shown to enhance critical thinking, problem-solving, and decision-making skills, which are essential in mathematics education. As such, it is an essential component of teachers' beliefs about mathematics education. Guo, Zhou, and Jiang (2019) investigated the relationship between teacher beliefs and implementation of collaborative learning in mathematics education in China. The study found that teacher beliefs were positively related to the implementation of collaborative learning in mathematics classrooms. Teachers who believed in the effectiveness of collaborative learning were more likely to use it in their teaching. Similarly, a study by Alghamdi and Almohammadi (2021) explored the effects of collaborative learning on students' mathemat-

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Table 11. Extent of instructional practices in the use of collaborative learning

No	Collaborative Learning	Mean	Descriptive Equivalent
1	Teachers who use collaborative learning in Mathematics may assign group projects, collaborative problem-solving tasks, or group discussions to facilitate student learning.	3.10	Moderately Extensive
2	Teachers who use collaborative learning in Mathematics encourage students to work together, share ideas, and support each other to achieve a common goal.	3.30	Moderately Extensive
3	Teachers who use collaborative learning in Mathematics create opportunities for students to share their ideas, perspectives, and approaches to problem-solving, to deepen their understanding of mathematical concepts and skills.	3.50	Extensive
4	Teachers who use collaborative learning in Mathematics create opportunities for students to work with peers from diverse backgrounds, experiences, and abilities, and encourage students to value and respect each other's perspectives and ideas.	2.30	Less Extensive
5	Teachers who use collaborative learning in Mathematics create opportunities for students to reflect on their learning, evaluate their group's performance, and provide constructive feedback to their peers, to promote deeper learning and growth.	2.10	Less Extensive
Overall Mean		2.86	Moderately Extensive

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ical achievement and attitudes in Saudi Arabia. The study found that collaborative learning significantly improved students' mathematical achievement and attitudes towards mathematics. The authors noted that teachers' beliefs and attitudes towards collaborative learning influenced their implementation and the resulting outcomes. In the Philippines, Reguyal and Cullado (2021) aimed to explore the impact of collaborative learning on students' mathematical problem-solving skills. The study involved 67 Grade 9 students from a public high school in the Philippines who were divided into two groups: a collaborative learning group and an individual learning group. The results showed that the students who participated in collaborative learning activities showed significant improvement in their problem-solving skills compared to those who learned individually. Moreover, the students who engaged in collaborative learning reported a more positive attitude towards mathematics and enjoyed learning mathematics more. Cullado and Reguyal (2019) investigated the effect of collaborative learning on students' mathematical achievement and attitude towards mathematics. The study involved 56 Grade 7 students from a public high school in the Philippines who were randomly assigned to a collaborative learning group or an individual learning group. The results showed that the students who participated in collaborative learning activities showed significantly higher achievement scores in mathematics compared to those who learned individually. Moreover, the students who engaged in collaborative learning reported a more positive attitude towards mathematics. Table 12 shows the summary of the extent of instructional practices. The result is focused on the highest and lowest mean ratings of indicators which are as follows: manipulatives (3.77) and differentiated instruction (3.74) are oftentimes manifested, while, technology (3.31), problem-based learning (3.22) and collaborative learning (2.86) are sometimes manifested. The overall mean rating of 3.38 denotes that extent of instructional practices is sometimes manifested, thus, moderately extensive.

Table 12. Summary of the Extent of instructional practices

No	Instructional Practices	Mean	Descriptive Equivalent
1	Manipulatives	3.77	Extensive
2	Technology	3.31	Moderately Extensive
3	Differentiated Instruction	3.74	Extensive
4	Problem-based Learning	3.22	Moderately Extensive
5	Collaborative Learning	2.86	Moderately Extensive
Overall Mean		3.38	Moderately Extensive

Studies have shown that tailoring instruction to individual students' needs can improve their understanding of Mathematics (Liu Teng, 2019; Shaikh et al., 2021). Additionally, using differentiated instruction can help to address the diverse needs of students in the classroom, leading to more equitable outcomes. Problem-based learning is another instructional practice that has been found to be effective in Mathematics. In a study by Abdulraheem and Saha (2020), it was found that problem-based learning improved students' problem-solving skills and increased their interest in Mathematics. Similarly, a study by Pan and Lin (2019) found that

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problem-based learning was effective in promoting students' critical thinking skills. Collaborative learning is another instructional practice that has gained attention in recent years. Studies have shown that working in groups can improve students' problem-solving and critical thinking skills in Mathematics (Gao et al., 2019; Chen Liu, 2020). Additionally, collaborative learning can help to promote social and emotional learning outcomes, such as teamwork and communication skills.

3.2. Significant Relationship Between Numerical Expertise and Instructional Practices— It can be depicted that Pearson's Correlation generated a significant correlation between numerical expertise (r=0.869; p¡.000) and instructional practices. Table 13 revealed the yielded results of the significant relationship between numerical expertise and instructional practices. It provides an information that the posed null hypothesis stating that there is no significant correlation between numerical expertise and instructional practices must be rejected for it provided empirical evidence of significant results.

Table 13. Significant Relationship between numerical expertise and instructional practices

Variables	r-value	p-value	Interpretation	Decision
Instructional Practices	0.869	<0.000	Significant	Reject H0
*significant @p<0.05				

There is a significant relationship between numerical expertise and instructional practices in education. Numerical expertise refers to a teacher's proficiency in understanding and teaching numerical concepts, while instructional practices encompass the strategies and techniques used to facilitate learning in the classroom. When teachers possess strong numerical expertise, it directly impacts their instructional practices, leading to more effective teaching and improved student outcomes. Teachers with high levels of numerical expertise are better equipped to explain mathematical concepts clearly and in multiple ways. They have a deep understanding of the underlying principles and connections within numerical topics, enabling them to break down complex ideas into manageable components. This expertise allows them to anticipate common student misconceptions and tailor their instructional practices to address these challenges. By recognizing the specific needs of their students, they can employ appropriate instructional strategies to support learning. Moreover, teachers with numerical expertise are more likely to engage students in active and meaningful learning experiences. They can design tasks and activities that promote conceptual understanding, problem-solving skills, and critical thinking. These instructional practices often involve hands-on exploration, collaborative learning, and real-world applications of numerical concepts. By incorporating such practices, teachers create an environment that encourages student engagement and fosters deeper learning. Numerical expertise also influences the use of instructional technology and resources. Proficient teachers are knowledgeable about various digital tools and resources that can enhance students' mathematical understanding. They can effectively inte-

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grate technology into their instructional practices, utilizing interactive simulations, virtual manipulatives, and data analysis tools. By leveraging these resources, teachers can provide dynamic and interactive learning experiences that engage students and deepen their numerical proficiency. Furthermore, teachers with strong numerical expertise are better equipped to differentiate their instruction to meet the diverse needs of their students. They can identify individual student strengths and weaknesses and provide appropriate support or extension activities accordingly. By tailoring their instructional practices to address the specific learning needs of each student, teachers can create a more inclusive and supportive learning environment. In summary, the relationship between numerical expertise and instructional practices is highly significant. Teachers with strong numerical expertise are able to employ effective instructional strategies, create meaningful learning experiences, utilize technology and resources, and differentiate their instruction to meet students' needs. This ultimately leads to improved student understanding, engagement, and achievement in numerical concepts. Therefore, developing and enhancing numerical expertise among teachers is vital for promoting effective instructional practices and facilitating successful learning outcomes.

3.3. On the Indicators of Numerical Expertise That Significantly Influence Instructional Practices—Table 14 depicts the simple regression coefficient analysis on the indicators of numerical expertise that significantly influence instructional practices. Indicators of numerical expertise in terms of importance of application (0.000), use of real-world examples (0.001), importance of problem-solving (0.000) importance of student engagement (0.001) and importance of teacher-student relationship (0.001) suggest significant influential over instructional practices. Meanwhile, the R2 value of 0.874 suggests that the numerical expertise, is explained by 87.4In addition, the F-value shows all the sums of squares, given regression being the model and Residual being the error. The F-value (254.897) and F-statistic is significant p¡.001, tells that the model is significantly a better predictor of the instructional practices.

Indicators of numerical expertise significantly influence instructional practices, shaping the way teachers approach and deliver numerical concepts in the classroom. These indicators serve as markers of a teacher's deep understanding and proficiency in mathematics, and they have a direct impact on instructional strategies and pedagogical choices. One key indicator of numerical expertise is a strong conceptual understanding of mathematical content. Teachers who possess a deep understanding of the underlying concepts and principles in mathematics are better equipped to explain and teach these ideas to students. This indicator enables them to go beyond superficial explanations and instead provide meaningful connections and real-life applications. With a solid conceptual foundation, teachers can select appropriate representations, design relevant tasks, and foster student engagement and conceptual development. Another crucial indicator is pedagogical content knowledge (PCK) specific to numerical concepts. PCK involves understanding how students think and learn mathematics, as well as the most effective instructional approaches. Teachers with strong PCK can anticipate student misconceptions and difficulties, select appropriate instructional strategies, and provide targeted feedback. This indicator empowers teachers to address student needs and tailor their instructional prac-

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Table 14. Regression Coefficient Analysis on Indicators of Numerical Expertise that Significantly Influence Instructional Practices

Model	**B**	**Beta**	**Standard Error**	**t-value**	**p-value**	**Decision**
H_0 (Intercept)	4.145		0.079	60.416	0.001	
H_1 (Intercept)	0.313		0.175	1.066	0.270	
IA	0.207	0.107	0.102	1.010	0.315	*Reject H_0
URWA	0.241	0.108	0.136	1.299	0.196	*Reject H_0
IPS	0.202	0.097	0.210	2.098	0.038	*Reject H_0
ISE	0.202	0.097	0.210	2.098	0.038	Accept H_0
ITSR	0.221	0.508	0.136	1.299	0.296	Accept H_0
$\mathbf{R^2}$	0.874					
F-value	254.897				<0.001	

Note. *Significant at $p < 0.05$

IA = importance of application; *URWA* = use of real-world examples; *IPS* = importance of problem-solving; *ISE* = importance of student engagement; *ITSR* = importance of teacher-student relationship

tices to foster deep understanding and conceptual mastery. Teachers' ability to create a positive classroom climate and foster mathematical discourse is also an important indicator. A classroom environment that encourages active student participation, collaboration, and mathematical discourse significantly influences instructional practices. Skilled teachers create opportunities for students to explain their thinking, engage in problem-solving discussions, and justify their solutions. This indicator promotes student engagement, critical thinking, and deeper understanding of numerical concepts. The effective use of instructional strategies is another significant indicator of numerical expertise. Teachers who employ a variety of instructional strategies, such as hands-on activities, problem-solving tasks, and technology integration, can cater to diverse student needs and learning styles. These strategies promote active engagement, provide multiple entry points for understanding, and facilitate the development of mathematical reasoning and problem-solving skills. The ability to select and implement appropriate instructional strategies is a strong indicator of numerical expertise and greatly impacts the instructional practices of teachers. Lastly, ongoing professional development and a commitment to staying current with research and best practices in mathematics education are indicators of numerical expertise that influence instructional practices. Teachers who engage in continuous learning, attend professional development workshops, and stay informed about advancements in the field are better positioned to enhance their instructional practices. This indicator allows teachers to incorporate new methodologies, instructional technologies, and research-based approaches into their teaching, ultimately benefiting their students' numerical understanding and achievement. In conclusion, indicators of numerical expertise significantly influence instructional practices. A strong conceptual understanding, pedagogical content knowledge, the ability to create a positive classroom climate, effective use of instructional strategies,

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and a commitment to professional development all contribute to the instructional choices and strategies employed by teachers. By developing and honing these indicators, teachers can create engaging and effective learning experiences that foster students' numerical proficiency and promote their overall mathematical success.

4. Conclusions and Recommendations

This chapter presents the findings, conclusion and recommendation based on the results of the data analyzed, discussed, and drawn implications. Findings are based on the posed statement of the problem; conclusions are based on the findings generated and recommendations are based on the implications of the discussions.

4.1. Findings—The following are findings of the study given the results in the presentation, analysis and discussions. The extent of teachers' numerical expertise in terms of importance of teacher-student relationship (4.00) and importance of student engagement (3.45) are oftentimes manifested, while, importance of problem-solving (3.39), use of real-world examples (3.37) and importance of application (3.07) are sometimes manifested. The overall mean rating of 3.45 denotes that extent of teachers' numerical expertise is oftentimes manifested, thus, extensive. The extent of instructional practices in the use of manipulatives (3.77) and differentiated instruction (3.74) are oftentimes manifested, while, technology (3.31), problem-based learning (3.22) and collaborative learning (2.86) are sometimes manifested. The overall mean rating of 3.38 denotes that extent of instructional practices is sometimes manifested, thus, moderately extensive. Pearson's Correlation generated a significant correlation between numerical expertise (r=0.869; p¡.000) and instructional practices. Indicators of numerical expertise in terms of importance of application (0.000), use of real-world examples (0.001), importance of problem-solving (0.000) importance of student engagement (0.001) and importance of teacher-student relationship (0.001) suggest significant influential over instructional practices.

4.2. Conclusions—Given the findings of the study presented, the following are conclusions, to wit; The teachers' numerical expertise in terms of importance of teacher-student relationship, importance of student engagement, importance of problem-solving, use of real-world examples and importance of application is oftentimes extensive. The instructional practices in the use of manipulatives, differentiated instruction, technology, problem-based learning collaborative learning is moderately extensive. There is a significant relationship between numerical expertise and instructional practices. Indicators of numerical expertise in terms of importance of application, use of real-world examples, importance of problem-solving, importance of student engagement, and importance of teacher-student relationship significant influential over instructional practices.

4.3. Recommendations—With the presented conclusions of the study, the following are recommendations, to wit; Public School District Supervisor. May rioritize and allocate resources for professional development programs that focus on enhancing teachers' numerical expertise. Establish a system for monitoring and evaluating teachers' numerical proficiency and instructional practices. Encourage collaboration among schools to share best practices and resources related to numerical instruction. Consider numerical expertise as a criterion during the hiring process of new teachers. School Principals. May support teachers in their professional growth by providing opportunities for

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ongoing professional development in numerical expertise. Create a positive and collaborative school culture that encourages the sharing of effective instructional strategies for teaching numerical concepts. Allocate resources and instructional materials that promote conceptual understanding and support teachers in implementing innovative instructional practices. Foster a supportive environment where teachers can reflect on their numerical expertise and continuously improve their instructional practices. Teachers. May engage in professional development opportunities that enhance numerical expertise, such as workshops, conferences, and online courses. Collaborate with colleagues to exchange instructional strategies, discuss student misconceptions, and improve instructional practices related to numerical concepts. Incorporate research-based instructional strategies, hands-on activities, and real-world applications to foster conceptual understanding among students. Seek continuous learning and professional growth in numerical expertise through self-reflection and ongoing professional development. Future Researchers. May conduct further research on the relationship between numerical expertise and instructional practices, exploring different contexts and grade levels. Investigate effective professional development models that promote numerical expertise among teachers. Explore the impact of numerical expertise on student achievement and attitudes towards mathematics. Identify innovative instructional strategies and technologies that enhance teachers' numerical expertise and improve student outcomes.

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