

# Teacher-Student Perceptions of Senior High School Mathematics Textbooks: Basis for Textbook Development Framework

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**Abstract** Many students find mathematics subjects to be complicated. However, research has uncovered various interventions and strategies to improve classroom learning. Acknowledging that instructional materials, such as textbooks, can significantly influence students' learning experiences is crucial. However, textbook users like teachers and students have different perceptions and preferences of the physicality and content of the mathematics textbooks, particularly Basic Calculus of Senior High School. This research paper is a portion of the bigger research project on analysis of the mathematics textbooks which could be the basis of mathematics textbook development framework. It utilized phenomenological research design to determine the teacher-student perceptions of the Senior High School Mathematics textbook. Teacher and student respondents are from National High School, Science High School, and Laboratory School offering STEM strand. The interview was done separately with teachers and students on their experiences as firsthand users of the textbooks. The results show two themes, namely, book physicality and knowledge development. Common to both teachers' and students' perceptions in terms of the physicality of the book are big in size, thick, and monochromatic fonts and images. Moreover, as firsthand users, they suggested having colored text and images to enhance the performance of the visual learners. Another surprising idea during the discussion is making one mathematics book a book series with a handy size. In terms of knowledge development, teachers and students both agree that lessons should be presented in a simpler way. Both commented on the long and complicated discussion. Examples and exercises should have parallel difficulty levels so students can relate when answering the activities themselves. Lastly, contextualized examples are relatable to the students.

**Keywords:** *mathematics textbook, mathematics textbook development, teacher-student perceptions, mathematics textbook development framework*

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## 1. Introduction

Education is continuously evolving. An education system involves a curriculum policy that influences students' learning. In implementing the curriculum itself, many aspects are involved, such as the plan (intended curriculum), the implementation (enacted curriculum), and the instructional materials. The enacted curriculum has been considered to have the most significant impact on students learning since it enables direct interaction between teachers and students. Furthermore, experts have mentioned that instructional materials significantly shape the enacted curriculum in the classroom, including the textbook [1]. Textbooks strongly influence classroom practices as they reflect a system's intended curriculum

and exemplify its implementation [2]. It is one of the most common instructional materials teachers use and is considered a revised tool in the reformation process [3].

Textbooks on mathematics have a significant influence on both teachers' and students' methods of instruction. These textbooks serve as a guide for educators, giving them the tools and resources they need to successfully instruct students in mathematical ideas and subjects. In addition, they function as a resource for students, offering lucid clarifications, illustrations, and interactive exercises to strengthen their comprehension of mathematical ideas. [4] Furthermore, mathematics textbooks can give the teaching and learning process a feeling of organization and structure.

The way in which mathematics textbooks are perceived by educators and learners alike significantly influences the nature of instruction and learning in mathematics classrooms. But there is also a lack of study on how

instructors and students view math textbooks, especially when it comes to various social backgrounds and learning environments. [5] The usefulness of present textbooks in satisfying the requirements and expectations of users is called into question by this research gap, as is the possibility of discrepancies in access to high-quality mathematical instruction.

This study aimed to identify the perception and preferences of mathematics teachers and students on Senior High School Mathematics textbook particularly Basic Calculus book.

## 2. Methodology

The phenomenological research design was employed in this study to ascertain how senior high school mathematics textbook perceived these instructional materials from the lens of teachers and students. The respondents of this study were teachers and students randomly chosen from National High Schools, Science High School, and Laboratory School that offer Science, Technology, Engineering, and Mathematics (STEM) strand in the city of Cagayan de Oro. These randomly chosen ten (10) mathematics teachers and ten (10) students have utilized these mathematics textbooks were interviewed separately using structured interview questionnaire about their experiences on using these mathematics textbooks based on the physicality as well as the content presentation of these mathematics textbooks. Their responses were recorded, organized and analyzed using thematic analysis. Furthermore, to ensure confidentiality of the participants, informed consent are given and they are assured that their responses were used for this study only.

## 3. Salient Findings

Two themes emerged from the interview: the physicality of books and the development of knowledge.

*Theme 1: Mathematics Textbooks are large and thick with monochromatic typefaces and graphics*

Based on the responses, the mathematics textbooks were large, thick with monochromatic typefaces and graphics and both teachers' and students' assessments of the book's physicality are common. Furthermore, based on their personal experience, they recommended using colored text and visuals to improve the performance of visual learners. Creating a handy-sized book series out of a single mathematics book was another unexpected suggestion made during the conversation.

*"Hadlok kasyo ang mga libro sa Math kay dagko ug бага"*

"Math books are intimidating due to its large size and thickness."

*"Kasagara pud sa Math books kay black and white lang, lisod kayo if naay mga drawings."*

"Most of the Math books are in black and white text, it's hard to comprehend the illustrations or drawings."

These are some of the common comments made by teachers and students towards the physical appearance of the mathematics textbooks. If the physicality itself intimidates the user, this will send a message of fear to learn the subject matter especially Mathematics. As it is always been the not so friendly subject to the students, these perceptions may help in drafting a framework to develop a mathematics textbook that is user-friendly.

*Theme 2: Complicated Mathematics Concept Development*

Teachers and students both believe that lessons should be given in a simpler style in order to promote knowledge acquisition. Both made remarks regarding the lengthy and intricate conversation. It is important for exercises and examples to have similar levels of difficulty so that students can relate to them as they are doing the tasks. Finally, students can relate to examples that are contextualized.

*"Lisod kaayo ang explanation sa libro, dili mi kasabot."*

"We cannot comprehend well the explanation presented on the textbook."

*"Sayon kaayo ang example pero pag-abot sa exercises kay lisod na dayon kaayo, dili na dayon mi ka-relate."*

"Examples presented are easy but not in exercises."

It is not just the appearance that intimidates students, presentation of concepts and the level of examples too. If students find it hard to understand at first hand, it will also lose their interest to push through. Students believe that simple presentation of concepts will help them learn easily.

## 4. Conclusion

Textbooks in mathematics have the potential to establish a uniform learning environment in various classrooms and educational institutions. Textbooks guarantee that all students, irrespective of their teacher or school, have access to the same mathematical concepts and skills by offering a simplified content. Both teachers and students recognize the importance of mathematics textbooks in facilitating effective teaching and learning of mathematics. They provide easier plan to deliver the lessons, while also giving students a comprehensive resource to support their learning. Addressing the concerns of the firsthand users, they will appreciate the structure and organization that textbooks provide, as well as the clear explanations and examples that help students understand mathematical concepts. On the other hand, students appreciate having a handy-sized book and contextualized and parallel level of examples and practice problems. Thus, it is recommended to develop a handy-sized series of Mathematics textbooks with parallel level of examples and exercises. Answers for odd or even items

in exercises should also be provided.

The findings of this research study contribute to the bigger project on mathematics textbook development framework in the region and the Philippines in general. Further, other areas to look into on these mathematics textbooks are considered such as gender and development (GAD) concerns, language, contextualization and localization, instructional models used, technology integration and among others.

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