

# The Role of Inquiry Frameworks in Enhancing Students' Sense-making in Math Word Problems

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## Introduction

In recent years, educators have been exploring various strategies to help students improve their problem-solving abilities, particularly in mathematics. One such approach is the use of inquiry frameworks, which encourage active engagement and deep thinking. When applied to math word problems, these frameworks help students not only solve problems but also understand the underlying concepts, thereby enhancing their sense-making abilities. Mathematics word problems are a significant aspect of mathematical learning and assessment, requiring students to interpret, process, and solve problems by making connections between linguistic information and mathematical operations. However, students often struggle with these types of problems due to the complexity of both the language used and the underlying mathematical concepts. The way a word problem is structured, particularly the nature of the inquiry or the questions posed, can significantly influence students' sense-making processes and their ability to successfully interpret and solve these problems. This article explores how different inquiry structures in mathematics word problems affect students' cognitive engagement, problem-solving strategies, and overall sense-making. Mathematics word problems play a crucial role in developing students' problem-solving skills and understanding of mathematical concepts. However, the effectiveness of these problems depends significantly on the design of the questions posed. This essay explores the profound influence of question design on students' sense-making in mathematics word problems, emphasizing the importance of well-crafted questions in fostering a deeper understanding of mathematical concepts. One of the key aspects of question design is clarity. Clear and concise wording is essential to ensure that students comprehend the problem accurately. Ambiguous or convoluted language can lead to confusion, hindering students' ability to make sense of the mathematical concepts embedded in the problem. Therefore, educators must pay meticulous attention to the language used in formulating questions, striving for clarity to enhance students' understanding [1,2].

## Description

An inquiry framework refers to a structured approach that guides students through a process of exploration, questioning, and discovery. Unlike traditional methods where students passively receive information, inquiry-based learning promotes critical thinking and self-discovery. In mathematics, this means encouraging students to explore problems, ask relevant questions, and make connections between concepts to arrive at solutions. Well-structured inquiries help students recognize key mathematical relationships within word problems. For instance, a problem that clearly frames a question like, "What is the total cost of purchasing 3 items if each item costs \$5?" directs students to identify the multiplication operation at the core of the problem. More open-ended questions, on the other hand, might prompt students to first analyze the

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relationships in the text before determining what operations to apply, fostering a deeper understanding of how the mathematical concepts connect. The design of mathematics word problems significantly influences students' sense-making and understanding of mathematical concepts. Clarity, contextual relevance, multiple entry points, scaffolded complexity, and reflective elements are crucial components of effective question design. Educators play a pivotal role in shaping students' mathematical experiences by crafting well-structured problems that not only assess their skills but also foster a deep and meaningful connection to mathematical concepts. One of the key components of inquiry-based learning is reflection. After solving a problem, students are encouraged to reflect on the strategies they used, the steps they followed, and the insights they gained. This reflection solidifies learning and helps students apply the same strategies to future problems.

Math word problems often present challenges for students because they require the application of mathematical concepts to real-world situations. Without a clear understanding of the problem context, students can struggle to identify relevant information, devise a strategy, and ultimately reach the correct solution. This exposure helps them develop a versatile toolkit of problem-solving strategies and encourages a deeper understanding of how mathematical principles apply across various contexts. By guiding students through the problem-solving process with thought-provoking questions, an inquiry structure encourages the development of various problem-solving strategies. For example, a problem that prompts students to consider "How might you visualize this problem?" may lead to drawing a diagram or using models to aid in solving. This inquiry structure helps students move beyond rote application of formulas, encouraging creative thinking and the use of multiple strategies. By engaging in inquiry, students are prompted to think critically about the math problem. They may ask themselves questions like, Inquiry frameworks help students connect different mathematical concepts and apply them in varied contexts. This is particularly valuable in word problems, where the correct solution often requires students to draw on multiple areas of knowledge, such as algebra, geometry, or basic arithmetic. Many inquiry frameworks promote collaborative learning, where students discuss their thought processes with peers. This collaboration can help clarify misunderstandings, provide new insights, and lead to a richer understanding of how to approach math word problems [3-5].

## Conclusion

The use of inquiry frameworks in math instruction provides students with the tools they need to make sense of complex word problems. By promoting deeper understanding, critical thinking, and reflection, these frameworks enhance students' ability to solve math problems while fostering a more meaningful connection to the subject. As educational practices continue to evolve, inquiry-based approaches will likely play an increasingly important role in helping students become more confident and capable problem-solvers. The structure of inquiry in mathematics word problems plays a critical role in shaping how students interpret the problem, engage with mathematical concepts, and develop problem-solving strategies. By fostering an inquiry-based approach, educators can encourage deeper learning and facilitate better sense-making in students. Whether through explicit questions, real-world contexts, or scaffolded hints, thoughtful inquiry design supports not just the solving of a problem but also the understanding of the underlying mathematical principles. As educators continue to refine their teaching practices, the impact of inquiry structures on students' mathematical sense-making should remain a key focus in designing effective word problems that promote conceptual understanding and mathematical fluency.

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## Conflict of Interest

None.

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