Enhancing Upper Secondary Students' Achievement in Sentence-Based Mathematics Problem Solving: Challenges and Instructional Strategies

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ABSTRACT

Students' positive perceptions of sentence-based mathematics problem solving have been shown to support better performance and overall achievement in Mathematics. However, many students continue to struggle with sentence-based problem solving, a persistent issue in the Malaysian context where limited problem-solving skills remain a major concern. Mathematics teachers also face considerable difficulties in teaching sentence-based problems, particularly in helping students to comprehend problem contexts and apply mathematical concepts to real-life situations. Therefore, this study aims to identify the challenges encountered by Mathematics teachers when teaching sentence-based problem solving and to explore the teaching strategies they employ to support students' learning. This study adopted a mixed-methods approach and was conducted in a secondary school in Subang Jaya, Selangor. The findings are presented across three dimensions: students' perceptions, teachers' challenges, and the teaching strategies used in sentence-based Mathematics problem solving. A total of 175 upper secondary students (Forms 4 and 5) were selected through stratified sampling to examine students' perceptions. Ten Mathematics teachers from the same school participated in the investigation of teaching challenges, while four teachers were interviewed to obtain qualitative insights into instructional strategies. The results indicate that upper secondary students generally hold poor perceptions of sentence-based Mathematics problem solving. The study further reveals that the primary challenges faced by teachers stem from student-related factors, particularly students' weak mathematical foundations and limited mastery of essential mathematical skills. Several effective strategies were identified, including the use of Polya's problem-solving steps, problem-based learning in groups, questioning techniques, contextual learning, and structured group discussions. These findings provide valuable insights into students' perceptions and teachers' challenges, enabling Mathematics educators to adopt more effective instructional approaches. Nevertheless, further research involving larger samples and diverse school settings is recommended to deepen understanding and refine strategies for teaching sentence-based Mathematics problem solving.

INTRODUCTION

Improving students' problem-solving skills has become an ongoing challenge for many teachers, particularly in the context of Mathematics. A significant number of students struggle with sentenced-based Mathematics problem-solving tasks, which require them to interpret written scenarios before applying appropriate mathematical procedures (Wakhata et al., 2022). Ishak et al. (2021) note that teachers face multiple challenges when teaching this form of problem-solving, as students must not only understand the underlying concepts but also transfer and apply them to real-life contexts. Consequently, the present study aims to explore effective strategies for teaching sentenced-based Mathematics problem-solving, with the goal of supporting Mathematics teachers in enhancing students' comprehension and performance.

Sentenced-based problem-solving questions represent one of the most demanding components of Mathematics assessments. Students often find these tasks difficult because they must read, identify relevant information, interpret the meaning of the problem, and execute the correct mathematical solution (Moleko & Mosimege, 2020; Wakhata et al., 2022). Learners with weak reading or language skills are particularly disadvantaged, as comprehension is a prerequisite for successful problem-solving. These questions are typically grounded in

real-life situations, requiring students to apply mathematical concepts learned in class to authentic scenarios. As a result, teachers encounter various instructional challenges in helping students develop the requisite skills for tackling these problems (Ishak et al., 2021).

Previous studies have consistently shown that Malaysian students face difficulties in solving sentenced-based Mathematics problems, especially those that require real-life application (Ganesen et al., 2020). This suggests that many students remain unable to connect mathematical concepts with daily experiences, contributing to their overall weak performance in Mathematics. Limited exposure to real-world mathematical tasks further exacerbates this issue, resulting in low achievement, particularly in problem-solving items that require contextual understanding.

Given these concerns, teachers play a critical role in selecting and employing appropriate instructional strategies that can effectively support students' learning of sentenced-based problem-solving. As highlighted by Ishak et al. (2021), meaningful teaching and learning require not only strong content knowledge but also the ability to apply suitable pedagogical approaches. Teachers should also be aware of students' perceptions of sentenced-based Mathematics problem-solving, as these perceptions can guide the planning and implementation of targeted and effective instructional methods (Daud et al., 2020).

Research Objectives

1. To analyse the upper secondary school students' perceptions of sentenced-based Mathematics problem-solving.

2. To identify the challenges faced by the mathematics teachers in teaching sentenced-based Mathematics problem-solving.

3. To examine the relationship between years of serving and challenges faced by the mathematics teachers in teaching sentenced-based Mathematics problem-solving.

4. To explore the effective approaches in teaching sentenced-based Mathematics problem-solving to upper secondary school students.

LITERATURE REVIEW

The Students' Perceptions of Sentence-Based Mathematics Problem-Solving

Mathematics is essential for everyday functioning, yet many students view it as a difficult subject, particularly in the realm of sentence-based problem-solving (Zaharin et al., 2021). This negative perception is often reinforced by peer narratives, where senior students convey the challenges of subjects like Additional Mathematics, shaping the attitudes and expectations of younger cohorts (Ishak et al., 2021). Such beliefs adversely impact students' motivation, interest, and anxiety, leading to poor mathematical performance in problem-solving tasks. Gafoor and Kurukkan (2015) found that students who perceive Mathematics as inherently difficult display low persistence, ineffective learning strategies, and inadequate problem-solving skills (Ishak et al., 2021).

Additionally, sentence-based problem-solving is viewed as cognitively demanding, contributing to students' disengagement (Simamora et al., 2018). Empirical evidence indicates that difficulties arise largely from students' inability to visualize and interpret mathematical concepts within textual scenarios (Moleko & Mosimege, 2020; Shawan et al., 2021). Many struggle to understand problem contexts, identify relevant information, and apply appropriate solution strategies, resulting in consistently poor performance attributed to limited conceptual understanding, low confidence, and weak strategic competence (Wakhata et al., 2022).

Challenges Faced by Mathematics Teachers in Teaching Sentence-Based Mathematics Problem-Solving

Mathematics teachers face significant challenges when instructing secondary school students in sentence-based problem-solving, primarily stemming from student-related factors and external influences. A key issue is

students' lack of foundational mathematical knowledge, exacerbated by the abolishment of the UPSR and PT3 examinations, which has diminished motivation and led to inadequate mastery of essential concepts (Ishak et al., 2021; Moleko et al., 2020; Ling & Mahmud, 2023). This deficit requires teachers to spend considerable time revisiting fundamental skills, as students who struggle with foundational concepts often find it difficult to solve more complex problems. Additionally, many students struggle to transfer mathematical knowledge across contexts, complicating their problem-solving efforts (Sanjeet Sah, 2016).

Another challenge is students' limited understanding of mathematical vocabulary, which hampers their ability to comprehend sentence-based problems (Moleko et al., 2020). Insufficient familiarity with terms and symbols leads to difficulties in interpreting mathematical tasks, especially when faced with lengthy descriptions (Moleko & Mosimege, 2020; Ling & Mahmud, 2023). Furthermore, negative perceptions of mathematics significantly affect students' motivation and confidence, with many viewing the subject as inherently difficult (Taley, 2022). This mindset, often perpetuated by peer narratives and a culture of fear surrounding subjects like Additional Mathematics, discourages engagement and contributes to a reluctance to tackle sentence-based problems. Consequently, this negative attitude presents a substantial obstacle for teachers aiming to enhance student learning and performance.

The Effective Approaches in Teaching Sentenced-Based Mathematics Problem-Solving to Upper Secondary School Students

Teachers are required to diversify instructional strategies to enhance students' understanding, performance, and motivation in sentenced-based Mathematics problem-solving. Prior studies have extensively examined effective approaches for improving students' mathematical problem-solving skills; however, much of this work relies on qualitative methodologies, particularly interview-based designs, resulting in context-specific and varied findings. These studies collectively suggest that no single strategy is universally effective, as instructional practices are often shaped by classroom context, learner characteristics, and teachers' pedagogical beliefs. Consequently, existing literature highlights the need to examine how different strategies complement one another in supporting students' comprehension of sentence-based mathematical problems.

For instance, Ling and Mahmud (2023) identified instructional strategies such as oral questioning, mastery learning, contextual learning, game-based learning, and modular approaches, noting that oral questioning is particularly effective in guiding students to interpret problem statements through structured prompts. However, other scholars argue that reliance on questioning alone may provide only short-term support. Moleko et al. (2020) and Ishak et al. (2021) emphasised the importance of explicitly teaching mathematical vocabulary and strengthening foundational knowledge to enable students to independently interpret and solve new problems. Similarly, Ishak et al. (2021) proposed the Easy Maths Model, which employs step-by-step procedures and mnemonic techniques to support retention and confidence, aligning with Wakhata et al.'s (2020) structured problem-solving framework. Collectively, these findings suggest that effective instruction in sentenced-based Mathematics problem-solving requires an integrated approach that combines guided questioning, explicit vocabulary instruction, and structured procedural models to promote sustained problem-solving autonomy.

RESEARCH METHODOLOGY

This study adopted a mixed-methods research approach to integrate quantitative and qualitative data within a single investigation, allowing the research questions to be examined from multiple perspectives. Mixed-methods designs are particularly effective for capturing both measurable patterns and contextualised insights, thereby enhancing the depth, robustness, and validity of the findings (Regnault et al., 2018; Molina-Azorin et al., 2018). By complementing quantitative results with qualitative evidence, this approach enables triangulation and supports a more nuanced and holistic understanding of the research problem compared to a single-method design (Gogo & Musonda, 2022).

Specifically, the study employed an explanatory sequential mixed-methods design, in which quantitative data were collected and analysed first, followed by qualitative data to further explain the initial findings (Bell et al., 2022). The quantitative phase examined students' perceptions of sentence-based Mathematics problem-solving, and the challenges faced by Mathematics teachers, while the subsequent qualitative phase explored

instructional approaches used by teachers to address these challenges. This design allowed key patterns identified in the quantitative data to guide the qualitative inquiry, thereby providing contextualised explanations and strengthening the interpretive depth and coherence of the overall findings.

Population and Sampling for upper secondary students.

The population of this study comprised upper secondary students from a secondary school in the Subang Jaya district, Selangor. This district was selected due to the presence of several cluster secondary schools, which reflect diverse academic contexts. Upper secondary students were chosen because sentence-based Mathematics problem-solving, particularly in Additional Mathematics, involves higher levels of cognitive and linguistic complexity at this level. The total population of upper secondary students in the selected school was 320.

A stratified sampling technique was employed to ensure that the sample was representative of the population (Sharma, 2017). Based on the Krejcie and Morgan (1970) sample size table, a sample of 175 students was selected. The population was divided into 11 strata according to the number of upper secondary classes, and proportional allocation was applied to determine the number of students selected from each stratum. Within each stratum, participants were chosen using simple random sampling to ensure that every student had an equal chance of selection, thereby enhancing the representativeness and generalisability of the findings.

Table 1 Number of Sample Selected for Each Class

Form	Class	Total Students	Sample; $\frac{Number\ of\ students\ in\ strata}{Total\ Population} \times Sample\ size$
Form 4	4A	37	20
	4K	23	13
	4M	24	13
	4R	35	19
	4S	25	14
	4T	21	12
Form 5	5A	39	21
	5M	28	15
	5R	33	18
	5S	20	11
	5T	35	19
		320	175

Table 1 summarises the sample distribution across the 11 upper secondary classes and the corresponding population sizes. The sample size for each class was determined using proportional allocation to ensure representation consistent with each class's share of the total population. Accordingly, 20 students were selected from Class 4A, 13 from 4K, 13 from 4M, 19 from 4R, 14 from 4S, 12 from 4T, 21 from 5A, 15 from 5M, 18 from 5R, 11 from 5S, and 19 from 5T. Within each class, students were chosen through simple random sampling to ensure equal selection probability. Overall, 175 students were selected, in line with the Krejcie and

Morgan (1970) recommendation for a population of 320, thereby enhancing the representativeness and methodological rigour of the study.

Population and Sampling for The Mathematics Teachers

The teacher component of this study involved Mathematics teachers from a selected secondary school in the Subang Jaya district, Selangor, chosen for its cluster school context. For the quantitative phase, all 10 Mathematics teachers in the school participated in the survey, consistent with the Krejcie and Morgan (1970) recommendation for a population of this size. A census approach was therefore adopted to examine the challenges teachers faced in teaching sentence-based Mathematics problem-solving. The questionnaire was administered online, with a one-week response period.

For the qualitative phase, purposive sampling was used to select four teachers for in-depth interviews. Selection criteria included teaching Mathematics or Additional Mathematics at the upper secondary level and having substantial secondary teaching experience. The interviews explored teachers' perspectives on effective instructional approaches for sentence-based Mathematics problem-solving, providing rich insights that complemented and extended the quantitative findings.

FINDINGS

The Upper Secondary School Students' Perceptions on The Sentenced-Based Mathematics Problem-Solving

Table 2 Mean and Standard Deviation of Students' Perceptions on The Sentenced-Based Mathematics Problem-Solving

	Items	Mean	SD
1	I am interested in studying Mathematics in sentenced-based Mathematics problem-solving	2.27	0.804
2	I enjoy learning Mathematics in sentenced-based Mathematics problem-solving	2.17	0.776
3	I am excited in solving the sentenced-based Mathematics problem-solving because I understand the concept of Mathematics that I have learned	2.25	0.789
4	I am more excited in solving sentenced-based Mathematics problem-solving because I like to challenge myself	2.17	0.874
5	I am thrilled when Mathematical concept is need to use in solving sentenced-based Mathematics problem solving	2.17	0.789
6	I am not easily bored when solving the sentenced-based Mathematics problem-solving	2.33	0.811
7	I like to learn how solve sentenced-based Mathematics problem-solving because this type of questions can enhance my thinking skills	2.61	0.794
8	I love the application of Mathematics to the real-life context in the sentenced-based Mathematics problem-solving because I can improve my problem-solving skills	2.41	0.803

Table 2 presents the mean scores and standard deviations of upper secondary students' perceptions of sentence-based Mathematics problem-solving measured on a four-point Likert scale. The highest mean was recorded for Item 7 (M = 2.61, SD = 0.794), exceeding the midpoint of 2.00 and indicating generally positive perceptions, particularly regarding the role of sentence-based problems in developing higher-order thinking skills. This suggests that, despite their complexity, students recognise the cognitive value of such problems.

In contrast, Items 2, 4, and 5 recorded the lowest mean scores (M = 2.17), reflecting weaker agreement related to enjoyment, perceived challenge, and the application of mathematical concepts. These findings indicate that while students acknowledge the importance of sentence-based problem-solving, affective and conceptual difficulties persist, likely due to linguistic demands and challenges in transferring conceptual knowledge. Overall, the results underscore the need for instructional approaches that strengthen conceptual understanding while reducing cognitive and linguistic barriers to enhance students' engagement and confidence.

Challenges Faced by The Mathematics Teachers in Teaching Sentenced-Based Mathematics Problem-Solving

Table 3 Mean and Standard Deviation of Challenges Faced by The Mathematics Teachers in Teaching Sentenced-Based Mathematics Problem-Solving

	Items	Mean	SD
1	My students are having lack of basic Mathematical knowledge	4.10	0.568
2	My students having difficulty in understanding the sentenced-based Mathematics problem	4.50	0.527
3	My students having difficulty in transforming the sentenced-based Mathematics problem to the operational form	4.40	0.516
4	My students do not have interest in solving the sentenced-based Mathematics problem	3.70	0.483
5	My students do not pay attention when teachers are teaching how to solve the sentenced-based Mathematics problem	2.40	0.843
6	I cannot too focus in teaching the sentenced-based Mathematics problem solving because there are more syllabus to finish up	3.40	1.075
7	I have insufficient time in teaching the sentenced-based Mathematics problem because of too packed curriculum scheduled	3.50	0.707
8	I have a continuing training which makes me cannot teaching effectively the sentenced-based Mathematics problem solving	3.00	1.333
9	I cannot teach effectively in solving the sentenced-based Mathematics problem solving because there is lack of facilities and infrastructure in school	3.10	0.994

Table 3 presents the mean scores and standard deviations of the challenges faced by Mathematics teachers in teaching sentence-based Mathematics problem-solving, based on a five-point Likert scale. The highest mean was recorded for Item 2 (M = 4.50, SD = 0.527), indicating strong teacher agreement that students experience significant difficulty in understanding sentence-based problems. This suggests that the linguistic and contextual demands of word problems, particularly those situated in real-life contexts, pose substantial cognitive challenges as students must interpret verbal information before applying mathematical procedures.

In contrast, Item 5 recorded the lowest mean score (M = 2.40, SD = 0.843), reflecting more varied teacher perceptions regarding students' attentiveness during instruction. While most teachers did not perceive attention as a major issue, the variability indicates that some students may still struggle to remain engaged. Overall, the findings suggest that comprehension rather than engagement constitutes the primary instructional challenge, highlighting the need for pedagogical strategies that explicitly support language comprehension and problem interpretation in Mathematics learning.

The relationship between years of teaching and challenges

Table 4 correlation between years of teaching and challenges

Correlations			
		Years of experience in teaching Mathematics	TotalC
Years of experience in teaching Mathematics	Pearson Correlation	1	-.604
	Sig. (2-tailed)		.064
	N	10	10
TotalC	Pearson Correlation	-.604	1
	Sig. (2-tailed)	.064	
	N	10	10

A Pearson correlation analysis was conducted to examine the relationship between teachers' years of experience in teaching Mathematics and the challenges they face in teaching sentenced-based Mathematics problem-solving. The results indicate a moderate negative correlation between years of teaching experience and challenges ($r = -.604$, $n = 10$); however, this relationship was not statistically significant at the .05 level ($p = .064$). This suggests that teachers with more years of teaching experience tend to report fewer challenges, although the association does not reach conventional levels of statistical significance.

The negative direction of the correlation implies that teaching experience may play a role in reducing perceived instructional challenges, possibly due to increased pedagogical knowledge, classroom management skills, and familiarity with effective problem-solving strategies developed over time.

Effective Approaches Suggested by Mathematics Teachers in Teaching Sentenced-Based Mathematics Problem-Solving

From the interviewed that have been conducted by the researcher, there are various effective approaches suggested by Mathematics teachers in teaching sentenced-based Mathematics problem-solving to the upper secondary students.

Table 5 Analyses of Effective Approaches Suggested by Mathematics Teachers in Teaching Sentenced-Based Mathematics Problem-Solving

Open Coding	Theme
1) understanding the problem, 2) plan the strategy, 3) implement the strategy 4) check and look back (P1, P3, P4)	Polya method
Problem-based learning in group (P2)	
Questioning approach (P2)	

Contextual learning (P3)	
Group discussion (P4)	

For the first approach that have been highlighted by participants is Polya method. Three out of four participants have stated that Polya method is a systematic way to solve the sentenced-based Mathematics problem solving. Participant 1 stated:

"In our Maths application in the last part of every topic there is an application question, and we always need to carry out the four strategies which is they need to understand the problem. Then, they plan the strategy and carry out the strategy and they make conclusion. So, for me I always advise my students to read and reread the problem and then they put the problem in their own word or they might use a flowchart to simplify the question. They also can visualize the problem if there is no diagram given. Finally, they need to check their works, reflect and learn from their mistakes".

These four strategies are followed similarly as the Polya method. Participant 3 stated:

"This method has four steps which are :1) understanding the problem, 2) plan the strategy, 3) implement the strategy, 4) check and look back. This method is teaching the students to answer the questions step by step. With using this method, students will know where they need to start in answering the question".

This approach also supported by Participant 4:

"This step usually has in the mathematics textbook which are understanding the problem, planning the strategy, implementing the strategy and lastly making a conclusion. This guides the students in answering the question step by step. Usually with this systematic step, students can have better understanding in how to answer this type of questions because from the first step it requires the students to understand the question first".

Next approach that is suggested by participant is problem-based learning in group. Participant 2 said that this approach is an appropriate approach to apply to make students familiar with sentenced-based Mathematics problem solving questions:

"Since most students having difficulty in solving the sentenced-based Mathematics problem solving questions, therefore I think it is suitable to apply this approach because it can make the students to familiar with this kind of question which is sentenced-based Mathematics problem-solving questions since problem-based learning also use a real-life context of problem. Thus, when they do it in group, they can discuss with themselves and get more ideas on how to solve the question. If in every class, the teacher has applied the problem-based learning, the students will slowly familiar with this type of question and already know how to plan the strategy and solve the problem".

Participant 2 highlighted that if teacher applied problem-based learning in every class, it will make students familiar with sentenced-based Mathematics problem solving question and improve their knowledge on how to solve the problem.

Furthermore, Participant 2 suggested a questioning approach in teaching sentenced-based Mathematics problem solving. Participant 2 reported:

"Most students having difficulty in understanding and visualize the problem given in the sentenced- based Mathematics problem solving, therefore since I did not want to just give the answer directly to the students and want to stimulate students thinking, then I just applying the questioning technique to the students. I am questioning the students which will lead and guide them to understanding the problem and help them to plan appropriate strategy to solve the problem. With questioning also, it can help the students know the first step that they need to do to solve the problem. This approach can stimulate students thinking and gives opportunity for them to solve the problems independently".

Participant 2 said that by applying questioning approach, it can stimulate students critical thinking since teacher just guide them with questioning. This approach gives students opportunity to solve the problem on their own.

In addition, another effective approach that is suggested is using contextual learning in class. Participant 3 said:

"This teaching approach focusses on connecting mathematical knowledge and concept to the real-world contexts. Therefore, it will help the students in applying the mathematical concept from one context to another context. Teachers can apply this approach by presenting all example and problem in Mathematics topic which related to the real-world context especially give situation which nearest and around the students".

Since sentenced-based Mathematics problem solving usually relate with the real-world problem, Participant 3 pointed out that teachers should use contextual learning in class where teachers gives a lot of real-world problem that related with the mathematics topic to the students and ask them solve the problem. This approach is to ensure students can apply the correct mathematical concept from one context to another context.

Lastly, the effective approach in teaching sentenced-based Mathematics problem solving is group discussion. Participant 4 stated:

"With group discussion, it can stimulate their thinking by discussing with each other and they also can listen to the idea of each other in how to solve the problem given. Usually, students can have the idea in solving the problem when working together with their friends compared to solving the problem individually".

Participant 4 reported that students demonstrated higher motivation when engaging in sentence-based Mathematics problem-solving through group-based activities, as collaboration enabled the sharing of ideas and strategies, thereby increasing students' confidence. Overall, the qualitative findings indicate that effective instructional approaches identified by the participants include the Polya problem-solving method, group-based problem-based learning (PBL), questioning strategies, contextual learning, and structured group discussions. Collectively, these approaches emphasise cognitive scaffolding, peer interaction, and active engagement in problem-solving.

These findings align with previous studies highlighting the effectiveness of mastery learning and explicit instructional support in sentence-based Mathematics problem-solving. Ling and Mahmud (2023) emphasised mastery learning as a means of addressing students' difficulties with language and conceptual application, while Moleko et al. (2020) underscored the importance of explicitly teaching mathematical vocabulary to enhance comprehension. From a theoretical perspective, mastery learning resonates with Bandura's Social Learning Theory (1977), whereby students observe demonstrated solutions, practise problem-solving procedures, and consolidate understanding through repetition, supporting both procedural fluency and conceptual development.

In addition, contextual and game-based learning approaches were strongly reflected in both participants' views and prior research. Contextual learning supports students in connecting mathematical concepts to real-life situations, thereby improving comprehension and relevance (Ling & Mahmud, 2023), while game-based learning enhances engagement and reduces anxiety (Ishak et al., 2021). Furthermore, PBL in group settings encourages collaborative inquiry, critical thinking, and shared responsibility for learning, making it particularly effective for addressing the cognitive and linguistic demands of sentence-based Mathematics problem-solving (Bosica et al., 2021).

DISCUSSION

Upper Secondary School Students' Perceptions on The Sentenced-Based Mathematics Problem-Solving

The findings indicate that students generally held positive perceptions of sentence-based Mathematics problem-solving, particularly recognising its role in developing higher-order thinking skills. However, this

positivity was modest, as reflected by a mean score of 2.61 on a four-point Likert scale, suggesting that students' confidence and motivation remained limited. While students acknowledged the cognitive value of such tasks, their engagement appeared constrained by uncertainty and perceived difficulty.

This pattern aligns with previous research indicating that students' confidence and motivation in Mathematics tend to decline at higher levels of schooling, especially when tasks require complex reasoning and strategic planning (Wakhata et al., 2022). Sentence-based Mathematics problems are often avoided because students prefer routine tasks and struggle with planning solution strategies, a challenge further compounded by low self-efficacy (Gafoor & Kurukkan, 2015; Shawan et al., 2021). Difficulties in interpreting linguistic information and translating it into mathematical representations may also reinforce negative attitudes and avoidance behaviours (Moleko & Mosimege, 2020).

Nevertheless, a small proportion of students expressed positive attitudes towards applying Mathematics to real-life contexts through sentence-based problem-solving. This supports earlier findings that such problems promote meaningful learning, creativity, and real-world application of mathematical concepts (Ling & Mahmud, 2023; Moleko & Mosimege, 2020). Despite these benefits, persistent negative perceptions of Mathematics as a difficult subject continue to hinder engagement among many students (Zaharin et al., 2021). Overall, the findings underscore the need for instructional strategies that enhance conceptual understanding, language comprehension, and self-efficacy to support sustained engagement in sentence-based Mathematics problem-solving.

Challenges Faced by The Mathematics Teachers in Teaching Sentenced-Based Mathematics Problem-Solving

The challenges faced by Mathematics teachers in teaching sentence-based problem-solving are primarily linked to student-related factors, particularly difficulties in understanding complex, worded problems embedded in real-world contexts. Students often struggle to visualise problems, extract relevant information, and apply higher-order cognitive skills for accurate interpretation (Chirimbana et al., 2022; Ling & Mahmud, 2023). These difficulties are compounded when problems involve multiple pieces of information, leading to confusion about what is required (Ishak et al., 2021; Shawan et al., 2021).

Limited knowledge of mathematical terminology and vocabulary further hinders students' ability to comprehend and translate problems into operational or algebraic forms, a critical step for successful problem-solving (Moleko & Mosimege, 2020; Taley, 2022). This gap often results in errors and misconceptions, as students fail to apply previously learned concepts or visualise problem contexts effectively (Shawan et al., 2021). Reading comprehension and conceptual understanding are therefore closely linked to students' problem-solving performance, with deficiencies in these areas increasing the likelihood of mistakes and negative attitudes toward sentence-based tasks (Ling & Mahmud, 2023; Taley, 2022).

Overall, the findings indicate that students' limited understanding of mathematical language and concepts constitutes the main barrier to effective sentence-based problem-solving. This underscores the need for targeted instructional strategies that develop vocabulary, comprehension skills, and the ability to translate real-world situations into mathematical representations, thereby supporting students' problem-solving competence and confidence.

Effective Approaches in Teaching Sentenced-Based Mathematics Problem-Solving to Upper Secondary School Students

Beyond content knowledge, teachers must employ effective instructional strategies to support students' mastery of sentence-based Mathematics problem-solving (Ishak et al., 2021). Qualitative findings from teacher interviews revealed several approaches perceived as effective for upper secondary students, particularly those that provide structured guidance and active engagement with word-based problems.

The Polya problem-solving method emerged as a key strategy, with most participants highlighting its systematic four-step framework: understanding the problem, planning a strategy, implementing the solution,

and reviewing the outcome. Teachers reported that this approach helps students navigate complex sentence-based problems by offering a clear procedural pathway. In practice, students are encouraged to reread and rephrase problems, use visual representations, and apply appropriate mathematical vocabulary to support comprehension and accurate problem translation (Taley, 2022). Prior research supports the effectiveness of this method, showing that consistent application enhances students' ability to solve sentence-based problems successfully (Ishak et al., 2021; Ling & Mahmud, 2023; Ganesan et al., 2020).

Group-based problem-based learning (PBL) and questioning strategies were also identified as effective instructional approaches. PBL fosters collaborative discussion, shared strategy development, and increased confidence through engagement with authentic problems (Bosica et al., 2021; Ling & Mahmud, 2023). Meanwhile, structured questioning enables teachers to scaffold students' thinking without providing direct answers, particularly when students struggle with comprehension. Together, these approaches support differentiated instruction and promote independent, strategic engagement in sentence-based Mathematics problem-solving.

CONCLUSION

The findings of this study indicate that upper secondary students generally hold weak perceptions towards sentence-based Mathematics problem-solving. A significant difference was also observed between Form 4 and Form 5 students' perceptions, suggesting that students' attitudes and confidence in engaging with sentence-based problems may vary across grade levels.

Furthermore, the study identified student-related factors as the primary challenge faced by Mathematics teachers in teaching sentence-based problem-solving. Specifically, students often lack mastery of mathematical skills and, in some cases, fundamental mathematical knowledge. These deficiencies hinder their ability to comprehend, analyse, and solve complex word-based problems effectively.

Understanding both students' perceptions and the challenges encountered by teachers provides a foundation for targeted instructional interventions. Teachers can adopt evidence-based and contextually appropriate teaching strategies to enhance students' engagement, confidence, and competence in sentence-based problem-solving. The findings suggest that a range of pedagogical approaches—such as the Polya method, problem-based learning, contextual learning, and questioning strategies—can be applied, provided they are tailored to students' cognitive abilities, learning preferences, and intellectual needs. By aligning instructional strategies with students' profiles, teachers can potentially improve students' perceptions, mitigate learning difficulties, and foster more effective problem-solving skills.

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