International Journal of Mathematics and Mathematics Education
https://journals.eduped.org/index.php/ijmme
Volume 03, No. 3, 2025

e-ISSN 2986-4534
p-ISSN 2988-0734

Mathematics Teachers' Dilemma in Choosing Linguistically Framed Tasks for Instructional Discourse: A Qualitative Study

Isaac Bengre Taley[1*], Frank Kwarteng Nkrumah[2]

[1,2]Mampong Technical College of Education, Department of Mathematics & Computer Studies, Ghana

*Corresponding author: ibtaley@mtce.edu.gh

Received: 16/04/2025 Revised: 21/07/2025 Accepted: 03/08/2025

ABSTRACT

Purpose – This study investigates the factors influencing high school mathematics teachers' decision-making processes in selecting linguistically framed tasks (LFTs) for instructional purposes. Since LFTs are widely embedded in curriculum materials and standardized assessments, understanding teachers' considerations is crucial for improving task design and classroom practice.

Methodology – A qualitative research design was employed, combining semi-structured interviews with 12 Ghanaian high school mathematics teachers and curriculum document analysis. The data were analyzed thematically, guided by constructivist learning theory and assessment theory, to identify key patterns and pedagogical orientations shaping task selection.

Findings – The analysis revealed four major considerations that shape teachers' decisions: progression of difficulty, differentiated task design, engagement and real-life relevance, and alignment with curriculum standards and exam preparation. Teachers reported scaffolding LFTs from simple to complex, tailoring tasks to diverse learners, emphasizing authentic connections to students' experiences, and strategically preparing them for high-stakes assessments. These practices reflect an interplay between pedagogical intentions and systemic demands.

Novelty – The study contributes original insights into the pedagogical underpinnings of task selection, showing that teachers' choices are not merely technical but are deeply grounded in curriculum policy, learning theories, and professional autonomy. It highlights the need to empower teachers with skills to adapt and design LFTs that address contextual and learner diversity.

Significance – The findings are significant for mathematics teachers, curriculum developers, policymakers, and teacher educators, as they underscore the importance of aligning curriculum goals with responsive instructional practices to enhance equitable and meaningful learning.

Keywords: Curriculum; Engagement; Linguistically framed tasks; Instructional discourse; Progression; Relevance; Student-centred.

How to cite: Taley, I. B., & Nkrumah, F. K. (2025). Mathematics Teachers' Dilemma in Choosing Linguistically Framed Tasks for Instructional Discourse: A Qualitative Study. *International Journal of Mathematics and Mathematics Education*, 03(3), pp, 177-193, doi: https://doi.org/10.56855/ijmme.v3i3.1376

1. Introduction

Mathematics tasks that are in-text constructed are described as word problems or linguistically framed. Linguistically framed tasks (LFTs) consist of problem situations embedded in a linguistic narrative that may be routine or non-routine. Non-routine LFTs are authentic problems whose solution paths are not obvious. However, routine LFTs have solutions deduced from the application of known mathematical concepts inferred from the problem situation (Verschaffel et al., 2020).

High school mathematics textbooks and curricula are replete with linguistically framed tasks (LFTs), partly because the curriculum aims to equip learners to solve LFTs (Ministry of Education [MoE], 2010). In addition, examination bodies, such as the West African Examination Council (WAEC), which is mandated to assess students' mathematics proficiency, use LFTs in their mathematics examinations. Admittedly, the significance of LFTs in mathematics is unquestionable, and teachers are not oblivious to their importance (Taley, 2022b). Subsequently, teachers are committed to appropriately applying LFTs in mathematics instruction (Khoshaim, 2020). Nevertheless, the selection, teaching, and assessment of LFTs have been a nightmare for many high school mathematics teachers. Teaching experience indicates that learners' presage factors (such as learning preferences and proficiency in instructional language), curriculum requirements, and teachers' knowledge and dispositions necessitate that mathematics teachers spend considerable time preparing to select appropriate LFTs for their lessons. As deduced by de Araujo (2017), selecting suitable LFTs is crucial, as these tasks should cognitively challenge students and provide opportunities for high-quality mathematics engagement (the depth and rigor of students' involvement in mathematical tasks).

Extensive studies have explored teaching strategies and assessment techniques in enacting instruction in LFTs (Lei & Xin, 2023; Nur et al., 2023); however, there is a notable gap in research on selecting LFTs, with few studies providing valuable insights. According to de Araujo (2017), teachers' beliefs about students' mathematical and linguistic abilities significantly influence their task selection, as these beliefs shape their understanding of students' linguistic abilities and cultural backgrounds. Thus, teachers often opt for tasks that align with their perceptions, such as those focusing on vocabulary. Similarly, Aubusson et al. (2014) Deduced that teachers adopt task elements based on their beliefs about which elements are likely to create greater levels of student learning outcomes, balancing their choices against factors such as student enjoyment and lesson preparation. Moreover, Sorto et al. (2018) Found a positive relationship between teachers' mathematical knowledge and task complexity, emphasising the importance of teacher knowledge in shaping task selection. This suggests that teachers' mathematical knowledge for teaching is a significant factor that contributes to the selection and implementation of tasks. (Sorto et al., 2018).

Several factors influence the selection of tasks in general mathematics, including learning objectives, students' prior knowledge, instructional resources, classroom dynamics (specific setting or environment in which teaching and learning occur), and contextual considerations. However, these factors may not fully reflect the specific circumstances of LFTs' instruction. Against this background of limited studies on the criteria for selecting LFTs, this study was designed to explore the contextual situation to inform practice and contribute to the literature. The research questions guiding this study are as follows: (1) What considerations influence teachers' selection of linguistically framed tasks? (2) How well are the selection criteria grounded in the mathematics curriculum? Answering these questions will reveal the considerations influencing LFT selection and improve instructional practices and student learning outcomes in mathematics.

1.1. Literature Review

Research on the selection of LFTs in mathematics education is limited, although some studies provide meaningful insights into the factors that inform teachers' choices of mathematics tasks. One important factor is teachers' beliefs about students' linguistic and mathematical capabilities. According to de Araujo (2017), teachers' beliefs about students' mathematical and linguistic abilities, particularly for English Language Learners (ELLs), predicts their choice of tasks. When teachers view ELLs as a homogeneous group, they may opt for tasks that prioritise vocabulary or linguistic simplicity, inadvertently narrowing instructional opportunities. These beliefs act as interpretive lenses, influencing decisions about which tasks are deemed appropriate or accessible for the specific context or population under study.

Another critical determinant is teachers' mathematical knowledge for teaching (MKT). Charalambous (2010) conducted a comparative study examining how teachers with high and low MKT levels selected and implemented mathematical tasks in their teaching. In this study, two teachers, one with high MKT and the other with low MKT, were examined, focusing on task unfolding and the cognitive demands of each task. The differences in instruction and task choices between the two teachers revealed how their knowledge influenced task complexity and selection, addressing the relationship between teachers' MKT and task unfolding. The findings revealed that teachers with higher MKT consistently chose and enacted tasks with greater cognitive demand, demonstrating MKT's impact on instructional rigor. Similarly, Sorto et al. (2018) confirmed that teachers' depth of mathematical knowledge directly influences their ability to make instructional decisions, including task selection that enhances student learning outcomes. Thus, teachers with a more extensive understanding of mathematical instruction are better equipped to make instructional choices, including task selection, which contributes to students' learning experiences.

Teachers also consider student engagement and the learning outcomes when selecting tasks. Aubusson et al. (2014) explored how teachers' choice of "rich tasks", which incorporate features such as authenticity, student-led enquiry, collaboration, student-generated reflection, impact overall lesson choices, student learning, enjoyment, and ease of lesson preparation. Their study found that teachers often balance the anticipated learning benefits of tasks against practical concerns such as ease of preparation and student enjoyment. Consequently, teachers' task selection is shaped by a combination of pedagogical beliefs, student considerations, and pragmatic classroom realities.

Collectively, these studies Charalambous (2010), de Araujo (2017), and Sorto et al. (2018), highlight the multifaceted nature of instructional decision-making in mathematics task selection for students with disabilities. The key considerations identified in this review include teachers' beliefs about students, contextual factors, mathematical knowledge, and perceptions of curriculum alignment. Given the limited research on the selection LFTs, this study seeks to address that gap by exploring how teachers navigate these factors when choosing LFTs for high school mathematics instruction.

1.2. Theoretical Framework

The theoretical framework of this study integrates differentiated instruction grounded in constructivist learning (Suprayogi et al., 2017; Umayrah et al., 2024) and assessment theories (Baird et al., 2017). Constructivist learning focuses on students actively building knowledge through experience and interaction. Differentiated instruction extends this idea by tailoring lessons to meet the unique needs, abilities, and interests of individual learners. In high school mathematics, where students' prior knowledge and cognitive abilities vary widely (Suprayogi et al., 2017), differentiation allows teachers to adapt LFTs to create inclusive, flexible classroom environments. The key principles of differentiation involve tailoring content, processes, and assessments, ensuring responsiveness to individual differences, and fostering equitable access to meaningful learning opportunities.

Assessment theories support differentiation by helping teachers plan lessons that align with curriculum goals using both ongoing (formative) and final (summative) assessments (Shepard, 2019). According to Nurlankyzy and Egemberdiyevna (2023), these assessments provide ongoing feedback, shape teaching strategies, and support personalised learning experiences for students. By emphasising authentic tasks that reflect real-world problems and critical thinking, assessment theories ensure alignment between teaching methods, evaluations, and curriculum objectives. Together, these frameworks enable mathematics teachers to address diverse learner needs while maintaining curriculum standards, ultimately fostering an effective, responsiveness, and inclusive learning environment.

2. Methods

This research utilises Stake's (1995) instrumental case study approach to investigate the considerations that guide high school mathematics teachers' choice of LFTs and their conformity to curricular requirements. An instrumental case study is applied when the example functions to gain insights into bigger issues, which Balog (2016) states is the goal in such studies: to understand something other than the case itself. This study focuses on mathematics teachers within a single educational directorate, providing an in-depth exploration of instructional decision-making and presenting insights applicable to analogous educational contexts.

2.1. Participants and Setting

Considering proximity, we conducted this study in a single educational directorate with four senior high schools (with pseudonyms A, B, C, and D). We employed Onwuegbuzie and Collins' (2007) random purposeful sampling technique to sample mathematics teachers with varying years of experience. To meet the minimum number of interviews required to reach saturation, as suggested by Guest et al. (2006), we sampled 12 mathematics teachers from the selected schools. To sample 12 mathematics teachers from the four senior high schools for the interviews, a comprehensive list of all mathematics teachers from the four schools (totalling 71) was compiled, and each teacher was assigned a unique number for identification. We used a random number generator to select 12 unique numbers ranging from 1 – 71. Next, we matched the selected numbers with the corresponding teachers in the sampling frames. The list shows that three, two, three, and four teachers were randomly selected from schools A, B, C, and D, respectively. We contacted and informed the selected teachers about the study. Interviews were scheduled based on availability. This method ensured a fair and unbiased selection process and provided a representative sample for the study.

2.2. Data Collection

Semi-structured interviews were conducted with each teacher. These interviews allowed us to ask about the criteria that teachers used to select LFTs and their reasons for doing so. During the interview, we provided each teacher with examples of LFTs related to algebraic expressions and equations, sequences and series, and triangles. We sampled these examples from textbooks and mathematics curricula. Teachers were also required to provide a sample of the LFTs they used in their instruction. In addition, they were asked to comment on the appropriateness of the LFTs we showed them. The teachers also explained the usefulness of LFTs and the challenges they encountered during their instruction. Each interview was audio-recorded.

We acknowledge our positionality as insiders in the teaching profession, as mathematics teacher educators, and as former high school teachers. We also acknowledge our role as the primary instrument for designing the study and for collecting and analysing the data. Nevertheless, we employed peer debriefing and triangulated our sources to enhance the credibility and dependability of the findings, as per Silverman (2014).

2.3. Data Analysis

To analyse the data, the established methods of inductive content analysis by Vears and Gillam (2022) were applied. Following the interviews, we transcribed the audio recordings. The transcripts were returned to the teachers for member checking process. We carefully analysed the content of the approved transcripts and read the responses multiple times to familiarise ourselves with the content of each transcript. Each teacher's interview was examined using inductive thematic analysis to infer the initial description and explanation of their considerations. The analysis of these data required several rounds of coding. Coding was initiated by identifying the key phrases and concepts in each transcript. To foreground our understanding of the data, we used analytic memos to describe the focus of the excerpts. Using these memos together with literature related to teachers' beliefs about mathematics tasks (Charalambous, 2010; de Araujo, 2017; Sorto et al., 2018), we developed a set of initial codes (for example, Scaffolding, Bridging, Task variation, familiar context, task relevance, alignment/mathematics, and am-oriented tasks). Subsequently, we combined similar codes to form the initial themes because there were instances of overlap in the initial codes. For example, students' abilities, understanding, and differentiation showed evidence of differentiated tasks in designing teaching. We further engaged with the initial themes. Based on this insight, we regrouped the initial themes into four broad themes underpinning teachers' considerations for selecting LFTs, as presented in Table 1.

Table 1 - Initial themes and codes (Teacher-talks)

Broad Themes	Initial Themes	Codes
Progression in difficulty	1. Start from easy to complex	Scaffolding Bridging
Differentiated task design	1. Students' ability and understanding 2. Differentiation	Relevant knowledge Assessment (formative) Task variation Entry behaviour Diversity Familiar context Level of students' understanding Supportive learning environment
Engagement and relevance	**1.** Interest and engagement **2.** Real-life relevance	Task relevance Involvement Motivation Feedback Feedforward
Standards and examination preparations	1. Standard and exam relevance	Alignment/Mathematization Cognitive activation Exam oriented tasks Standard-based tasks

A total of 73 codes were included in the thematic analysis. Twenty-four codes (32.9%) defined engagement and relevance, 21 codes (28.8%) defined differentiated task design, 16 codes (21.9%) defined progression in difficulty, and 12 codes (16.4%) defined standards and examination preparation. The distribution of codes and the seemingly closed percentages across these themes suggest a balanced and integrated approach to mathematics instruction that addresses varied learning experiences for students.

Following inductive coding, we generated word clouds. The word cloud indicates the emphasis and key focus areas in the transcripts. Exploring the word cloud, as shown in Figure 1, we further confirmed the four themes reflecting the considerations for selecting LFTs.

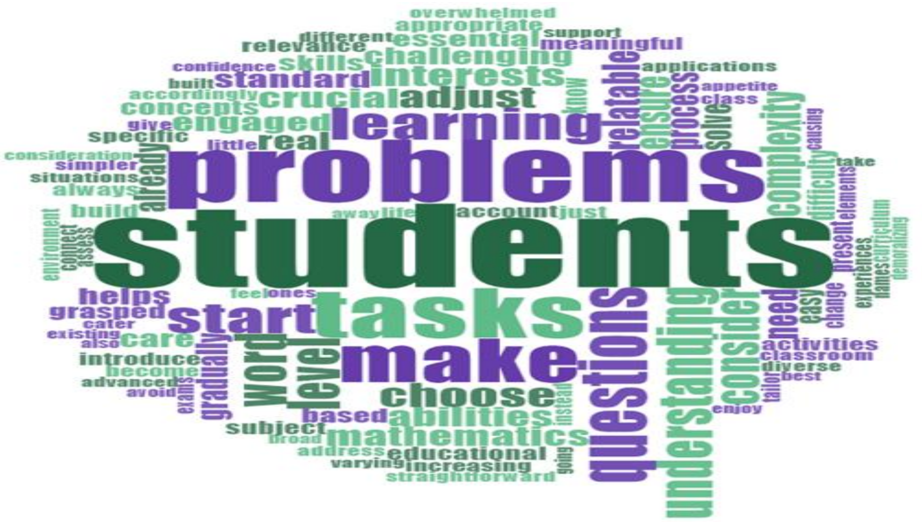

Figure 1. Word Cloud Based on Transcripts

Prominent words, such as questions, tasks, easy, difficult, complexity, solve, gradually, build, step-by-step, confidence, level, and start (Figure 1), depict theme related to the progression in difficulty. Starting from 'easy' questions and gradually progressing to more 'complex or difficult' tasks is a common strategy. This approach helps build confidence and understanding incrementally, thereby preventing students from being overwhelmed. The frequent use of 'solve' and 'questions' highlights the practical aspect of teaching, where teachers focus on ensuring that students can practically engage with and solve LFTs. Teachers also emphasised a step-by-step approach, indicated by words such as 'start' and 'level', which helped to scaffold students' learning experiences. For the theme relating to differentiated task considerations, connecting prominent words in Figure 1, such as students, abilities, consider, understanding, ability, tailor, support, and interest points to teachers frequently emphasising the importance of tailoring LFTs to students' abilities and understanding levels. This notion reflects a student-centred approach in which the diversity of students' capabilities in a class is acknowledged. These words further suggest that teachers are mindful of the divergent individual needs of students and adjust task complexity to ensure inclusivity. 'Interest' indicates that teachers consider what engages students. Incorporating students' interests, such as sporting activities, makes LFTs more relatable and stimulating.

In relation to the theme, engagement and relevance, prominent words such as related, real-life, situations, relevant, practical, connect, interest, relate, every day, and names (Figure 1) explained teachers' quest to make LFTs relevant to real-life situations. From Figure 1, it can be conjectured that teachers believe that connecting problems to everyday activities enhances comprehension, helps demystify mathematics, and shows the practical utility of mathematics in daily life. Using familiar "names" and contexts that students can identify with ("names common to my students") is crucial for making problems more relatable and less abstract for students. The fourth theme, relating to standards and exam preparations, was confirmed with prominent words such as standard, syllabus, scheme, exam, prepare, curriculum, and WASSCE (Figure 1). The transcripts show that teachers are concerned with aligning LFTs with curriculum standards and examination requirements. Terms such as "standard", "syllabus", and "scheme" indicate the importance of adhering to prescribed educational frameworks. Preparing students for exams, such as the West African Senior School Certificate Examination (WASSCE), is a critical consideration. Teachers aim to ensure that the problems they select not only educate but also prepare students for standard assessments.

The word cloud (Figure 1) further highlights the interconnectedness of the four themes, emphasising that effective mathematics instruction, particularly through LFTs, requires a balanced approach that considers difficulty in progression, differentiated task design for student engagement and relevance to real life, and preparation for standardised assessments.

3. Results and Discussion

3.1 Results

In this section, we present the results of this study based on our research questions. Accordingly, the considerations teachers use to select LFTs and an examination of how well the selection criteria are grounded in the mathematics curriculum are presented in this paper. In the initial coding process, four themes emerged from the data of all 12 respondents (Table 1). These include progression in difficulty, student-centred approach, engagement and relevance, and standards and examination preparations.

3.1.1 Progression in Difficulty

In mathematics instruction, progression in difficulty is a strategy founded on Vygotsky's Zone of Proximal Development (ZPD) and scaffolding principles (Muntasir & Akbar, 2023). These principles emphasise a gradual shift from simple to complex tasks to promote learners' confidence and competence in the target language. We understood from the transcripts that in selecting LFTs, teachers start with easy-to-complex tasks emphasising step-by-step pedagogy and highlighting the importance of structured progression as a means to prevent cognitive overload and to scaffold student learning effectively. Teacher 1 articulated,

> *"The best approach to selecting word problem tasks is to start at an easy level. Begin with questions that are very straightforward to ensure that students can build their confidence and understanding from the ground up. It's essential to ease them into the process, gradually increasing the complexity of the tasks. This means that while the problems may become more challenging, they are built on the same foundational concepts that the students have already grasped. You can't just jump in with a broad, complex question right away. For instance, you start with a basic problem. Once the students are comfortable with that, you introduce a slightly more complex one, adding new elements step by step. For the next question, you might add one more layer of complexity, and for the one after that, you add two."*

Teacher 6 highlighted the idea of scaffolding and skill-building over time,

> *"Okay, when selecting questions for teaching word problems, I always make it a priority to give many questions to the students, starting from what they already know and gradually moving to what they don't know yet. It's essential to start from scratch .... So, we must begin from a point they can relate to and understand. By starting with simpler, familiar problems and gradually*

> *increasing the complexity, I ensure that students can build on their existing knowledge without feeling overwhelmed. It's about guiding them step-by-step, making the learning process more accessible and engaging."*

Additionally, Teacher 11 echoed the benefits for progressing difficulty levels, explaining,

> *"starting with simpler, familiar problems and gradually increasing the complexity, I ensure that students can build on their existing knowledge without feeling overwhelmed. This step-by-step approach helps them understand better and builds their confidence as they tackle more challenging problems."*

This review showed that the progression in difficulty is well-supported in the literature. Kim (2020) recommended starting mathematics instruction with concrete exercises prior to progressively advancing to complex concepts, a strategy that improves understanding and retention. Aligned with the teachers' approaches described in our interviews, these scaffolding strategies are essential for helping students progress from fundamental understanding to more complex problem solving. Nevertheless, Habbert and Schroeder (2020) contend that students' self-efficacy can be increased by starting with the most difficult tasks. By confronting difficulties upfront, students may become more resilient if they face challenges heads-on, which suggests that an alternate progression strategy could work in some situations. These viewpoints highlight the need for mathematics teachers to adapt their strategies to students' unique cognitive and developmental requirements. Although increasing difficulty is still a commonly used teaching method in mathematics education, its effectiveness depends on several variables, including the unique challenges posed by the tasks, the characteristics of the students, and their prior knowledge (Ayres, 2013; Herold et al., 2019). According to Mendick (2020), attaining optimal learning outcomes requires a flexible strategy that adapts to learners' diverse needs.

3.1.2 Differentiated Task Design

Differentiated task design in LFTs instruction, anchored in the differentiated instruction of constructivist learning theory (Suprayogi et al., 2017), involves tailoring tasks to students' abilities and understanding, demonstrating a commitment to inclusive mathematics learning. According to Healy et al. (2013), designing student-participatory tasks requires consideration of students' abilities and understanding, mathematical affordances, embodied practices, and multimodal experiences, particularly for students with diverse needs. This approach ensures that tasks cater to the strengths, needs, and learning styles of each student. In selecting LFTs, we learned from teacher-talks that teachers consistently prioritised student abilities and understanding when selecting tasks (Teachers 3, 5, 7, 8, 10, and 12) to ensure accessibility for all students, regardless of their entry behaviour or learning profile. For instance, Teacher 3 explained:

> *"The first consideration when selecting word problem tasks is to assess the students' ability to understand what is being presented to them. It's crucial to ensure that the tasks are within their grasp, so they don't feel overwhelmed or discouraged. … so it's important to gauge the students' abilities and adjust the complexity of the tasks accordingly. If you don't consider their ability and just give them any word problem, it can lead to frustration and disengagement. Moreover, before teaching a new concept, it's essential to review what the students already know. This review helps in identifying their current understanding and readiness for the new material. Based on this assessment, I can then tailor the word problems to ensure they are appropriate and build on the students' existing knowledge."*

Teacher 8 reinforced this individualised approach

> *"So, yes, I consider the kind of students I am dealing with very carefully. Each student is different, and understanding their unique needs and capabilities helps me tailor the tasks to suit them best. This personalised approach ensures that all students feel supported and are given the right amount of challenge to encourage continuous improvement" (Teacher 8)*

Similarly, Teacher 4 highlighted diversity in student abilities:

> *"Secondly, I take into account the diversity of learning styles and abilities within my classroom. Students have different strengths and weaknesses, and it's essential to provide a range of word problems that cater to these differences. For example, I include problems that vary in complexity and context, ensuring that both advanced students and those who need more support are appropriately challenged and engaged" (Teacher 4).*

Teacher 5 described how task complexity is managed in large, mixed-ability classrooms:

> *"to ensure that instruction is both effective and equitable. For a class of 45 students with varying skill levels, it's crucial to cater to the diverse needs of all students. For instance, in a given class, there might be around 15 students who excel in mathematics, some who perform at an average level, and others who struggle. This variation necessitates a thoughtful approach to task selection. One of the primary considerations is the complexity of the questions. In a one-hour lesson, it is often feasible to work through four word problems. To accommodate the different skill levels within the class, I would select a mix of complex and less complex questions. By including two complex problems and two simpler ones, I ensure that both the more advanced students and those who need additional support are adequately challenged and engaged. This balanced approach prevents any group from being underserved and helps maintain a fair and inclusive learning environment." (Teacher 5).*

The effectiveness of this approach has been confirmed in previous studies. Vale et al. (2010) found that differentiated task design strategies improve mathematics outcomes for students from low socioeconomic backgrounds, highlighting their role in promoting educational equity. However, Louie (2019) cautions that teachers who make assumptions about student capabilities can unintentionally limit participation, emphasising the importance of avoiding bias in task selection.

3.1.3 Engagement and Relevance

Engagement and relevance are important aspects of mathematics instruction, aligned with constructivist theories that emphasise the importance of students relating new information to their existing knowledge and to real-world experiences. Mathematics engagement occurs when a student's efforts are focused on mathematics, acquiring mathematical knowledge, fulfilling mathematical tasks, or engaging in academic mathematics. Engagement and relevance refer to the potential of LFTs to engage students' interests in mathematics tasks with real-life relevance. Engagement describes the extent to which students actively participate in classroom activities (Jansen et al., 2023). From our teacher interviews, it was evident that engaging students' interests and making tasks relevant to their lives were primary considerations (Teachers 2, 9, and 12). For example, Teacher 2 noted that

> *"In my experience, the selection of word problems must be handled with great care to avoid demoralizing students or causing them to lose interest in the*

> *subject. Yeah, sometimes, a question may demoralise students and may even take their attention from learning maths. So, you bring to them questions that will whet their appetite from the basics. I've noticed that if students are confronted with overly challenging questions too early in their learning process, it can lead to frustration and a lack of motivation. ... The goal is to whet their appetite for mathematics—essentially, to spark their interest and curiosity right from the basics. As they successfully solve these initial problems, they gain confidence and are more receptive to tackling more complex tasks. This step-by-step progression ensures that students see the continuity in their learning journey. I aim to keep them engaged and motivated, fostering a positive learning environment where students enjoy and look forward to learning mathematics."*

Teacher 12 noted how cultural interests support engagement:

> *"Nowadays, the youth are particularly interested in football and other sporting activities. So, if I can frame problems around football, they tend to understand them more easily. This not only captures their attention but also makes learning more enjoyable and relevant to their lives. Additionally, I try to relate questions to their elective subject areas. This approach helps in making the problems more relatable and applicable to what they are already studying, thereby enhancing their engagement and understanding."*

The idea of connecting mathematics to real-life contexts was further reinforced by Teacher 4:

> *"Thirdly, real-world relevance is a crucial factor in selecting word problems. I choose problems that reflect real-life situations and applications of mathematics. This approach not only makes learning more interesting for students but also helps them understand the practical importance of mathematical concepts. By seeing how math applies to their everyday lives, students are more likely to stay motivated and interested in their learning."*

Our observations agree with Leiss et al. (2019) that solving reality-based tasks requires both mathematical and real-world understanding of the problem. To this end, Irvine (2020) demonstrated that real-world connections and active student involvement positively influence student engagement and attitudes. Basu and Greenstein (2019) advocated knowledge-eliciting mathematical activities that leverage students' everyday experiences and cultural knowledge as resources for instruction. The use of real-life contexts and familiar names explained by teachers in this study demonstrates their efforts to make mathematics more accessible and engaging, collectively with the existing literature underscoring the value of connecting mathematical concepts to students' existing knowledge and real-world experiences, promoting engagement, and enhancing comprehension in mathematics education.

3.1.4 Standards and Examination Preparations

According to the assessment theory of Byun and Herbel-Eisenmann (2024), aligning tasks with curriculum standards and preparing students for examinations in mathematics instruction is crucial for fostering competency, and confidence in assessment theory is a critical aspect of mathematics instruction, especially in high-stakes testing environments. Mathematics standards and examination preparations focus on assisting students in developing their competency and confidence in the abilities required at a particular grade level. The teacher interviews revealed a strong focus on standards and examination preparation, particularly in ensuring that tasks reflect both syllabus requirements and the types of questions students would encounter in exams (Teachers 4, 5, and 9, respectivel). For this consideration, Teacher 5 stated:

> *"Preparation for standardized tests, such as the WASSCE, is also a significant consideration. The problems selected must reflect the types and standards of questions students will encounter in their final exams. This alignment ensures that students are not only practicing their problem-solving skills but are also familiarizing themselves with the format and expectations of their upcoming assessments. By incorporating standard question types and formats, I help students build confidence and competence for their exams. Lastly, the quality of the questions is paramount. I strive to ensure that the questions I present are of high standard and can be appreciated by outsiders for their rigor and clarity. This commitment to quality reflects my dedication to providing a robust and effective mathematics education. High-quality questions not only test students' understanding but also challenge them to apply their knowledge in various contexts, thereby reinforcing their learning and problem-solving abilities.".*

Similarly, Teacher 9 highlighted the importance of adhering to syllabus standards to meet educational goals stressing

> *"Besides interest, I also consider the standard of the question. At least one standard question that everyone should be able to answer is crucial. This is because meeting the syllabus requirements is essential. The syllabus sets the benchmark for what students need to know, so ensuring that they can answer at least one standard question helps meet these educational standards. So, in summary, I select tasks that align with the students' interests to make learning engaging and relatable, and I also ensure that the tasks meet the syllabus standards to fulfil the educational requirements."*

This focus is consistent with assessment theory, which suggests that balancing standards-based instruction and test preparation is critical in high-stakes testing environments (Byun & Herbel-Eisenmann, 2024). However, Sonnert et al. (2020) cautioned that while teaching the test may improve short-term performance, it can negatively affect long-term outcomes, particularly for students with weaker mathematics preparation. Matorevhu (2020) further warned that an overemphasis on test preparation can lead to drilling techniques that prioritise grades over the development of higher-order thinking skills, reducing the real-world applicability of mathematical knowledge.

3.2 Discussion

To foreground the four considerations that guide teachers in selecting LFTs in the core mathematics curriculum, we extracted the Aims, Philosophy, and Instructional Expectations of the curriculum (MoE, 2010). Using these extracts, we applied Braun and Clarke's (2012) deductive coding strategy to develop codes aligned with the themes extracted from teacher talks.

The curriculum supports the progression in difficulty through its emphasis on progressive skill development, critical thinking, and readiness for higher education, ensuring that students build a strong foundation before the tackle more complex problems. The curriculum aims to develop mathematical curiosity, inductive and deductive reasoning, and confidence in solving real-life problems, suggesting a progression from a basic understanding to more challenging applications (Ismail & Imawan, 2023; Kania et al., 2025). Preparing students for further mathematics studies implies a structured increase in the difficulty of ensuring their readiness for advanced concepts. Instructional strategies to meet these aims include encouraging higher-order reasoning and problem-solving skills, which necessitate a gradual increase in task complexity. Teachers guide and facilitate learning by adapting and planning lessons to meet learners' varied abilities and experiences, ensuring that all students progress at an appropriate pace. The instructional strategies underpinning in the enquiry-based philosophy encourage students to progressively expand and modify their understanding, supporting a gradual increase in difficulty.

Regarding the theme of differentiated task design, the curriculum is grounded in instruction that promotes active, hands-on learning experiences tailored to individual student needs, thus enhancing engagement and personal responsibility in the learning process. The mathematics curriculum aims to encourage students to enjoy mathematics, develop patience, and persist in problem-solving to support a learning environment in which student engagement and interest are prioritised (Akendita et al., 2025; Kania et al., 2024). Developing confidence and competence in mathematics further aligns with differentiated practices, as these goals are best achieved when the instruction is responsive to students' needs. The instructional strategy expects teachers to select and adapt content to meet the interests, abilities, and experiences of learners, ensuring that instruction is relevant and engaging for each student. Generating discourse and encouraging students to take responsibility for their learning fosters a student-centred classroom, where learners are active participants in their education. Philosophically, the mathematics curriculum perceives learning as an active process in which students construct knowledge based on their experiences, with teachers serving as facilitators. This approach further underscores the significance of tailoring instruction to students' needs and interests, thereby fostering a differentiated and inclusive learning environment.

In support of the theme, relevance, and engagement, the curriculum effectively promotes relevance and engagement by linking mathematical concepts to real-life applications, encouraging the use of technology, and fostering a learning environment in which students can collaboratively explore and solve practical problems. The curriculum aims to appreciate the usefulness and power of mathematics and apply it to analyse and solve real-life problems, highlighting the curriculum's focus on making mathematics relevant and engaging (Putri & Khadijatuzzahra, 2025). Teachers are encouraged to design instructional strategies that allow students to work on real-life problems, use appropriate technologies, and enhance the relevance of their learning experiences. Additionally, teachers are required to present ideas in multiple ways and promote peer critiquing among learners to make learning more dynamic and engaging. The aims and instructional strategy advocated in the curriculum underscore the learner-centred philosophy, which views learners as researchers and information constructors and promotes students' experiences and interests, thereby enhancing engagement.

By providing a structured framework that emphasises critical thinking, problem solving, and systematic assessment of student understanding, the curriculum supports standards and exam preparation themes. Aiming to develop critical thinking, logical reasoning, and problem-solving skills, and to use mathematical language and symbols, the curriculum ensures that learners are well prepared for standardised assessments and future academic challenges. In the mathematics curriculum, teachers are expected to use multiple approaches to gather data on learners' understanding and provide feedback, which is crucial for preparing students for examinations (Dhuli et al., 2023). A structured approach to teaching and learning, with clear standards and indicators, ensures that students are systematically prepared for assessments. Philosophically, the curriculum's enquiry-based approach not only prepares students for exams but also emphasises the development of skills necessary for academic success and lifelong learning.

The Ghanaian high school mathematics curriculum demonstrates a strong alignment with the four major considerations identified in this study. These connections emphasise that teachers are not simply implementers of prescribed tasks but active agents interpreting and enacting curricula in ways that respond to learner needs and contexts. This reinforces the importance of professional judgment, scaffolding strategies, and differentiated planning in the selection of LFTs. In regions with multilingual classrooms, such as those in sub-Saharan Africa, South Africa, and some regions of Southeast Asia, the focus on language accessibility and task differentiation aligns with global initiatives to enhance inclusivity in mathematics education. Similarly, the notion of aligning tasks with real-life applications and examination standards is pertinent in high-stakes testing contexts worldwide. The analysis indicated that teachers play a crucial role in shaping curriculum implementation through their instructional decision-making and actions.

As explained by Kim and Atanga (2014), teachers' decisions regarding task enactment can create opportunities for student learning, especially when addressing gaps in the curriculum. Furthermore, teachers can act critically on the curriculum by shifting their focus, adopting supportive curricular perspectives, and implementing innovations reflectively, dynamically, and contextually (Gelmez-Burakgazi, 2020). These findings highlight the importance of teachers' professional competence in curriculum implementation and their ability to apply instructional practices to meet students' needs, interests, and achievements (Yolcu & Akar-Vural, 2021), particularly in selecting and teaching LFTs efficiently. Modules on scaffolding techniques and differentiated teaching should be included in teacher preparation programs so that teachers can create tasks that meet the requirements of a wide range of students with diverse needs. For instance, workshops might mimic real-world situations in which teachers practice choosing LFTs according to different student ability levels and curricular needs. Furthermore, including case studies from this study in professional development sessions can offer useful perspectives, showing how factors such as task progression and applicability to real-world situations can improve learning outcomes and student's engagement.

3. Conclusion

Amid the abundance of LFTs in curriculum materials for instruction, the present study has shown that high school mathematics teachers' choice of LFTs is influenced by several factors. Generally, the high school mathematics curriculum in Ghana is well-aligned with the four considerations for selecting the LFTs identified in this study. This alignment underscores the importance of a comprehensive approach to mathematics instruction that balances progression in difficulty, differentiated task design, relevance and engagement, and adherence to the standards. These considerations are crucial for fostering an inclusive, motivating, and educationally sound learning environment that ultimately enhances students' mathematics outcomes. By grounding their instructional choices in these considerations, teachers can effectively address the diverse needs of their students, helping them achieve a deeper understanding and appreciation of mathematics. This study highlights the necessity of continuous professional development and curriculum refinement to support teachers' efforts to implement these best practices in mathematics instruction.

The research conducted in this study was limited to a single educational directorate and concentrated on high school teachers, which may restrict the applicability of the results to other educational levels, regions, or countries with distinct educational contexts and curricula.

Additionally, relying only on interviews may lead to biased results, as teachers may provide socially desirable responses. The use of observational data and other methods could enhance the validity of these findings in future studies. Furthermore, the curriculum evaluation curriculum was based on current documents. As changes in the curriculum may occur in the future, this could impact the alignment of task-selection considerations.

It is recommended that teachers be provided with a diverse range of LFTs that cater to varying degrees of difficulty, student interests, and real-world applications. Digital platforms can provide access to a wide array of tasks and facilitate personalised instruction, which can aid teachers in locating and employing appropriate tasks in their teaching. To validate and expand the findings of this study, additional research involving larger and more diverse samples encompassing different educational levels and regions is suggested. Mixed-method approaches can provide a more comprehensive understanding of task-selection practices. Subsequently, as previous studies (Taley, 2022a) have shown that teachers enact quality mathematics instruction, future studies should investigate how the interrelationship between appropriately selected LFTs and quality instruction can improve students' learning outcomes in mathematics.

Acknowledgments

The authors sincerely thank the headteachers, mathematics teachers, and staff of the participating schools for their invaluable cooperation and support during the data collection phase of this study. We are especially grateful for the time and insights generously shared by the mathematics teachers who participated in the interviews regarding their selection and use of linguistically framed tasks in mathematics instruction. Their openness and professional reflections greatly enriched the findings of this study.

Conflict of Interest

The authors declare no conflicts of interest.

References

Akendita, P. A., Boateng, F. O., Arthur, Y. D., Banson, G. M., Abil, M., & Ahenkorah, M. (2025). The Mediating Role of Teacher Effective Communication on the Relationship between Students' Mathematics Interest and their Mathematics Performance. *International Journal of Mathematics and Mathematics Education*, *3*(1), 1–17. https://doi.org/10.56855/ijmme.v3i1.1214

Aubusson, P., Burke, P., Schuck, S., Kearney, M., & Frischknecht, B. (2014). Teachers choosing rich tasks. *Educational Researcher*, *43*(5), 219–229. https://doi.org/10.3102/0013189x14537115

Ayres, P. (2013). Can the isolated-elements strategy be improved by targeting points of high cognitive load for additional practice? *Learning and Instruction*, *23*, 115–124. https://doi.org/https://doi.org/10.1016/j.learninstruc.2012.08.002

Baird, J.-A., Andrich, D., Hopfenbeck, T. N., & Stobart, G. (2017). Assessment and learning: fields apart? *Assessment in Education: Principles, Policy & Practice*, *24*(3), 317–350. https://doi.org/10.1080/0969594x.2017.1319337

Balog, C. (2016). A validation of the efficacy of descriptive instrumental collective case study research methodology for examining pilot cognitive functioning. *International Journal of Aviation, Aeronautics, and Aerospace*, *3*(4), 1–17. https://doi.org/10.15394/ijaaa.2016.1094

Basu, D., & Greenstein, S. (2019). Cultivating a space for critical mathematical inquiry through knowledge-eliciting mathematical activity. *Occasional Paper Series*, *2019*(14), 15–21. https://doi.org/10.58295/2375-3668.1299

Braun, V., & Clarke, V. (2012). Thematic analysis. In *APA handbook of research methods in* *psychology, Vol 2: Research designs: Quantitative, qualitative, neuropsychological, and biological*. (pp. 57–71). American Psychological Association. https://doi.org/10.1037/13620-004

Byun, S., & Herbel-Eisenmann, B. (2024). "Guess what they would make you do on this one": The discourse of a high-stakes exam in an AP Calculus classroom. *The Journal of Mathematical Behavior*, *73*, 101127. https://doi.org/10.1016/j.jmathb.2024.101127

Charalambous, C. Y. (2010). Mathematical knowledge for teaching and task unfolding: An exploratory study. *The Elementary School Journal*, *110*(3), 247–278. https://doi.org/10.1086/648978

de Araujo, Z. (2017). Connections between secondary mathematics teachers' beliefs and their selection of tasks for English language learners. *Curriculum Inquiry*, *47*(1), 363–389. https://doi.org/10.1080/03626784.2017.1368351

Dhuli, R., Lamo, P., & Larsari, V. N. (2023). An Analysis of the Significance of Vocabulary in Fostering ESL/EFL Students' Writing Skills: An Empirical Study. *International Journal of Contemporary Studies in Education (IJ-CSE)*, *2*(1). https://doi.org/10.56855/ijcse.v2i1.252

Gelmez-Burakgazi, S. (2020). Curriculum adaptation and fidelity: A qualitative study on elementary teachers' classroom practices. *Issues in Educational Research*, *30*(3), 920–942.

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough?: An experiment with data saturation and variability. *Field Methods*, *18*(1), 59–82. https://doi.org/10.1177/1525822X05279903

Habbert, R., & Schroeder, J. (2020). To build efficacy, eat the frog first: People misunderstand how the difficulty-ordering of tasks influences efficacy. *Journal of Experimental Social Psychology*, *91*, 104032. https://doi.org/10.1016/j.jesp.2020.104032

Healy, L., Fernandes, S. H. A. A., & Frant, J. B. (2013). Designing tasks for a more inclusive school mathematics. *Proceedings of ICMI Study 22*, 61–78.

Herold, K. H., Bock, A. M., Murphy, M. M., & Mazzocco, M. M. M. (2019). Expanding task instructions may increase fractions problem difficulty for students with mathematics learning disability. *Learning Disability Quarterly*, *43*(4), 201–213. https://doi.org/10.1177/0731948719865476

Irvine, J. (2020). Positively influencing student engagement and attitude in mathematics through an instructional intervention using reform mathematics principles. *Journal of Education and Learning*, *9*(2), 48–62. https://doi.org/10.5539/jel.v9n2p48

Ismail, R., & Imawan, O. R. (2023). Five Priority Character Values: Content Analysis in The Independent Curriculum Mathematics Textbook in Indonesia. *International Journal of Mathematics and Mathematics Education*, *1*, 83–103. https://doi.org/10.56855/ijmme.v1i02.330

Jansen, A., Curtis, K., & Mohammad Mirzaei, A. (2023). Secondary mathematics teachers' descriptions of student engagement. *Educ Stud Math*, *113*, 425–442. https://doi.org/10.1007/s10649-023-10228-x

Kania, N., Saepudin, A., & Gürbüz, F. (2025). Assessing cognitive obstacles in learning number concepts: Insights from preservice mathematics teachers. *JRAMathEdu (Journal of Research and Advances in Mathematics Education)*, 146–166. https://doi.org/10.23917/jramathedu.v10i3.8638

Kania, N., Suryadi, D., Kusumah, Y. S., Dahlan, J. A., Nurlaelah, E., & Elsayed, E. E. (2024). Comparative Praxeology: Assessing High-Level Cognitive Skills in TIMSS and Indonesian National Examinations. *International Journal of Applied Learning and Research in Algebra*, *1*(1), 25–47. https://doi.org/10.56855/algebra.v1i1.1160

Khoshaim, H. B. (2020). Mathematics teaching using word-problems: Is it a phobia? *International Journal of Instruction*, *13*(1), 855–868. https://doi.org/10.29333/iji.2020.13155a

Kim, H. (2020). Concreteness fading strategy: A promising and sustainable instructional model in mathematics classrooms. *Sustainability*, *12*(6), 2211. https://doi.org/10.3390/su12062211

Kim, O. K., & Atanga, N. A. (2014). Teachers' decisions on task enactment and opportunities for students to learn. *Proceedings of the 35th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*, 66–73.

Lei, Q., & Xin, Y. P. (2023). A synthesis of mathematical word problem-solving instructions for English learners with learning disabilities in mathematics. *Review of Education*, *11*(2). https://doi.org/10.1002/rev3.3396

Leiss, D., Plath, J., & Schwippert, K. (2019). Language and mathematics - Key factors influencing the comprehension process in reality-based tasks. *Mathematical Thinking and Learning*, *21*(2), 131–153. https://doi.org/10.1080/10986065.2019.1570835

Louie, N. (2019). Agency discourse and the reproduction of hierarchy in mathematics instruction. *Cognition and Instruction*, *38*(1), 1–26. https://doi.org/10.1080/07370008.2019.1677664

Matorevhu, A. (2020). O – Level mathematics and science teachers' alignment of stem skills oriented instructional objectives with assessment in a high stakes examinations environment. *International Journal of Trends in Mathematics Education Research*, *3*(1), 1–7. https://doi.org/10.33122/ijtmer.v3i1.165

Mendick, H. (2020). *Inside the mathematics class: Sociological perspectives on participation, inclusion, and enhancement*. Springer.

Ministry of Education [MoE]. (2010). *Core mathematics syllabus*. Curriculum Development and Research Division.

Muntasir, M., & Akbar, I. (2023). Revisiting the significance of ZDP and scaffolding in English Language teaching. *JETLEE : Journal of English Language Teaching, Linguistics, and Literature*, *3*(1), 40–45. https://doi.org/10.47766/jetlee.v3i1.1276

Nur, A. S., Nuraini, K. D., & Mayasari, D. (2023). The effectiveness of dynamic assessment strategies in solving math word problems using cultural context. *Technium Soc. Sci. J*, *50*, 133–149. https://doi.org/10.47577/tssj.v50i1.9880

Nurlankyzy, Y. K., & Egemberdiyevna, K. U. (2023). Exploring the role of assessment in supporting differentiated instruction and individualized learning. *IARJSET*, *10*(6). https://doi.org/10.17148/iarjset.2023.10601a

Onwuegbuzie, A. J., & Collins, K. M. T. (2007). A Typology of mixed methods sampling designs in social science research. *The Qualitative Report*, *12*(2), 281–316.

Putri, K. K., & Khadijatuzzahra, K. (2025). Students' Creative Thinking Abilities in Solid Geometry Topics. *International Journal of Geometry Research and Inventions in Education (Gradient)*, *2*(01), 27–41. https://doi.org/10.56855/gradient.v2i01.1397

Shepard, L. A. (2019). Classroom assessment to support teaching and learning. *The ANNALS of the American Academy of Political and Social Science*, *683*(1), 183–200. https://doi.org/10.1177/0002716219843818

Silverman, D. (2014). *Interpreting Qualitative Data* (5th ed.). SAGE.

Sonnert, G., Barnett, M. D., & Sadler, P. M. (2020). Short-term and long-term consequences of a focus on standardized testing in AP calculus classes. *The High School Journal*, *103*(1), 1–17. https://doi.org/10.1353/hsj.2020.0000

Sorto, M. A., Wilson, A. T., & White, A. (2018). Teacher knowledge and teaching practices in linguistically diverse classrooms. *ICME-13 Monographs*, 219–231. https://doi.org/10.1007/978-3-319-75055-2_16

Stake, R. (1995). *The art of case research*. Sage.

Suprayogi, M. N., Valcke, M., & Godwin, R. (2017). Teachers and their implementation of differentiated instruction in the classroom. *Teaching and Teacher Education*, *67*, 291–

301. https://doi.org/10.1016/j.tate.2017.06.020

Taley, I. B. (2022a). Do students like us because we teach well? The popularity of high school mathematics teachers. *Asian Journal for Mathematics Education*, *1*(4), 384–407. https://doi.org/10.1177/27527263221142906

Taley, I. B. (2022b). Teacher and student views of mathematics word problem-solving task at senior high school level. *Faculty of Natural and Applied Sciences Journal of Mathematics, and Science Education*, *3*(2), 33–43.

Umayrah, A., Iswara, P. D., Salsabila, S., Azzahra, S. S., & Jeujanan, M. (2024). The nature of differentiated learning in the perspective of constructivist educational philosophy: A systematic literature review. *Jurnal Kependidikan: Jurnal Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran Dan Pembelajaran*, *10*(2), 691–703. https://doi.org/10.33394/jk.v10i2.11474

Vale, C., Weaven, M., Davies, A., & Hooley, N. (2010). *Student centred approaches: Teachers' learning and practice*. Deakin University.

Vears, D. F., & Gillam, L. (2022). Inductive content analysis: A guide for beginning qualitative researchers. *Focus on Health Professional Education: A Multi-Professional Journal*, *23*(1), 111–127. https://doi.org/10.11157/fohpe.v23i1.544

Verschaffel, L., Schukajlow, S., Star, J., & Van Dooren, W. (2020). Word problems in mathematics education: a survey. *ZDM*, *52*(1), 1–16. https://doi.org/10.1007/s11858-020-01130-4

Yolcu, O., & Akar-Vural, R. (2021). An examination of instructional autonomy practices of science teachers. *International Journal of Educational Methodology*, *7*(1), 79–94. https://doi.org/10.12973/ijem.7.1.79