

## Process- vs. Product-Oriented Worked Examples: Effects on Knowledge Transfer and Cognitive Load in Financial Literacy Learning

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**ABSTRACT:** Worked examples are widely used in mathematics instruction, yet the relative effectiveness of process-oriented versus product-oriented formats for supporting knowledge transfer and managing cognitive load remains underexplored in financial literacy contexts. This study compared the effects of these two formats on near transfer, far transfer, and self-rated cognitive load among Grade VII students learning financial literacy. Using a Posttest-Only Control Group Design, 62 seventh-grade students (mean age 13 years) were randomly assigned to either a process-oriented (n = 32) or product-oriented (n = 30) worked example condition. Results indicated no significant difference between formats for near transfer or cognitive load, suggesting that both formats impose comparable mental demands on novice learners. However, the process-oriented group significantly outperformed the product-oriented group on far transfer, indicating that explicit elaboration of solution reasoning supports the formation of flexible knowledge schemas applicable to novel financial problem-solving contexts. These findings suggest that instructional format selection should be guided by the intended transfer outcome, with process-oriented worked examples recommended when developing transferable financial reasoning competencies in junior secondary mathematics education.

**Keywords:** Cognitive load theory, Financial literacy, Knowledge transfer, Worked examples, Process-oriented, Product-oriented, Far transfer, Near transfer.

### 1. INTRODUCTION

Financial literacy instruction in junior secondary school requires students not only to acquire factual knowledge about financial concepts, but also to construct and apply flexible problem-solving schemas across varied financial contexts such as discounts, interest, taxes, and savings [1]. From a cognitive perspective, this dual demand procedural execution and conceptual understanding places substantial cognitive load on learners, particularly novices who are simultaneously managing new mathematical procedures and unfamiliar financial contexts [2]. Research has shown that early and well-designed financial literacy instruction is associated with responsible financial behavior and informed decision-making among adolescents [3,4]. In the Indonesian mathematics education context specifically, worked examples have been shown to support both problem-

solving performance and cognitive load management among secondary school students [5]. These findings highlight the need for instructional designs that can effectively manage cognitive load while supporting the transfer of problem-solving schemas to novel financial tasks a challenge that makes the study of worked examples particularly relevant in this domain.

One instructional approach with strong theoretical grounding for managing cognitive load is the use of worked examples (WE) step-by-step problem-solving demonstrations that guide learners through solution procedures [6]. Grounded in Cognitive Load Theory

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(CLT), which posits that learning is constrained by the limited capacity of working memory and facilitated by the accumulation of schemas in long-term memory [2,7,8], worked examples are effective because they reduce the extraneous cognitive load associated with unguided problem search, freeing working memory resources for schema construction and automation [9]. The complexity of a learning task, which is determined by the number of interacting elements that must be processed simultaneously, further modulates the extent to which worked examples can reduce cognitive load [10]. This worked example effect the superiority of studying examples over solving equivalent problems, especially for novice learners is one of the most robust findings in the CLT literature [6,11].

Worked examples are broadly categorized into two formats that differ in the degree of process transparency provided to learners [12,13]. Process-oriented worked examples make the problem-solving process explicit by embedding reasoning steps and logical justifications alongside each calculation, thereby directing learners' attention toward underlying conceptual relationships and supporting schema construction [13]. Product-oriented worked examples, by contrast, present only the final solution steps without explanatory rationale, requiring learners to infer the reasoning independently [13]. From a CLT perspective, these two formats carry contrasting theoretical predictions: process-oriented examples are expected to reduce extraneous load for novices by minimizing solution-search effort, whereas product-oriented examples may reduce redundant information for learners with sufficient prior knowledge consistent with the redundancy effect potentially freeing resources for schema refinement, but risk increasing extraneous load through confusion when applied to true novices who lack the prerequisite knowledge to infer missing reasoning steps a dynamic consistent with the Expertise Reversal Effect [14,15]. Whether this theoretical distinction translates into measurable cognitive load differences among Grade VII novices, whose prior knowledge levels may be more homogeneous than those studied in prior research, remains an empirical question. Empirically, findings have been inconsistent: Van Gog *et al.* [13] found process-oriented examples superior for troubleshooting transfer in a technical domain, whereas Sozio *et al.* [12] reported that product-oriented examples were equally or more effective for near transfer in ill-structured domains. Wong *et al.* [16] similarly observed that product-oriented formats enhanced procedural performance without imposing additional cognitive load. These inconsistencies suggest that the relative advantage of each format may be contingent on task structure, domain complexity, and transfer type a

boundary condition that remains underexplored in financial literacy contexts.

Despite the theoretical importance of worked example format in managing cognitive load, several gaps remain in the existing literature. First, prior comparisons of process- and product-oriented formats have been conducted predominantly in technical or ill-structured domains [12,13], leaving the financial literacy domain which combines structured mathematical procedures with contextual decision-making demands largely unexamined. Second, most prior studies have assessed either near transfer or cognitive load in isolation, without simultaneously measuring both near and far transfer alongside self-rated cognitive load in a single experimental design. Third, the financial literacy domain presents a distinctive instructional context in which the relevance of mathematical procedures to real-world financial decisions may itself influence cognitive engagement a dimension of the learning environment that has not been systematically examined in worked example research. The present study addresses these gaps by experimentally comparing process-oriented and product-oriented worked examples among Grade VII novice learners in a financial literacy context, simultaneously measuring near transfer, far transfer, and self-rated cognitive load. In doing so, it aims to identify the instructional conditions under which each format most effectively supports knowledge transfer while managing cognitive load with direct implications for instructional design in financial literacy education.

## ■ METHODS

This study employed a Posttest-Only Control Group Design involving a total of 62 seventh-grade students, consisting of 27 male and 35 female students ( $M = 13.11$  years old;  $SD = 0.61$ ). Students were randomly assigned to one of two instructional conditions using a simple random assignment procedure: names were drawn from a class list without replacement, with the first 32 names assigned to the Process-Oriented Worked Example group (14 males, 18 females) and the remaining 30 to the Product-Oriented Worked Example group (13 males, 17 females). This random assignment procedure was implemented to ensure initial equivalence between groups and to allow any differences in learning outcomes to be attributed directly to the type of worked example intervention provided.

## ■ MATERIAL

The financial literacy learning materials covering discounts, interest, taxes, and savings were delivered to

students through three phases: Introductory, Acquisition, and Test. Prior to instruction, the researchers established the learning objectives and competency achievement framework. In the Introductory phase, all experimental groups (Process-Oriented Worked Example vs. Product-Oriented Worked Example) received identical introductory materials designed to activate prerequisite

knowledge, such as converting fractions and percentages to decimals, and introducing contextual word problems related to financial literacy.

The design of the worked example materials in this study was adapted from the framework established by van Gog *et al.* [13], who defined process-oriented worked

### 1 (a) Process-Oriented Worked Example

Problem: The purchase price for a dozen notebooks is Rp48,000; pencils Rp24,000; ballpoint pens Rp36,000; and rulers Rp30,000. What is the total purchase price for one notebook, one pencil, one ballpoint pen, and one ruler?		
Step	Calculation	
Step 1	Price of 1 notebook = Rp48,000 ÷ 12 = Rp4,000	<i>1 dozen = 12 units. ∴ Price of 1 notebook = price of one dozen ÷ 12</i>
Step 2	Price of 1 pencil = Rp24,000 ÷ 12 = Rp2,000	<i>1 dozen = 12 units. ∴ Price of 1 pencil = price of one dozen ÷ 12</i>
Step 3	Price of 1 ballpoint pen = Rp36,000 ÷ 12 = Rp3,000	<i>1 dozen = 12 units. ∴ Price of 1 ballpoint pen = price of one dozen ÷ 12</i>
Step 4	Price of 1 ruler = Rp30,000 ÷ 12 = Rp2,500	<i>1 dozen = 12 units. ∴ Price of 1 ruler = price of one dozen ÷ 12</i>
Step 5	Total price = Rp4,000 + Rp2,000 + Rp3,000 + Rp2,500 = Rp11,500	<i>Sum of unit prices of all four items.</i>
Step 6	<b>Conclusion:</b> The total purchase price for one notebook, one pencil, one ballpoint pen, and one ruler is Rp11,500.	

### 1 (b) Product-Oriented Worked Example

Problem: The purchase price for a dozen notebooks is Rp48,000; pencils Rp24,000; ballpoint pens Rp36,000; and rulers Rp30,000. What is the total purchase price for one notebook, one pencil, one ballpoint pen, and one ruler?		
Step	Calculation	
Step 1	Price of 1 notebook = Rp48,000 ÷ 12 = Rp4,000	
Step 2	Price of 1 pencil = Rp24,000 ÷ 12 = Rp2,000	
Step 3	Price of 1 ballpoint pen = Rp36,000 ÷ 12 = Rp3,000	
Step 4	Price of 1 ruler = Rp30,000 ÷ 12 = Rp2,500	
Step 5	Total price = Rp4,000 + Rp2,000 + Rp3,000 + Rp2,500 = Rp11,500	
Step 6	<b>Conclusion:</b> The total purchase price for one notebook, one pencil, one ballpoint pen, and one ruler is Rp11,500.	

Figure 1: (a) Process-Oriented Worked Example and (b) Product-Oriented Worked Example

examples as instructional materials that not only present a step-by-step problem solution but also provide explicit explanations of the rationale underlying each solution step that is, why a particular operation is performed and how it contributes to the overall solution. Product-oriented worked examples, by contrast, present only the problem solution steps without any accompanying explanatory rationale, as defined by the same framework [13]. This distinction formed the conceptual basis for the two instructional conditions in the present study, adapted to the domain of financial literacy for Grade VII students [17]. Specifically, the process-oriented condition embedded conceptual rationale alongside each calculation step in the financial literacy worked examples (e.g., explaining why a percentage must first be converted to a decimal before multiplication), while the product-oriented condition presented identical financial problems and solution steps but omitted these explanatory elaborations.

In the Acquisition phase, both experimental groups received identical instructional content on financial literacy topics, including discounts, interest, taxes, and savings, but differed in the type of Worked Example (WE) provided. The Process-Oriented Worked Example was designed to make the problem-solving process explicit by embedding conceptual rationale alongside each calculation step (see Figure 1a). These explanations clarified why specific operations were performed (e.g., dividing by 12 to obtain unit prices) and how intermediate results contributed to the final solution. From a Cognitive Load Theory perspective, this design aimed to support germane cognitive load by directing learners' attention to underlying conceptual relationships and facilitating schema construction processes theoretically beneficial for far transfer [2].

In contrast, the Product-Oriented Worked Example presented the same problem content and solution steps but omitted explicit explanatory rationale (see Figure 1b). By focusing on essential calculations and final outcomes, this format reduced informational redundancy and minimized unnecessary processing demands. According to CLT, this streamlined presentation minimizes potentially redundant explanatory information; for learners who already possess sufficient prerequisite knowledge, this reduction may lower overall cognitive load and support procedural automation [14,15]. The absence of explicit explanations also encouraged learners to actively infer relationships between steps, supporting efficient knowledge application in structurally similar financial literacy problems.

Both instructional designs were intentionally structured to examine the trade-off between conceptual elaboration and procedural efficiency in financial literacy learning, following principles of worked example design established in prior mathematics education research [18]. During this phase, students reported their perceived cognitive load after completing each item using a 9-point subjective rating scale, where a score of 1 indicated very low mental effort and a score of 9 indicated very high mental effort [9].

In the Test Phase, students were presented with problem-solving tasks covering the topics of discounts, interest, taxes, and savings. The test consisted of two types of assessments: a near transfer test, in which the structure of the problems closely resembled the worked examples previously provided, and a far transfer test, which required the addition of at least one new problem-solving procedure. In addition to completing the tasks, students were also asked to fill out a subjective cognitive load rating after each item (see Figure 2).

(a)

Budi has savings of Rp300,000 in the school cooperative. The cooperative gives 5% interest every month. If Budi does not withdraw his savings for 2 months, how much will Budi's savings be after 2 months?

(b)

Andi wants to save Rp100,000 every month for 6 months. He has two bank options:

- Bank A gives 2% interest every month.
- Bank B gives 1% interest every month, but there is an additional bonus of Rp10,000 at the end of the period.

In your opinion, which bank is more profitable for Andi? Provide calculations to prove your answer.

**Figure 2:** (a) Near transfer test questions; (b) Far transfer test questions

The near transfer test (Figure 2a) is a direct problem-solving item whose solution structure closely mirrors the examples provided in the lessons on discounts, interest, or savings. This item, which focuses on calculating Budi's savings interest over a period of two months, requires students to apply only the procedures they have previously learned without needing to modify or add any complex solution steps, thereby classifying it as a near transfer task. In contrast, the far transfer test (Figure 2b) presents a more complex financial decision-making problem, namely comparing savings outcomes between Bank A and Bank B. This task specifically requires students to perform two or more new solution procedures that were not explicitly taught in the basic worked examples, such as making comparisons and considering additional variables (e.g., the bonus offered by Bank B). Consequently, this task assesses students' ability to transfer and adapt their knowledge schemas to a substantially different context.

The instructional materials including the financial literacy word problems, worked example designs, and the 9-point cognitive load self-rating scale were validated through two sequential stages of expert review. In the first stage, a CLT expert with a doctoral qualification in educational psychology and established expertise in Cognitive Load Theory and instructional design conducted three rounds of iterative review. In each round, the expert evaluated three dimensions of the materials: (1) alignment with CLT

principles assessing whether each design minimized extraneous cognitive load and supported germane load; (2) mathematical content accuracy verifying that the financial literacy topics were correctly represented and sequenced in accordance with Grade VII curriculum standards; and (3) word problem quality evaluating whether the problem situations were realistic, linguistically accessible for novice learners, and varied enough to elicit both near and far transfer. Following each round, the expert provided written feedback, and the materials were revised accordingly before being resubmitted. The materials were considered ready for the second stage once the CLT expert confirmed approval across all three dimensions in the final round. In the second stage, a mathematics education postgraduate colleague currently enrolled in a master's program in mathematics education conducted three rounds of discussion-based review. Each round focused on the clarity of the financial literacy contexts, the appropriateness of the mathematical procedures for Grade VII learners, and the consistency of CLT principles across both worked example formats. Feedback from each round was incorporated before the materials were finalized for use in the experiment. No formal inter-rater agreement coefficient was computed, as the two stages employed different review methods written expert feedback versus collegial discussion and focused on complementary rather than identical aspects of the materials.

**Table 1: Experimental phases: duration, content, and activities**

Phase	Content / Activity	Phase Duration
Introductory Phase	<b>Prior Knowledge Activation &amp; Contextualization:</b> Presentation of learning objectives (discounts, interest, taxes, and savings)	15
	Review of prerequisite material (number conversions: percentages/fractions to decimals and vice versa)	
	Expository teaching approach (teacher-student Q&A sessions and short exercises)	
	Distribution of Student Worksheets (LKPD) in preparation for the next phase	
Acquisition Phase	Contextual Problem Solving via Worked Examples (WE)	30
	<b>Experimental Condition I (Process-Oriented Group):</b> Studied step-by-step solution procedures accompanied by conceptual rationale (5 worked examples & 5 problem-solving questions)	
	<b>Experimental Condition II (Product-Oriented Group):</b> Studied step-by-step solution procedures without explanation of reasons (5 worked examples & 5 problem-solving questions)	
	Strict time rule per task item: 3 minutes to study example + cognitive load assessment; 3 minutes to solve problem + cognitive load assessment	
	Collection of worksheets and distribution of transfer test sheets	
Test Phase	<b>Near Transfer Test:</b> Solving 3 near-transfer contextual questions	10
	<b>Far Transfer Test:</b> Solving 3 far-transfer contextual questions	
	Collection of all measurement data by researchers and assistants	5
<b>TOTAL DURATION</b>		<b>65</b>

## ■ EXPERIMENTAL PROCEDURE

The detailed procedural flow, activities, and precise time allocation for each experimental phase are systematically presented in Table 1.

The reliability of all instruments was assessed using Cronbach's Alpha ( $\alpha$ ) on the final dataset following outlier removal. The cognitive load rating scales for both near transfer ( $\alpha = 0.875$ ) and far transfer ( $\alpha = 0.875$ ) demonstrated high internal consistency, as did the far transfer performance test ( $\alpha = 0.864$ ). The near transfer performance test yielded a moderate reliability coefficient ( $\alpha = 0.551$ ), which falls below the conventional threshold of 0.70; however, this value remains within an acceptable range for short performance-based assessments measuring procedural knowledge transfer, where item heterogeneity is expected given the varying financial literacy sub-topics covered [1]. Reliability coefficients for the cognitive load rating scales administered during the Acquisition Phase were not separately analyzed, as these items served as process measures rather than psychometric instruments. Overall, the reliability evidence is considered adequate for the purposes of this study.

## ■ RESULTS AND DISCUSSION

Two hypotheses were tested in this study, focusing on students' transfer performance (near transfer and far transfer) and their self-rated cognitive load during these tasks. Prior to the main analysis, prerequisite assumption tests were conducted to ensure data validity. Normality was assessed through skewness and kurtosis statistics, which indicated that the data were normally distributed as all values fell within the acceptable range of  $\pm 2$ . Furthermore, the homogeneity of variance test (Levene's test) confirmed that the assumption of equal variances was met for all dependent variables ( $p > .05$ ), specifically for near transfer ( $F(1, 60) = 0.001, p = .971$ ), far transfer ( $F(1, 60) = 2.386, p = .128$ ), cognitive load near transfer ( $F(1, 60) = 0.370, p = .545$ ), and cognitive load far transfer ( $F(1, 60) = 1.054, p = .309$ ).

The results of the independent samples t-test regarding the effect of Worked Examples (WE) on transfer performance revealed distinct outcomes for near and far transfer tasks. For near transfer, the test yielded  $t(60) = -0.487, p = .628$ , indicating that the type of worked example did not have a significant effect on students' performance in this domain. Descriptively, the product-oriented group ( $M = 2.60, SD = 0.70$ ) and the process-oriented group ( $M = 2.52, SD = 0.67$ ) showed nearly equivalent results. Conversely, for far transfer, the difference was statistically significant,  $t(60) = 2.715, p$

$= .009$ . The process-oriented group ( $M = 2.75, SD = 1.55$ ) significantly outperformed the product-oriented group ( $M = 1.92, SD = 0.68$ ), suggesting that explicit reasoning elaborations support knowledge transfer to more complex and novel financial contexts.

Regarding cognitive load, the analysis indicated that the instructional strategy did not produce significant differences in students' perceived mental effort during the test phase. For near transfer cognitive load, the test yielded  $t(60) = 0.346, p = .731$ , with the process-oriented group ( $M = 2.63, SD = 1.80$ ) and the product-oriented group ( $M = 2.47, SD = 1.81$ ) reported comparable levels of perceived mental effort. Similarly, for far transfer cognitive load, the test produced  $t(60) = 0.953, p = .344$ . The process-oriented group ( $M = 3.84, SD = 2.14$ ), while the product-oriented group ( $M = 3.34, SD = 1.98$ ) showed no significant difference in far transfer cognitive load. These findings demonstrate that while the process-oriented format led to superior far transfer, it did not impose a significantly greater cognitive demand on Grade VII students than the product-oriented format in this financial literacy context.

The findings of this study indicate that, although the difference was not statistically significant, students who learned through product-oriented worked examples showed a slight descriptive tendency toward higher near transfer performance compared to those in the process-oriented condition ( $M = 2.60$  vs.  $M = 2.52$ ). This pattern, while not reaching significance, is directionally consistent with prior research indicating that product-oriented formats may support procedural efficiency in structurally similar tasks by reducing redundant information [12]. The absence of a statistically significant difference may reflect that both formats were equally effective at supporting near transfer in this financial literacy context a finding that itself carries theoretical relevance, as it suggests that the added process explanations in the process-oriented format did not impose a meaningful learning cost for novice learners. This interpretation aligns with prior evidence indicating that process-oriented formats can support conceptual engagement without necessarily impeding procedural performance [1]. Taken together, these findings indicate that the effectiveness of worked example formats is contingent upon transfer type, task characteristics, and domain complexity, with process-oriented formats offering a meaningful advantage specifically for far transfer tasks that require flexible schema application [15]. Although the process-oriented group reported descriptively higher cognitive load across both transfer tasks (near transfer:  $M = 2.63$  vs.  $M = 2.47$ ; far transfer:  $M = 3.84$  vs.  $M = 3.34$ ), these differences did not reach statistical significance (near transfer:  $p = .731$ ;

far transfer:  $p = .344$ ). This suggests that the additional explanatory elements embedded in the process-oriented format did not meaningfully increase mental effort beyond what was experienced in the product-oriented condition.

From a CLT perspective, this null finding suggests that the overall perceived mental effort which encompasses all sources of cognitive load did not differ significantly between formats. While this cannot be directly attributed to specific load types given the use of a unidimensional self-report measure, it is consistent with the view that the conceptual rationale embedded in process-oriented formats was manageable within learners' cognitive capacity, particularly among novice learners whose schemas are still developing [2,19]. This interpretation is consistent with the Expertise Reversal Effect, which posits that instructional supports beneficial for novices may lose their effectiveness or even become detrimental as learners' prior knowledge increases [12]. Notably, despite the theoretical prediction that product-oriented formats may increase extraneous load for true novices, the comparable cognitive load reported by both groups suggests that the Grade VII participants in this study possessed sufficient prerequisite knowledge to engage productively with product-oriented examples without experiencing cognitive overload.

In contrast, the descriptively higher, though not statistically significant, cognitive load associated with process-oriented worked examples is directionally consistent with findings from previous research suggesting that detailed explanations increase germane cognitive load by encouraging learners to engage more deeply with underlying principles [16]. Rather than hindering learning, this increased load reflects greater cognitive effort devoted to understanding why specific financial procedures are applied. Such conceptual engagement has been shown to support schema construction and long-term knowledge retention, even when immediate performance gains are not apparent [1,2].

The significant advantage of process-oriented worked examples on far transfer ( $t(60) = 2.715$ ,  $p = .009$ ) aligns with theoretical predictions that explicit process elaboration supports the formation of more flexible and robust knowledge schemas. This finding is consistent with prior research demonstrating that far transfer is facilitated when learners are exposed to the underlying reasoning of solution procedures rather than their surface outcomes alone [13,20]. At the same time, the magnitude of the far transfer advantage was moderate (process-oriented:  $M = 2.75$ ; product-oriented:  $M = 1.92$ ), suggesting that additional instructional scaffolding may

further strengthen far transfer outcomes beyond what either worked example format alone can achieve [1,2]. Financial literacy tasks often require learners to abstract principles across varying contexts, integrate multiple concepts, and regulate decision-making under uncertainty cognitive demands that process-oriented formats appear better equipped to support through their explicit elaboration of underlying reasoning. Previous studies have suggested that promoting far transfer requires instructional supports beyond worked examples, such as systematic example variation, explicit comparison tasks, or metacognitive prompts that encourage learners to reflect on underlying structures [1,2]. The present findings reinforce this conclusion by showing that while worked examples effectively support near transfer and cognitive efficiency, their impact on far transfer in financial literacy remains limited without additional scaffolding.

Taken together, the results of this study extend existing research on the worked example effect by confirming that both formats are comparably effective for near transfer, while process-oriented worked examples offer a meaningful advantage specifically for far transfer, supporting the formation of flexible schemas applicable to novel financial problem-solving contexts. In the context of financial literacy education, these findings align with prior evidence suggesting that instructional design must balance procedural efficiency and conceptual understanding to support learners' ability to apply financial knowledge flexibly across contexts. This alignment with previous research underscores the importance of situating worked example design within clearly defined learning goals, especially when aiming to develop transferable financial reasoning skills.

## ■ CONCLUSION

Differences in worked example orientation within instruction yield distinct implications for students' near transfer performance, far transfer performance, and cognitive load management. The findings of this study indicate that both process-oriented and product-oriented worked examples were equally effective in supporting near transfer and produced comparable levels of cognitive load, suggesting that the added process explanations did not impose a meaningful learning cost for novice learners. Process-oriented worked examples, however, demonstrated a meaningful advantage for far transfer, indicating that explicit elaboration of solution reasoning supports the formation of more flexible knowledge schemas that are transferable to novel and complex financial problem-solving contexts. These results reinforce the view that the effectiveness of worked

examples is contingent upon transfer type, instructional goals, and task characteristics, particularly in the context of financial literacy learning in which both procedural schema automation and conceptual schema construction are required precisely the cognitive demands that CLT-informed instructional design aims to address.

These findings carry practical implications for teachers, curriculum designers, and educational policymakers. Mathematics teachers are encouraged to use process-oriented worked examples when introducing new financial concepts, as this supports the development of flexible schemas, and to transition toward product-oriented formats as students consolidate procedural knowledge. Curriculum designers should consider sequencing these formats progressively within lesson units to support both near and far transfer outcomes. For policymakers overseeing national financial literacy curriculum development, these findings highlight the importance of embedding explicit reasoning elaboration not merely solution steps into instructional materials as a means of developing transferable financial reasoning competencies in students.

This study has several limitations, including its reliance on subjective self-report cognitive load ratings that may be subject to response bias, the use of two validators without a formal inter-rater agreement procedure, and a one-shot experimental design with non-standardized measures that limits generalizability. Future research is recommended to adopt longitudinal designs, integrate standardized financial literacy assessments, and triangulate self-report cognitive load with performance-based or observational indicators such as response time analysis or think-aloud protocols. Incorporating affective variables such as learning motivation and self-regulated learning would further strengthen understanding of how worked example formats can optimally support transferable financial reasoning skills.

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#### ■ CONFLICT OF INTEREST

The authors declare no conflict of interest.

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