

Analysis of Seventh-Grade Students' Fundamental Mathematical Conceptual Understanding in Social Arithmetic

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ABSTRACT

This study investigated the characteristics of seventh-grade students' mathematical conceptual understanding of Social Arithmetic and identified the factors influencing that understanding. The study employed a qualitative descriptive approach involving 18 seventh-grade students from SMPN 6 Watubangga. Three students were subsequently selected as key informants through purposive sampling based on variations in their problem-solving strategies, conceptual understanding, and communication abilities. Data were collected through problem-solving tasks and structured interviews and were analyzed using the interactive model of data condensation, data display, and conclusion drawing and verification. The findings revealed that students demonstrated varying levels of mathematical conceptual understanding, which were generally characterized by partial mastery of concepts and difficulties in applying concepts consistently across different problem situations. While some students were able to identify relevant information and recognize fundamental concepts such as percentages and discounts, they frequently encountered computational errors and difficulties in communicating mathematical reasoning. Other students struggled to connect multiple Social Arithmetic concepts, determine appropriate solution strategies, and solve contextual problems requiring multistep reasoning. The factors influencing students' conceptual understanding included limited mastery of fundamental concepts, difficulties in connecting related concepts, insufficient procedural accuracy, and limited mathematical communication skills.

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1. INTRODUCTION

Mathematical conceptual understanding is a fundamental ability that enables students to explore, interpret, and apply mathematical ideas meaningfully. This ability plays a crucial role in mathematics learning because it helps students solve

mathematical problems and transfer their knowledge to new situations (Al-Mutawah et al., 2019; Haji & Yumiati, 2019). Despite its importance, many students experience difficulties in mastering mathematical concepts due to various cognitive and instructional factors (Ningrum et al., 2024; Rahmawati & Roesdiana, 2022). These difficulties often arise because students are required to connect their prior knowledge with increasingly abstract mathematical ideas. In this regard, conceptual understanding serves as a bridge between students' concrete cognitive experiences and the abstract nature of mathematical concepts (Mills, 2016; Nahdi & Jatisunda, 2020). Furthermore, conceptual understanding reflects students' ability to think, reason, and act based on mathematical definitions and principles (Fitriani et al., 2016; Ncube & Luneta, 2025).

One mathematical topic that requires strong conceptual understanding is Social Arithmetic, which is taught at the junior secondary school level as part of basic numeracy education. Social Arithmetic is a branch of mathematics that involves mathematical calculations and applications within social and economic contexts, enabling students to connect mathematical ideas with everyday financial activities (Fauzan et al., 2018; Hardini et al., 2022; Siregar & Dewi, 2022). The topic includes concepts such as selling price, purchase price, discounts, profit and loss percentages, simple interest, and the valuation of goods in economic transactions (Friantini et al., 2020; Risdiyanti et al., 2019; Virdaus et al., 2024). Despite its practical relevance, many students encounter difficulties when learning Social Arithmetic. One major challenge arises from students' limited ability to understand mathematical problems presented in contextual forms. Students often experience obstacles in interpreting information embedded in word problems and relating it to appropriate mathematical concepts (Kurniasi et al., 2022; Rumasoreng & Sugiman, 2014). In addition, the variety of problem texts and the complexity of real-life contexts frequently make it difficult for students to identify relevant information and determine appropriate problem-solving strategies (Azzahra & Herman, 2022; Swastika et al., 2022).

Previous studies on Social Arithmetic learning at the junior secondary school level have examined various dimensions of students' mathematical performance. Jefrizal et al. (2021), for instance, analyzed students' conceptual, procedural, and technical errors and reported that conceptual errors were the most frequently occurring type of error. Other studies have focused on students' difficulties in solving contextual problems. These studies found that many students struggle to interpret information presented in word problems and transform it into appropriate mathematical models (Azzahra & Herman, 2022; Virdaus et al., 2024). In addition, students' performance in Social Arithmetic has been associated with their mathematical literacy and problem-solving abilities. Students are often required to identify relevant information, construct mathematical representations, and apply mathematical concepts in real-life contexts (Hardini et al., 2022). Despite

these contributions, the existing literature consistently indicates that students continue to experience difficulties in learning Social Arithmetic. This situation highlights the need for further research focusing on how students develop and apply their conceptual understanding of Social Arithmetic.

To address this issue, it is important to examine not only students' performance outcomes but also the processes through which conceptual understanding is developed and applied during problem solving. Although previous studies have explored students' errors, mathematical literacy skills, and learning difficulties in Social Arithmetic, relatively few studies have specifically examined seventh-grade students' fundamental conceptual understanding through the combined use of interviews and problem-solving tasks. Most previous studies primarily relied on written tests as the sole research instrument (Jefrizal et al., 2021). As a result, students' underlying thought processes were not examined in sufficient depth. Furthermore, previous research has not comprehensively explained how students develop their fundamental conceptual understanding or what misconceptions emerge during the learning process. It also remains unclear how students connect these fundamental concepts to mathematical problem-solving activities. Therefore, a research gap exists in the in-depth exploration of students' conceptual understanding through data triangulation involving both problem-solving tasks and guided interviews.

The novelty of the present study lies in its specific focus on examining seventh-grade students' fundamental mathematical conceptual understanding of Social Arithmetic through two complementary instruments, namely problem-solving tasks and guided interviews. This approach enables a deeper investigation of students' reasoning processes, the misconceptions they experience, and the ways in which they connect fundamental concepts with solution procedures. By integrating written performance data and interview findings, this study provides a more comprehensive picture of students' conceptual understanding than studies relying solely on written assessments.

This study aims to investigate how seventh-grade students develop conceptual understanding in Social Arithmetic. The study also seeks to identify the misconceptions they experience and examine how they apply fundamental concepts when solving mathematical problems. The findings are expected to contribute empirical evidence regarding students' conceptual understanding patterns and conceptual difficulties. Furthermore, the results may serve as a basis for designing more effective and targeted instructional strategies for Social Arithmetic learning. This study is guided by the following research questions:

1. What are the characteristics of students' mathematical conceptual understanding in learning Social Arithmetic?
2. What factors influence students' mathematical conceptual understanding of Social Arithmetic?

2. METHOD

2.1. Research Design

This study employed a qualitative descriptive approach to explore students' mathematical conceptual understanding in solving Social Arithmetic problems. A qualitative descriptive design was selected because it enables researchers to examine students' conceptual understanding in depth and to describe their reasoning processes based on both written and verbal responses (Maria & Susilowati, 2026). The study focused on identifying how students understood fundamental Social Arithmetic concepts, the misconceptions that emerged during problem solving, and the factors influencing their conceptual understanding.

The participants were 18 seventh-grade students from SMPN 6 Watubangga. Seventh-grade students were selected because they had previously completed instruction on Social Arithmetic and were therefore expected to possess the prerequisite conceptual knowledge required for the study. From the initial group of participants, three students were selected as key informants through purposive sampling. This sampling technique was employed to obtain information-rich cases that could provide deeper insights into students' conceptual understanding. The selection criteria included variation in problem-solving strategies, differences in conceptual understanding demonstrated in the written tasks, and students' ability to communicate their thinking processes during interviews.

Research ethics were carefully observed throughout the study. Permission to conduct the research was obtained from the school administration before data collection commenced. All participants were informed about the purpose of the study, and their participation was voluntary. To protect participants' privacy, all personal information was anonymized during data analysis and reporting, and pseudonyms were used when presenting excerpts from students' responses and interview transcripts.

2.2. Instruments and Data Collection

Consistent with the qualitative research paradigm, the researcher functioned as the primary research instrument throughout the study. The researcher was directly involved in collecting, interpreting, and analyzing the data. To facilitate data collection, a problem-solving task and a structured interview protocol were developed and employed as supporting instruments. The problem-solving task was designed to elicit evidence of students' understanding of fundamental Social Arithmetic concepts, including selling price, purchase price, profit and loss, percentages, and discounts. The structured interview protocol was subsequently used to probe students' reasoning processes, clarify their written responses, identify misconceptions, and explore factors influencing their conceptual understanding.

Prior to data collection, both instruments underwent a content validation process. The instruments were reviewed by two experts in mathematics education consisting of university lecturers with expertise in mathematics learning and assessment. The validators were not involved as authors of this study, thereby providing an independent evaluation of the instruments. Based on the validators' feedback regarding content relevance, clarity of wording, and alignment with the research objectives, revisions were made and the instruments were subsequently declared suitable for use in the study.

Data collection began with the administration of a problem-solving task consisting of three contextual Social Arithmetic problems. Students' written responses were analyzed to identify patterns of conceptual understanding and potential misconceptions. Subsequently, structured interviews were conducted with the three selected informants. The interviews focused on clarifying students' written responses, exploring their reasoning processes, and obtaining a deeper understanding of the factors influencing their conceptual understanding. The interview data were used to complement, explain, and strengthen interpretations derived from the written task analysis.

2.3. Data Analysis

The data were analyzed qualitatively using the interactive model proposed by Miles et al. (2014), which consists of data condensation, data display, and conclusion drawing and verification. In the first stage, data condensation was conducted by reducing and organizing data obtained from students' written responses and interview transcripts. Students' responses were categorized according to indicators of conceptual understanding in Social Arithmetic. Irrelevant information was excluded, while data directly related to the research objectives were retained for further analysis.

In the second stage, the organized data were presented through narrative descriptions. This process enabled the researchers to identify patterns of conceptual understanding, recurring misconceptions, and factors influencing students' reasoning during problem solving. Furthermore, in the third stage, conclusions were drawn based on the patterns identified from both written and interview data. The conclusions were continuously verified throughout the analysis process to ensure consistency and accuracy. This iterative process enabled the researchers to develop a comprehensive description of students' conceptual understanding of Social Arithmetic.

To enhance the credibility and trustworthiness of the findings, methodological triangulation was employed through the use of two different data sources, namely problem-solving tasks and structured interviews. In addition, interpretation triangulation was conducted among the researchers. Each researcher independently reviewed and interpreted the data before discussing the findings

collectively. When differences in interpretation occurred, the researchers revisited the original data and reached a consensus through discussion. Furthermore, the analysis results were reviewed by an external expert in mathematics education to strengthen the validity and credibility of the study findings.

3. RESULTS AND DISCUSSION

3.1. Results

The results of the problem-solving task analysis are summarized in Table 1. The analysis focused on three indicators of mathematical conceptual understanding: identifying relevant concepts, applying concepts appropriately, and communicating mathematical reasoning. The findings reveal varying levels of conceptual understanding among the three focal participants.

Table 1. Characteristics of Students' Conceptual Understanding in Social Arithmetic

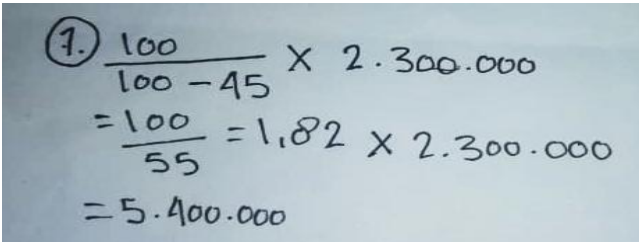
Problem	S-01	S-02	S-03
1	Identified the discount concept and applied the discount calculation procedure but produced an inaccurate final answer due to computational errors.	Identified part of the Social Arithmetic context and applied percentage calculations but demonstrated difficulties in selecting an appropriate solution strategy.	Identified relevant information and recognized the discount concept but demonstrated errors in the calculation process.
2	Demonstrated limited conceptual understanding and failed to communicate the mathematical reasoning required to solve the problem.	Demonstrated limited understanding of the concepts involved and failed to initiate an appropriate solution.	Demonstrated difficulties in relating unit price and total price concepts and failed to solve the multi-step contextual problem.
3	Failed to identify, apply, and communicate the relevant Social Arithmetic concepts.	Failed to connect Social Arithmetic concepts to the contextual situation and did not produce a solution.	Failed to connect purchase price, selling price, profit percentage, and combined discount concepts and did not produce a solution.

Table 1 summarizes the characteristics of students' conceptual understanding across the three Social Arithmetic problems. Overall, all participants demonstrated some degree of conceptual understanding in Problem 1, which primarily involved the concept of discounts. Each student was able to identify relevant information from the problem and recognize the underlying mathematical concept. Nevertheless, differences became apparent when students were required to apply the concept accurately and perform the necessary calculations. While some

students successfully initiated an appropriate solution procedure, computational errors and procedural difficulties affected the accuracy of their final answers.

A different pattern emerged in Problems 2 and 3. These problems required students to coordinate multiple Social Arithmetic concepts simultaneously and apply them within more complex contextual situations. As the cognitive demands increased, students' performance declined substantially. Although S-01 demonstrated a stronger conceptual foundation than the other participants, difficulties in communicating mathematical reasoning and integrating multiple concepts were still evident. Similar challenges were observed in S-02 and S-03, who experienced greater difficulty in connecting related concepts and developing complete solution strategies. Collectively, these findings suggest that students' conceptual understanding was relatively stronger when dealing with isolated concepts but became less stable when multiple concepts needed to be integrated within a problem-solving context.

Among the three participants, S-01 demonstrated the most developed conceptual understanding. An example of S-01's written response is presented in Figure 1. As illustrated in the figure, the student successfully identified the discount concept and recognized key information provided in the problem, including the initial price and discount percentage. The student also selected an appropriate procedure to determine the discounted price. However, the final answer was inaccurate due to computational errors rather than a misunderstanding of the concept itself. This finding indicates that S-01 possessed the necessary conceptual knowledge but encountered difficulties during the execution stage of the solution process.



Handwritten mathematical work for Problem 1:

$$\begin{aligned} \textcircled{1} \quad & \frac{100}{100 - 45} \times 2.300.000 \\ & = \frac{100}{55} = 1,82 \times 2.300.000 \\ & = 5.400.000 \end{aligned}$$

Figure 1. Example of S-01's Response to Problem 1

When presented with Problems 2 and 3, however, the student's performance became less consistent. The responses did not clearly demonstrate the ability to connect multiple Social Arithmetic concepts or communicate the reasoning underlying the solution process. To gain further insight into these difficulties, interview data were examined. During the interview, S-01 stated that Social Arithmetic was generally easy to understand. This statement suggests that the student's challenges were not primarily associated with conceptual recognition. Instead, they appeared to stem from limited computational accuracy, insufficient evaluation of completed solutions, and difficulties in articulating mathematical

reasoning systematically. Taken together, these findings indicate that S-01 had developed a basic conceptual understanding of Social Arithmetic but still required support in applying concepts consistently and accurately across more complex situations.

In contrast to S-01, S-02 demonstrated a more limited level of conceptual understanding. An example of the student's written response is shown in Figure 2. In Problem 1, the student was able to recognize certain elements of the Social Arithmetic context and attempted to apply percentage calculations. However, the response reflected a fragmented understanding of the concepts involved and relied largely on procedural knowledge. As a result, the student experienced difficulty determining an appropriate strategy for solving the problem independently.

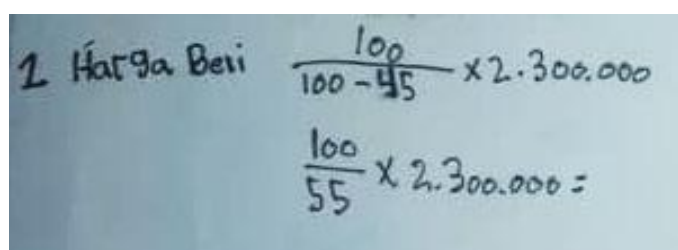

$$1 \text{ Harga Beli} \quad \frac{100}{100 - 45} \times 2.300.000$$
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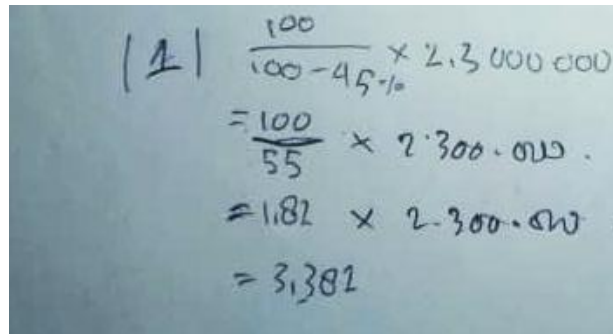
Figure 2. Example of S-02's Response to Problem 1

These difficulties became more apparent in Problems 2 and 3, for which no solutions were provided, as evidenced in Figure 2. The absence of responses suggests that the student struggled to identify the relevant concepts and was unable to formulate a plan for solving the problems. Consequently, the student's conceptual understanding could not be demonstrated through either solution procedures or mathematical explanations.

Further evidence emerged from the interview data. S-02 reported experiencing difficulty when applying formulas in Social Arithmetic problems and expressed uncertainty about how different mathematical concepts were related. This confusion appeared to hinder the student's ability to determine an effective starting point for problem solving. Therefore, S-02 can be characterized as a student with limited conceptual understanding, particularly in identifying concepts, applying them appropriately, and communicating mathematical thinking.

A similar pattern was observed in S-03, although some differences were evident in the student's initial responses. An example of S-03's written response is presented in Figure 3. As shown in the figure, the student successfully identified important information, including the initial price and discount percentage, and correctly recognized that a discount represents a reduction from the original price. Despite this conceptual recognition, errors occurred during the calculation process, leading to an incorrect final answer. This result indicates that the student possessed partial conceptual understanding but encountered difficulties in implementing the required procedures accurately.

As the complexity of the tasks increased, the student's performance declined considerably. No responses were provided for Problems 2 and 3, which can also be observed in Figure 3. These problems required the integration of several Social Arithmetic concepts, including purchase price, selling price, profit percentage, and combined discounts. The absence of solutions suggests that the student experienced substantial difficulty in recognizing the relationships among these concepts and applying them within a contextual problem-solving situation.



The image shows a student's handwritten work for Problem 1. It consists of four lines of calculations:

$$(1) \quad \frac{100}{100 - 45\%} \times 2,300,000$$
$$= \frac{100}{55} \times 2,300,000$$
$$= 1,82 \times 2,300,000$$
$$= 3,382$$

Figure 3. Example of S-03's Response to Problem 1

Interview findings provided additional insight into this pattern. S-03 stated that Social Arithmetic was an interesting topic but acknowledged difficulty in determining which formulas should be used in different situations. This response indicates that the student's difficulties extended beyond procedural knowledge and involved weaknesses in establishing conceptual connections among mathematical ideas. Consequently, S-03 can be characterized as a student with insufficient conceptual understanding, as evidenced by difficulties in connecting concepts, formulating solution strategies, and communicating mathematical reasoning.

3.2. Discussion

The Discussion should be an interpretation of the results rather than a repetition of the Results. The Discussion should be an interpretation of the results rather than a repetition of the Results. The Discussion should be an interpretation of the results rather than a repetition of the Results. The Discussion should be an interpretation of the results rather than a repetition of the Results. The Discussion should be an interpretation of the results rather than a repetition of the Results.

3.2.1 Characteristics of Students' Mathematical Conceptual Understanding in Social Arithmetic

The findings revealed that students demonstrated varying levels of mathematical conceptual understanding in Social Arithmetic. Overall, their understanding was characterized by partial mastery of concepts and difficulties in applying those concepts consistently across different problem contexts. The strongest conceptual understanding was demonstrated by S-01, who successfully

identified relevant information and recognized the discount concept in the first problem. This finding is consistent with Kilpatrick et al. (2001), who argued that conceptual understanding is reflected in students' ability to recognize, represent, and use mathematical concepts meaningfully. However, despite demonstrating an understanding of the underlying concept, S-01 produced an incorrect final answer due to computational errors. This result suggests that conceptual understanding alone is insufficient to ensure successful problem solving when procedural accuracy is lacking. Research has shown that successful mathematical problem solving requires the integration of conceptual and procedural knowledge, as students must not only understand mathematical ideas but also apply appropriate procedures accurately and efficiently (Hiebert, 1986; Rittle-Johnson & Schneider, 2015).

The difficulties experienced by S-01 indicate that conceptual knowledge was not fully integrated with procedural knowledge. According to Hiebert (1986), students may understand mathematical concepts but still encounter difficulties when carrying out procedures or evaluating the accuracy of their solutions. Similar findings were reported by Nahdi and Jatisunda (2020), who found that students often demonstrated conceptual understanding while making procedural errors during mathematical problem solving. Likewise, Swastika et al. (2022) reported that students solving Social Arithmetic problems frequently experienced procedural difficulties despite possessing an adequate understanding of the underlying concepts. In contrast, S-02 demonstrated limited conceptual understanding. Although the student recognized some elements of the problem context and attempted to apply percentage calculations, the responses reflected fragmented understanding and an overreliance on procedural approaches. Furthermore, the student was unable to solve the more complex problems and did not provide responses for Problems 2 and 3, indicating difficulties not only in concept application but also in communicating mathematical reasoning.

These findings align with the conceptual understanding indicators proposed by the National Council of Teachers of Mathematics (Haji & Yumiati, 2019), which emphasize that conceptual understanding extends beyond the ability to apply formulas and includes the ability to explain relationships among concepts and justify mathematical reasoning. Similar findings were reported by Kurniasi et al. (2022) and Virdaus et al. (2024), who found that students frequently experienced difficulties in solving contextual Social Arithmetic problems that required the integration of multiple concepts and mathematical representations. A comparable pattern was observed in S-03. The student successfully identified relevant information and correctly interpreted the meaning of a discount in the first problem, yet procedural errors resulted in an incorrect solution. When faced with more complex problems, the student did not provide any responses, suggesting difficulties in coordinating multiple Social Arithmetic concepts simultaneously. In

particular, the student struggled to connect concepts related to purchase price, selling price, profit percentage, and combined discounts.

Taken together, these findings suggest that students' conceptual understanding of Social Arithmetic remained largely fragmented. Students were generally able to recognize and apply isolated concepts, especially those that were familiar and explicitly represented in the problem. However, their performance declined substantially when they were required to integrate multiple concepts and explain their reasoning within contextual problem-solving situations. This finding supports the view that conceptual understanding involves recognizing relationships among mathematical ideas rather than merely applying formulas (Haji & Yumiati, 2019; Kilpatrick et al., 2001). Furthermore, the results are consistent with previous studies indicating that students often encounter difficulties when solving contextual mathematical problems involving interconnected concepts, multiple solution steps, and real-life situations (Kurniasi et al., 2022; Virdaus et al., 2024). The present findings also align with Ode et al. (2024), who reported that students with limited conceptual understanding often struggle to communicate mathematical ideas consistently, particularly when interpreting contextual information and explaining solution procedures. These findings suggest that mathematics instruction should provide greater opportunities for students to develop connections among Social Arithmetic concepts and to justify their reasoning when solving contextual problems.

3.2.2 Factors Influencing Students' Mathematical Conceptual Understanding in Social Arithmetic

The analysis of written responses and interview data identified several factors influencing students' mathematical conceptual understanding in Social Arithmetic. The first factor was students' mastery of fundamental concepts. Students who demonstrated a stronger understanding of basic concepts, such as percentages and discounts, were generally more capable of identifying relevant information and initiating appropriate solution procedures. Conversely, weaknesses in foundational concepts limited students' ability to understand more complex situations and establish meaningful connections among mathematical ideas. This finding is consistent with the view that conceptual understanding enables students to connect prior knowledge with new mathematical ideas and to organize mathematical knowledge into coherent relationships (Hiebert, 1986; Kilpatrick et al., 2001). Furthermore, conceptual understanding allows students to recognize relationships among concepts and apply them flexibly across different situations (Haji & Yumiati, 2019).

A second factor was students' ability to connect multiple concepts within a single problem. Several participants experienced difficulties when they were required to coordinate concepts such as purchase price, selling price, profit, loss,

and discount simultaneously. Although some students could recognize individual concepts, they struggled to understand how these concepts were related and how they should be combined to solve contextual problems. As a result, they were often unable to formulate effective solution strategies. Similar difficulties have been reported in previous studies, which found that students frequently encounter challenges when solving Social Arithmetic problems that require conceptual integration, contextual interpretation, and multistep reasoning (Kurniasi et al., 2022; Virdaus et al., 2024). Research on conceptual understanding also suggests that students often experience difficulties when they are required to coordinate several interconnected mathematical concepts simultaneously rather than applying a single familiar procedure (Rittle-Johnson & Schneider, 2015).

The findings also highlight the importance of procedural competence and mathematical communication. The case of S-01 demonstrates that students may possess conceptual knowledge but still produce incorrect solutions due to computational errors and insufficient evaluation of their work. Meanwhile, S-02 and S-03 experienced difficulties in explaining their reasoning and selecting appropriate formulas for different situations. Interview data revealed that both students relied heavily on memorized procedures and often felt uncertain about which formulas should be applied. These findings suggest that students' mathematical conceptual understanding is influenced not only by conceptual knowledge itself but also by procedural accuracy, mathematical communication, and the ability to reflect on and justify problem-solving processes. This finding is consistent with previous studies showing that conceptual understanding and procedural knowledge develop in a mutually supportive manner and together contribute to successful mathematical problem solving (Nahdi & Jatisunda, 2020; Rittle-Johnson & Schneider, 2015). Therefore, weaknesses in any of these aspects may hinder students' success in solving Social Arithmetic problems.

3.2.3 Implications of the Study

The findings of this study have important implications for mathematics instruction, particularly in the teaching of Social Arithmetic. First, classroom learning should place greater emphasis on conceptual relationships among mathematical ideas rather than focusing primarily on formula application. Students need opportunities to explore how concepts such as discounts, profit, loss, purchase price, and selling price are interconnected. Such an approach may help students develop a more coherent conceptual structure and improve their ability to solve contextual problems.

Second, mathematics instruction should encourage students to explain, justify, and reflect upon their reasoning processes. Activities such as classroom discussions, reflective questioning, and collaborative problem solving can support the development of both conceptual understanding and mathematical

communication. In addition, teachers should provide learning experiences that explicitly integrate conceptual and procedural knowledge. Helping students understand not only how a procedure is performed but also why it is appropriate in a particular context may reduce procedural errors and strengthen conceptual understanding.

Finally, the findings demonstrate the value of combining problem-solving tasks with interviews to investigate students' mathematical thinking. Written responses alone may not fully reveal students' conceptual understanding, misconceptions, or reasoning processes. By integrating multiple sources of evidence, researchers and educators can obtain a more comprehensive understanding of students' learning difficulties and design instructional interventions that are better aligned with students' needs.

4. CONCLUSION

This study examined the characteristics of seventh-grade students' mathematical conceptual understanding of Social Arithmetic and identified the factors influencing that understanding. The findings revealed that students demonstrated varying levels of mathematical conceptual understanding. Overall, their understanding was characterized by partial mastery of concepts and difficulties in applying those concepts consistently across different problem situations. Although some students were able to identify relevant information and recognize fundamental concepts such as percentages and discounts, their understanding was often not fully integrated with procedural knowledge. Consequently, computational errors, inaccurate final answers, and difficulties in communicating mathematical reasoning were frequently observed.

The findings further showed that students' mathematical conceptual understanding tended to be stronger when dealing with isolated concepts than when solving problems that required the integration of multiple Social Arithmetic concepts. Several factors were found to influence students' conceptual understanding, including limited mastery of fundamental concepts, difficulties in connecting related concepts, insufficient procedural accuracy, and limited ability to communicate mathematical reasoning. Interview data also indicated that students often experienced uncertainty when selecting appropriate formulas and organizing solution procedures. These findings suggest that students frequently relied on procedural knowledge rather than a coherent understanding of underlying mathematical concepts.

Based on these findings, mathematics instruction should place greater emphasis on strengthening conceptual relationships among Social Arithmetic concepts and promoting the integration of conceptual and procedural knowledge. Learning activities that encourage students to explain, justify, and reflect on their reasoning may help develop deeper conceptual understanding and improve

problem-solving performance. Such efforts are expected to support students in building a more coherent understanding of Social Arithmetic and applying mathematical concepts effectively in contextual situations.

This study has several limitations. First, the study employed a qualitative descriptive approach involving a relatively small number of participants from a single school. Therefore, the findings cannot be generalized to broader student populations. Second, the in-depth analysis was conducted with only three focal participants selected through purposive sampling. Although this approach provided rich insights into students' conceptual understanding, it may not fully capture the diversity of students' experiences and learning characteristics. Future studies may incorporate larger samples, multiple school contexts, and mixed-methods approaches to obtain a more comprehensive understanding of students' mathematical conceptual understanding in Social Arithmetic.

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