Exploration of Students' Mathematics Concept Understanding Ability on Social Arithmetic Material in Terms of Gender Differences

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Abstract. Concept understanding allows students to relate existing knowledge to new information or situations, so that they can represent mathematical ideas in various forms, both verbally, visually, and symbolically. This study aims to describe the effect of gender differences on students' mathematical concept understanding ability in social arithmetic material in junior high school. The research method used was qualitative with a case study approach, involving 22 seventh-grade students who were selected voluntarily. Data were collected through observation, tests, document analysis, and in-depth interviews, then analyzed using data reduction, data presentation, and conclusion-drawing techniques. The results showed that male students tend to rely more on logic and reasoning in solving problems, while female students are more analytical but sometimes less optimal in mathematical representation. Nevertheless, both gender groups were able to fulfill the indicators of concept understanding, such as restating concepts, classifying objects, and applying concepts, although with different approaches. These findings indicate the importance of considering gender differences in designing inclusive and effective mathematics learning strategies. In addition, this study provides important implications for the development of gender-responsive learning strategies to improve students' conceptual understanding.

Keywords: conceptual understanding of mathematics, social arithmetic, gender

INTRODUCTION

Mathematics is one of the disciplines that plays an important role in education because it is not only the basis for various fields of science, but also forms the ability to think logically, analytically, and systematically, which is needed in everyday life (1,2). In a global context, mathematics serves as a key foundation in building 21st-century skills such as problem solving, critical thinking, and data-driven decision making, all of which are essential for active participation in the information and technology age (3). Mathematical skills are not only needed in the academic domain, but also in dealing with complex practical problems in various aspects of life (4). Mastery of mathematical concepts in depth is crucial to support student success in education and life in general (5). Zuhriawan et al. (2024) emphasized that effective mathematics learning must include five important aspects, namely concept understanding, procedural fluency, adaptive reasoning, strategic problem solving, and productive belief in mathematics. Thus, the success of mathematics education is not simply measured by the ability to calculate, but by the extent to which students can understand the meaning, apply concepts, and understand concepts in solving mathematical problems.

The ability to understand mathematical concepts is a cognitive aspect that is very essential in the learning process because it is the basis for students to build meaningful knowledge, not just mechanical memorization (7). Concept understanding allows students to link existing knowledge with new information or situations, so that they can represent mathematical ideas in various forms, both verbally, visually, and symbolically (8). Moreover, concept understanding also helps students in choosing and applying appropriate strategies to solve diverse mathematical problems (9).

Students who understand concepts well can explain the reasons behind the procedures they use, show flexibility in thinking, and transfer their understanding to different contexts (10). This is in contrast to students who only rely on procedures or formulas without understanding their meaning, who tend to experience difficulties when facing contextual or non-routine problems (11,12).

However, the reality is that many students still experience difficulties in understanding mathematical concepts, including material that is directly related to everyday life (13). This difficulty has an impact on the low ability of students in solving contextual problems and in connecting mathematical concepts with the real situations they face (14). Based on the results of the PISA 2022 study show quite alarming results, namely around 61% of Indonesian students are only able to reach the basic level in mathematical problem solving, with the main difficulty lying in questions that demand concept understanding skills and mathematical problem-solving skills (15). This fact shows that the mathematical ability of Indonesian students, especially in understanding concepts, is still relatively low.

One of the materials that is often considered difficult by students is social arithmetic, which requires concept understanding skills to understand the context of the problem and obtain the right answer (16). Concepts such as the percentage of profit and loss, for example, are often a challenge for students because they involve data interpretation and the application of mathematical logic in real life (17). In fact, with the basic knowledge they have, students should be able to understand problems related to social arithmetic more easily (18). However, in reality, there are still many students who have difficulty in understanding and solving problems in this material, which can be seen from the many procedural and conceptual errors made (19). Given that social arithmetic is closely related to everyday life, this material has the potential to be used to improve students' concept understanding ability in problem solving through relevant contextual questions (20). Therefore, efforts are needed to improve learning strategies that can hone students' understanding of concepts in problem solving, especially in solving social arithmetic problems.

One factor that is thought to influence the ability to understand mathematical concepts is gender differences (21). Gender not only refers to biological differences between men and women, but also includes social, cultural, and psychological constructs that shape roles, behaviors, and expectations of individuals based on their sex (22). According to O'Rourke & Prendergast (2021), gender is the result of a socialization process that makes men and women develop different personalities, attitudes, and behaviors, including in educational contexts. In the context of mathematics learning, some studies state that there is a tendency for differences in learning styles, cognitive strategies, and confidence levels between male and female students when facing math problems (24). For example, male students tend to be more confident and competitive in facing mathematical challenges, while female students are more cautious and reflective, although not necessarily less capable (25). Although statistically, mathematics achievement between males and females does not show significant differences, approaches to mathematical problems and ways of understanding concepts are often different, which ultimately have an impact on the learning process and academic results achieved by each group (26). Therefore, understanding gender differences in mathematics learning is important to create learning strategies that are inclusive and responsive to individual student characteristics.

Previous research related to concept understanding in mathematical problem solving has been widely studied. Some of them were conducted by Edo & Tasik (2022) related to students' conceptual understanding of algebra and their ability to solve math problems. Research by Kholid et al. (2021) related to students' conceptual understanding in solving math problems. Furthermore, research by Mariano Dolesh et al. (2022) in the Philippines regarding the level of conceptual understanding in problem solving of prospective mathematics teachers. The research conducted by Braithwaite & Sprague (2021) in America regarding conceptual understanding in solving routine and non-routine problems. Furthermore, research by Ncube & Luneta (2025) in Africa related to improving student performance in mathematics through conceptual understanding. However, from these studies, no research has been found that specifically explores the ability to understand concepts in social arithmetic material in terms of gender. Therefore, in-depth research is needed on how students' conceptual understanding of mathematical problem solving when viewed based on gender. This study is important to reveal how gender can affect the characteristics of students' concept understanding, so that it becomes the basis for developing more effective mathematics learning.

Based on this description, the purpose of this study is to describe how gender affects students' concept understanding ability on social arithmetic material in junior high school.

METHODS

The method used in this research uses a qualitative approach. Qualitative research is research that describes or provides a description of data systematically and accurately based on facts, phenomena, and natural environmental conditions (32,33) according to facts in the field without any manipulation (Kholid, Rofi'ah, et al., 2022). This research

uses a case study approach, which focuses on understanding phenomena in a limited context or specific unit of analysis (36). Case studies are in-depth analyses of individuals, groups, institutions, social movements, or certain events (33). In this study this study specifically describes and analyzes students' understanding of mathematical concepts based on gender.

The subjects in this research were 22 seventh-grade students in one of the State Junior High Schools in Grobogan Regency. The subjects were chosen because they had taken social arithmetic learning. The subjects voluntarily participated in this research, without any coercion, and they expressed their willingness to provide the information needed in this research. Data collection was done through observation, tests, document analysis, and in-depth interviews. Observations were made to observe student behavior in solving problems. Tests were conducted to find out how students' understanding of mathematical concepts is through problem solving. The test consisted of three essay questions that were adjusted to the conceptual understanding indicators in Table 1 (37). The researcher then conducted interviews with students to get more in-depth data about their conceptual understanding. Data validity used method and source triangulation. Triangulation of methods by checking data from the same source using different methods. Meanwhile, source triangulation is done by checking data that has been obtained from various sources (Sutama et al., 2022).

Data analysis techniques using the flow method. The process of analyzing data through activities to collect or compile information systematically. Starting from the results of observations, documentation, and interviews, by organizing data into categories, breaking it down into units, synthesizing, arranging into patterns, choosing which ones are important and will be studied, and drawing conclusions so that it is easily understood by oneself and others. The data analysis technique is divided into three steps of activities, namely data reduction, data presentation, and conclusion drawing (38).

TABLE 1. Conceptual Understanding Indicators

Student' Skill	Indicators
Kemampuan Pemahaman Konsep	1. Restate a concept 2. Classify objects according to the concept 3. Presenting concepts in various forms of mathematical representations 4. Apply a concept 5. Use or select certain operating strategies

RESULT AND DISCUSSION

The research began with a written test on social arithmetic material. The test results were used to obtain information about the ability to understand mathematical concepts based on gender. After the test and interview activities, the researcher then analyzed the answers of each research subject. The results of the analysis of concept understanding ability tests and interviews from 22 research subjects, consisting of 10 male students and 12 female students. Furthermore, one of the research subjects from each gender will be presented as working on problems with the code SL as a male student and SP as a female student, which is described as follows:

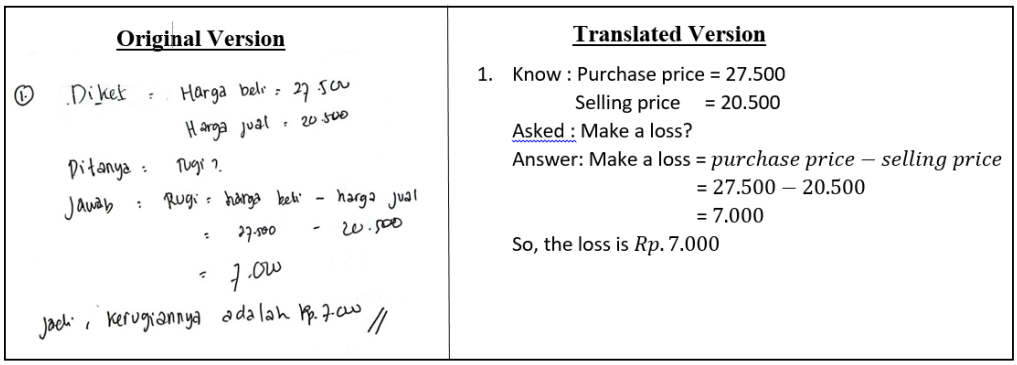
Indicator of Restating a Concept

In the first problem, which is about profit material with the problem of the selling price of an item is then analyzed according to the first indicator related to restating a concept. The following problem can be seen in Figure 1.

1. An item is purchased for $Rp.27.000$, then sold again. Determine the loss suffered by the trader if the item is sold for $Rp.20.000$?

FIGURE 1. First Problem

The ability to understand concepts in the first problem, with the indicator of restating a concept, namely that SL students have been able to restate a concept according to the definition correctly. This can be seen from the results of the work of SL students who can solve the problem correctly according to the problem-solving steps. The results of SL students' answers on this indicator can be seen in Figure 2.



Original Version

① Diket : Harga beli : 27.500
Harga jual : 20.500
Ditanya : Rugi ?
Jawab : Rugi : harga beli - harga jual
: 27.500 - 20.500
: 7.000
Jadi, kerugiannya adalah Rp. 7.000 //

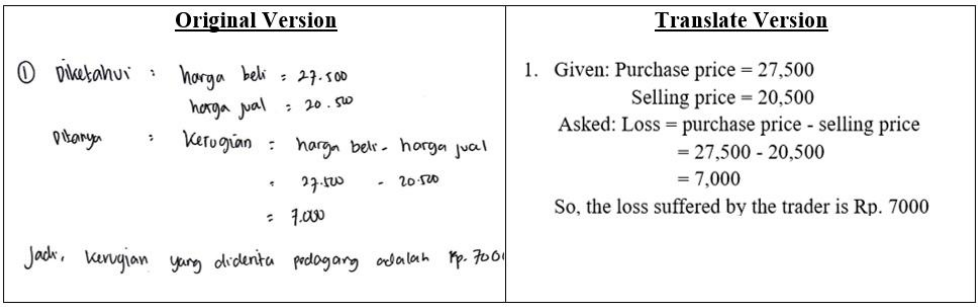
Translated Version

1. Know : Purchase price = 27.500
Selling price = 20.500
Asked : Make a loss?
Answer: Make a loss = $purchase\ price - selling\ price$
$= 27.500 - 20.500$
$= 7.000$
So, the loss is $Rp.\ 7.000$

FIGURE 2. SL's Answer to the First Problem: Indicator of Restating a Concept

Based on Figure 2, it can be seen that the SL subject was able to write the known and questionable elements in the problem. In addition, SL is also able to determine what formula to use and the steps of the process. The last part of SL gives the conclusion of the answer that has been found. Based on the interview, SL can explain what is in the problem is, what is asked, and the solution formula to calculate the selling price, purchase price, and loss. The best student also explained the overall solution strategy he chose. Furthermore, from the results of the completion and interview, SL was able to fulfill the indicator of restating a concept in the first problem. This is in line with research by Salmina & Nisa (2018), which explains that if students, when working on problems and being interviewed, are able to restate the concept of the problem given, it shows that they have a good ability to understand the concept.

Furthermore, the ability to understand concepts in the first problem, with the indicator of restating a concept, is the same as SL students; namely, SP students have also been able to restate a concept according to the correct definition. This can be seen from the work of SP students who can solve the problem correctly according to the problem-solving steps. The results of SP students' answers on the indicator of restating a concept can be seen in Figure 3.



Original Version

① Diketahui : harga beli : 27.500
harga jual : 20.500
Ditanya : kerugian : harga beli - harga jual
: 27.500 - 20.500
: 7.000
Jadi, kerugian yang diderita pedagang adalah Rp. 700

Translate Version

1. Given: Purchase price = 27,500
Selling price = 20,500
Asked: Loss = purchase price - selling price
= 27,500 - 20,500
= 7,000
So, the loss suffered by the trader is Rp. 7000

FIGURE 3. SP's Answer to the First Problem: Indicator of Restating a Concept

Based on Figure 3, it can be seen that SP can write the known and questionable elements in the problem. In addition, SP was also able to determine the formula used and the solution steps. SP is also able to write the conclusion at the end of the answer that has been found. Based on the interview results, SP was able to explain what was known about the problem, what was asked, and the formula for calculating the selling price, purchase price, and loss, even though he had to read the problem repeatedly. SP also explained the solution strategy he used to solve the problem. Furthermore, from the solution results and interview results, SP was able to fulfill the indicator of restating a concept in the first problem. This is in line with research by Pouta et al. (2021), who found that students' ability to restate

mathematical concepts through written problem solving and explanation through interviews is a strong indicator of deep concept understanding.

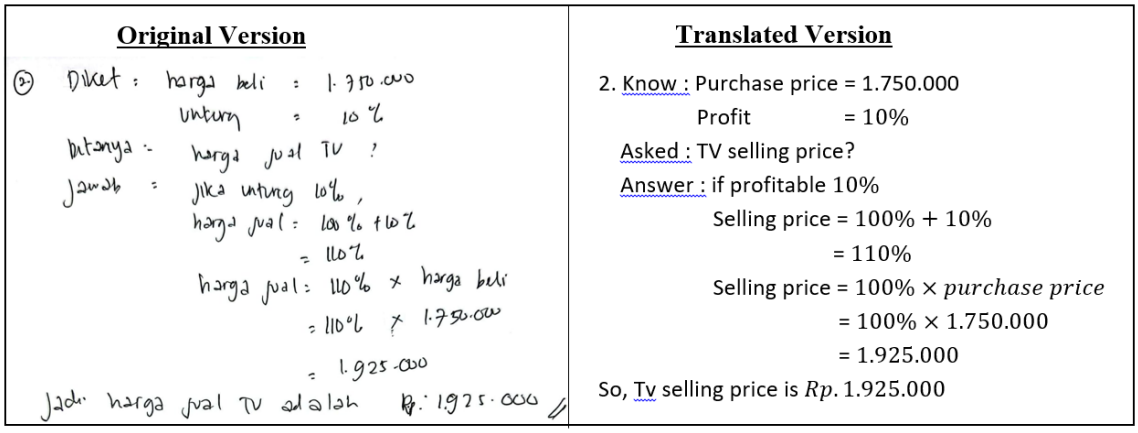
Indicators of Classifying Objects According to Their Concepts

In the second problem, which is about profit material with the problem of the selling price of an item is then analyzed according to the indicators of concept understanding, namely classifying objects according to their concepts and presenting concepts in various forms of mathematical representation. The following second problem can be seen in Figure 4.

> 2. Rena bought a Television for the price of $Rp.1.750.000$. After selling it, she made a profit of 10%. What is the selling price of the television?

FIGURE 4. Second Problem

The second problem of social arithmetic material regarding profit, that SL students have been able to classify objects according to their concepts, is marked by the completion of the problems written in full. The results of SL students' answers on this indicator can be seen in Figure 5.



Original Version

② Diket : harga beli : 1.750.000
untung : 10 %
Ditanya : harga jual TV ?
Jawab : jika untung 10%,
harga jual : 100 % + 10 %
= 110%
harga jual : 110% × harga beli
= 110% × 1.750.000
= 1.925.000
Jadi harga jual TV adalah Rp. 1.925.000

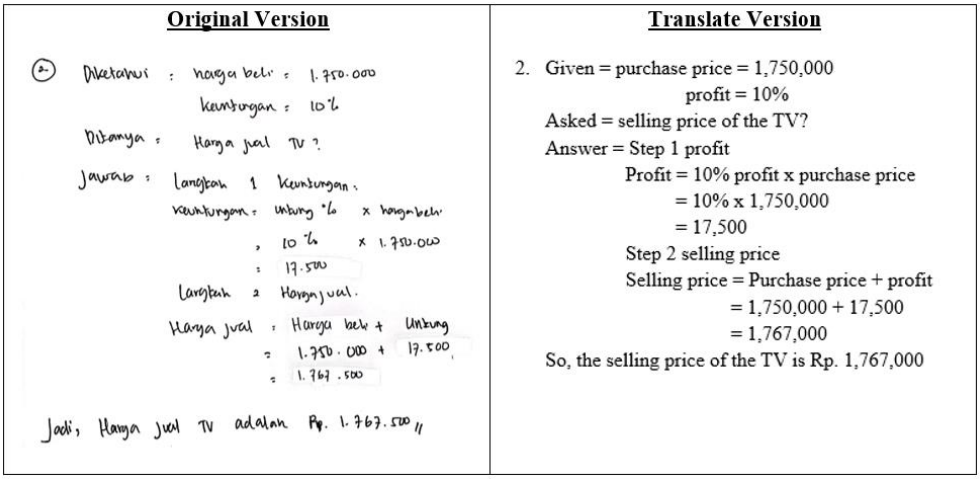
Translated Version

2. Know : Purchase price = 1.750.000
Profit = 10%
Asked : TV selling price?
Answer : if profitable 10%
Selling price = 100% + 10%
= 110%
Selling price = 100% × *purchase price*
= 100% × 1.750.000
= 1.925.000
So, Tv selling price is $Rp.1.925.000$

FIGURE 5. SL's Answer Second Problem: Indicator Classifying Objects According to the Concept

Based on Figure 5, the SL subject can write down any information from the problem given. In this indicator, SL classifies objects characterized by the solution, where the selling price plus the discount in the problem becomes 110%. This means that SL can classify the objects given in the problem with concepts that are in accordance with its logic. Based on the interview, SL was able to explain the information related to the problem, the classification of the object, and the concept that fits the problem. Furthermore, when asked how she can find that the selling price is 110%, she can use her logic when the selling price means the price is 100% so when a 10% discount is added, it becomes 110%. This shows that SL can use logic to achieve the goal of classifying objects according to the concept. This is in line with research conducted by Pertiwi & Siswono (2021), which states that knowledge about classifying objects of male students is more likely to develop their reasoning and logic skills to be able to connect to mathematical concepts.

The ability to understand the concept in the second problem, with the indicator of classifying objects according to the concept that SP students have been able to classify objects according to the concept correctly. This can be seen from the work of SP students who can solve the second problem according to the problem-solving steps. The results of SP students' solutions to this indicator can be seen in Figure 6.



Original Version

② Diketahui : harga beli : 1.750.000
keuntungan : 10%
Ditanya : Harga jual TV ?
Jawab : Langkah 1 keuntungan :
keuntungan : untung % x harga beli
, 10 % x 1.750.000
: 17.500
Langkah 2 Harga jual.
Harga jual : Harga beli + Untung
: 1.750.000 + 17.500
: 1.767.500
Jadi, Harga jual TV adalah Rp. 1.767.500 //

Translate Version

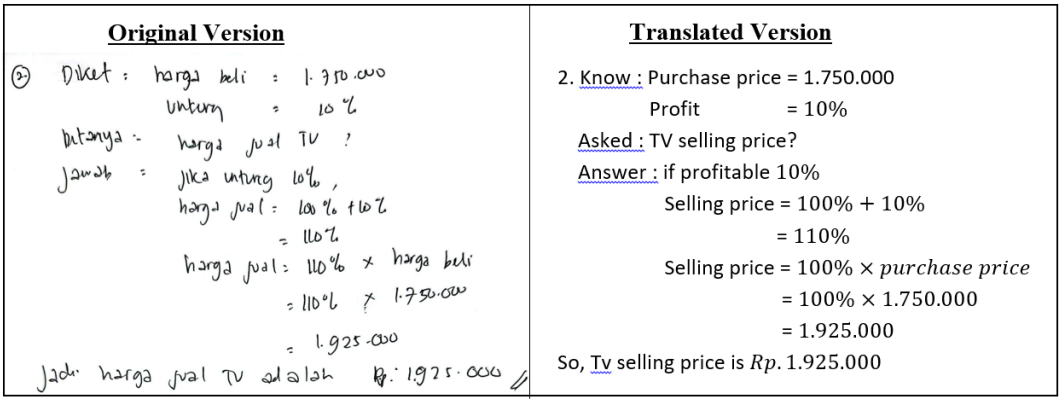
2. Given = purchase price = 1,750,000
profit = 10%
Asked = selling price of the TV?
Answer = Step 1 profit
Profit = 10% profit x purchase price
= 10% x 1,750,000
= 17,500
Step 2 selling price
Selling price = Purchase price + profit
= 1,750,000 + 17,500
= 1,767,000
So, the selling price of the TV is Rp. 1,767,000

FIGURE 6. SP's Answer to the Second Problem: Indicator Classifying Objects According to the Concept

Based on Figure 6, subject SP was able to write down information from the problem given. Furthermore, SP can classify objects which is marked by solving the problem, SP wrote that to find the selling price, it must calculate the amount of profit first by multiplying the percentage of profit which is 10% with the purchase price, then find the selling price by adding up the purchase price with the profit it has obtained, so the formula used by SP is appropriate. This means that SP can classify objects with concepts according to his knowledge. Based on the interview, SP was able to explain the information about the problem, the classification of the object, and the concept that corresponds to the problem. Furthermore, when asked how she can find that to find the profit, the selling price is multiplied by the profit percentage of 10%, she can analyze the relationship between the selling price, the purchase price, and the profit percentage. This shows that SP can use conceptual understanding ability about social arithmetic to achieve the indicator of classifying objects according to the concept. This is in line with research conducted by Lubienski et al. (2021), which explains that to classify objects, female students are able to solve problems by analyzing problems to be able to connect to mathematical concepts.

Indicator of Presenting Concepts in Various Forms of Mathematical Representation

In the indicator of presenting concepts in various forms of mathematical representation, this is still related to the second problem. This indicator is characterized by SL students being able to present the concept of completion correctly and completely. The results of SL students' solutions to this indicator can be seen in Figure 7 below.



Original Version

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untung : 10 %
Ditanya : harga jual TV ?
Jawab : jika untung 10%,
harga jual : 100 % + 10 %
= 110%
harga jual : 110 % x harga beli
= 110% x 1.750.000
= 1.925.000
Jadi harga jual TV adalah Rp. 1925.000 //

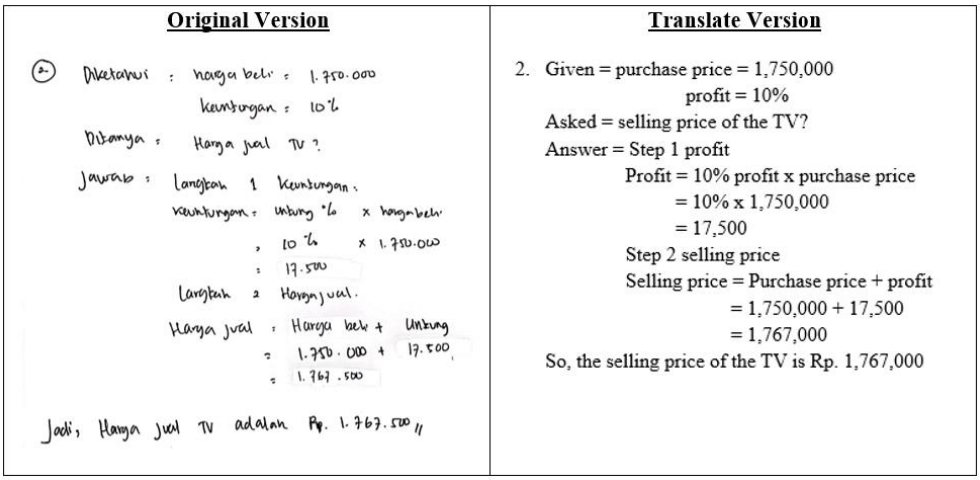
Translated Version

2. Know : Purchase price = 1.750.000
Profit = 10%
Asked : TV selling price?
Answer : if profitable 10%
Selling price = 100% + 10%
= 110%
Selling price = 100% × *purchase price*
= 100% × 1.750.000
= 1.925.000
So, Tv selling price is *Rp.* 1.925.000

FIGURE 7. SL's Answer Second Problem: Indicator Presenting Concepts in Various Forms of Mathematical Representation

Based on Figure 7, the SL subject can write down any information from the problem given. In the previous indicator, it was explained that SL was able to find that the selling price was 110%. He used his logic when the selling price means the price is 100% so when a 10% discount is added, it becomes 110%. Furthermore, for the indicator of presenting concepts in various forms of mathematical representation, it is characterized by the completeness of the solution steps written by SL. He gave the answer that the selling price of the goods was obtained from multiplying the selling price in the form of percent (%) that had been found previously by the purchase price known from the second problem. Based on the results of the interview conducted with SL, he used his logic to determine the selling price, even so the answers written still used mathematical concepts. Thus, based on the results of the answers and interviews, SL was able to fulfill the indicator of presenting concepts in various forms of mathematical representation in the second problem. This is in line with research by Lestari et al. (2021), which states that the level of male students' strategies in solving problems is in the good category, so that they can fulfill the indicators of understanding mathematical concepts.

Furthermore, the indicator of presenting concepts in various forms of mathematical representation is still related to the second problem. This indicator is characterized by students being able to present the concept of completion, but not maximally. The results of SP students' solutions to this indicator can be seen in Figure 8 below.



Original Version

② Diketahui : harga beli = 1.750.000
keuntungan = 10%
Ditanya : Harga jual TV ?
Jawab : Langkah 1 keuntungan.
keuntungan = untung % x harga beli
= 10 % x 1.750.000
= 17.500
Langkah 2 Harga jual.
Harga jual = Harga beli + Untung
= 1.750.000 + 17.500
= 1.767.500
Jadi, Harga jual TV adalah Rp. 1.767.500 //

Translate Version

2. Given = purchase price = 1,750,000
profit = 10%
Asked = selling price of the TV?
Answer = Step 1 profit
Profit = 10% profit x purchase price
= 10% x 1,750,000
= 17,500
Step 2 selling price
Selling price = Purchase price + profit
= 1,750,000 + 17,500
= 1,767,000
So, the selling price of the TV is Rp. 1,767,000

FIGURE 8. SP's Answer to the Second Problem: Indicator of Presenting Concepts in Various Forms of Mathematical Representation

Based on Figure 8, the SP subject can write down information from the problem given. In the previous indicator, it was explained that SP can determine that to find the profit by multiplying the purchase price by the profit percentage which is 10%, and determine to find the selling price SP adds up the profit he gets with the purchase price, so SP uses his analysis to solve the problem. Furthermore, for the indicator of presenting concepts in various forms of mathematical representation, SP was able to write down the steps of the solution, but not maximally. Based on the results of the interview conducted with SP, he used his analysis to determine the selling price, although the answer written was not correct. Thus, based on the results of the answers and interviews, SP has not been able to fulfill the indicator of presenting concepts in various forms of mathematical representation in the second problem. This is in line with research by Doz et al. (2023), which states that female students in solving social arithmetic problems are in the poor category, so they are unable to fulfill the indicators of understanding mathematical concepts comprehensively.

Indicators of Applying a Concept

In the third problem, which is about discount material with the problem of money that must be paid by someone to buy an item, which is then analyzed in accordance with the indicators of concept understanding, namely applying a concept and using or selecting certain operating steps. The following third problem can be seen in Figure 9.

> 3. Aditya buys clothes for *Rp*. 150.000 if the clothes he buys get a 20% discount, then the amount of money Aditya has to pay is?

FIGURE 9. Third Problem

The third problem of discount social arithmetic material, that SL students have been able to apply a concept, is indicated by solving problems by applying the concepts obtained during learning. The results of SL students' answers on this indicator can be seen in Figure 10.

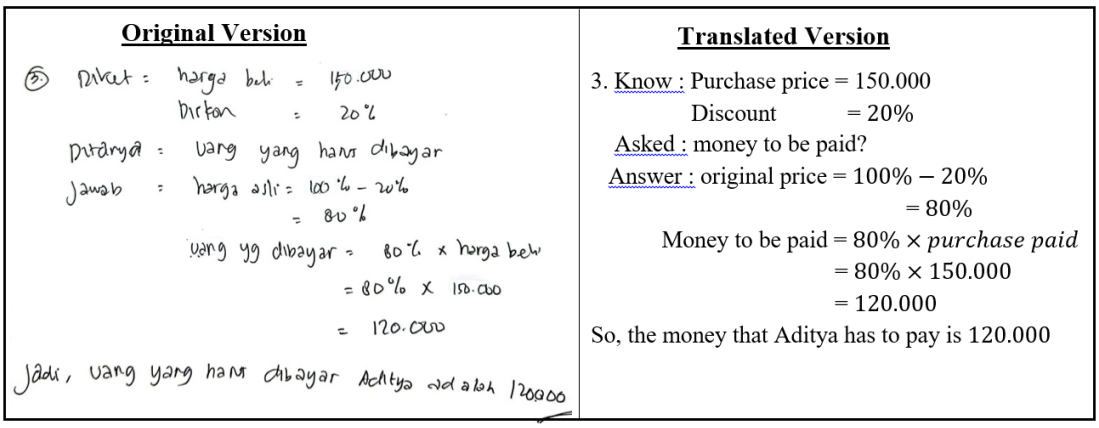
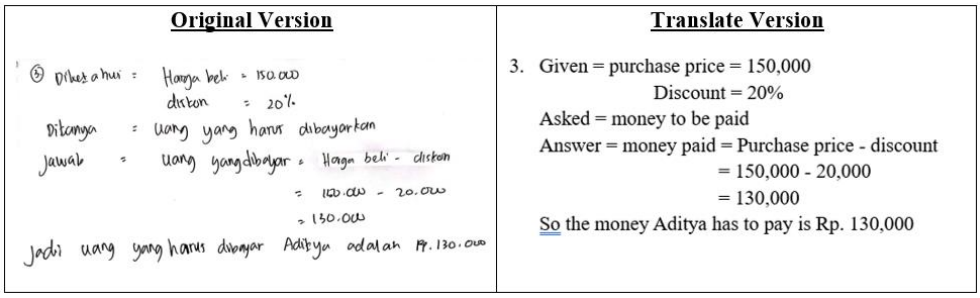


FIGURE 10. SL's Answer to the Third Problem: Indicator of Applying a Concept

Based on Figure 10, it can be seen that the SL subject can write the known and questionable elements in the problem. In addition, SL is also able to determine what formula to use and the steps of the process. The last part of SL gives the conclusion of the answer that has been found. This done by SL has proven that he can apply a concept from the given problem. Furthermore, with this completeness, SL can fulfill the indicator of applying a concept as evidenced by its completion. Based on the interview, SL can explain what is in the problem is, what is asked, and the solution formula to calculate the purchase price and discount. The student also explained as a whole related to the solution strategy he chose. This is in line with research by Satriana et al. (2022) which explains that if students can know the purpose of the problem, can determine what is asked, can determine what is known, and understand the concept of the problem, so that determining the actual results can be categorized as meeting the indicators of applying a concept.

The third problem of discounted social arithmetic material, that SL students have been able to apply a concept, is indicated by solving problems by applying the concepts they have obtained, but not maximally. The results of SL students' answers on this indicator can be seen in Figure 11.



Original Version

⑤ Diket a hui : Harga beli = 150.000
diskon = 20%
Ditanya : uang yang harus dibayarkan
Jawab : uang yang dibayar = Harga beli - diskon
= 150.000 - 20.000
= 130.000
Jadi uang yang harus dibayar Aditya adalah Rp. 130.000

Translate Version

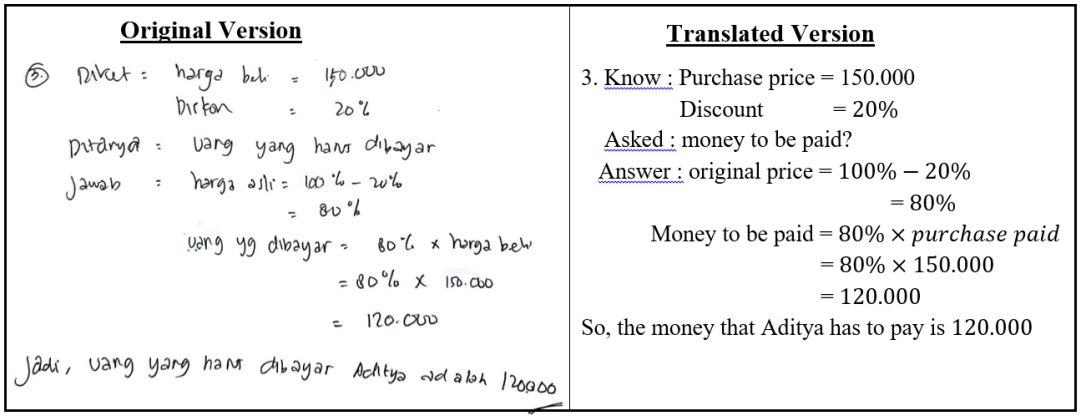
3. Given = purchase price = 150,000
Discount = 20%
Asked = money to be paid
Answer = money paid = Purchase price - discount
= 150,000 - 20,000
= 130,000
So the money Aditya has to pay is Rp. 130,000

FIGURE 11. SP's Answer to the Third Problem: Indicator of Applying a Concept

Based on Figure 11, it can be seen that the subject SP was able to write the known and questioned in the problem. In addition, SP can provide conclusions from the answers that have been found. Furthermore, SP can determine the formula used and is able to determine the steps of the process, but not maximally. This is indicated by SP not determining the amount of discount from the goods she bought and then determining the money to be paid, so SP did not fulfill one step in the solution. This means that SP has proven that he can apply a concept from the given problem, but not maximally, because there are steps that are not fulfilled. Based on the interview, SP was able to explain what was in the problem, what was asked, but not maximized in determining the solution formula, and how to calculate the purchase price and discount. This is in line with research by Kleinschmit et al. (2023), which states that students understand the components of the problem and are able to apply some procedures correctly, but still make mistakes in 1-2 critical steps and have the ability to explain the conceptual basis that is not perfect. This condition indicates that students reach a basic level of understanding but still need reinforcement in proper and systematic procedural application.

Indicator of Using or Selecting a Specific Operating Strategy

The indicator of using or choosing certain operating steps is still related to the third problem. This indicator is characterized by students being able to choose the steps of solving to find the right results according to their understanding. The results of student completion on this indicator can be seen in Figure 12 below.



Original Version

⑤ Diket : harga beli = 150.000
Diskon = 20%
Ditanya : uang yang harus dibayar
Jawab : harga asli = 100% - 20%
= 80%
uang yg dibayar = 80% x harga beli
= 80% x 150.000
= 120.000
Jadi, uang yang harus dibayar Aditya adalah 120000

Translated Version

3. Know : Purchase price = 150.000
Discount = 20%
Asked : money to be paid?
Answer : original price = 100% − 20%
= 80%
Money to be paid = 80% × *purchase paid*
= 80% × 150.000
= 120.000
So, the money that Aditya has to pay is 120.000

FIGURE 12. SL's Answer Third Problem Indicator Using or Selecting Certain Operating Steps

In Figure 12, the SL subject can write down any information from the problem given. In this indicator, SL chose a strategy by finding the original purchase price of the discount reduction given in the form of a percentage (%). Then, he used the result multiplied by the purchase price to find the money to be paid or the purchase price after the discount.

Furthermore, the indicator of using or choosing a particular operation strategy is characterized by the completeness of the solution answer written by SL. Thus, based on the results of the answers and interviews, SL was able to fulfill the indicators of using or choosing certain operating strategies in the third problem. This is in line with research by Mardhita et al. (2021), which states that male students' strategies in solving problems are influenced by the right hemisphere of the brain, which has stronger abilities in the numerical and logical fields.

The indicator of using or choosing certain operating steps is still related to the third problem. This indicator is characterized by students being able to choose a solution strategy to find the right results according to their understanding. The results of student completion on this indicator can be seen in Figure 13 below.

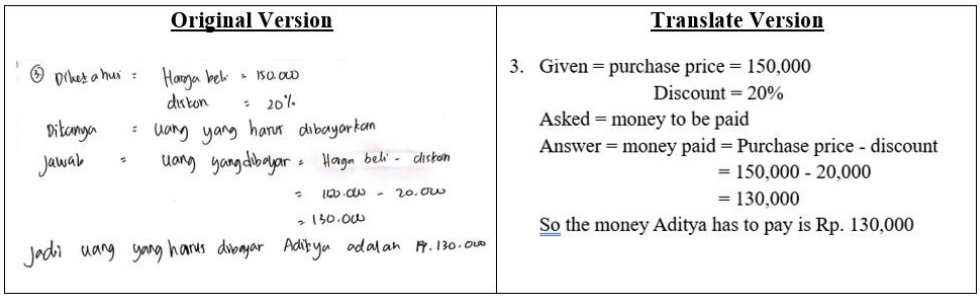


FIGURE 13. SP's Answer to the Third Problem: Indicator of Using or Selecting Certain Operating Steps

In Figure 13, although SP was able to identify the problem information completely, the subject did not fully fulfill the indicator of using or choosing the right operating strategy. SP made a strategic mistake by not calculating the discounted price of the goods he bought; besides that, SP was also wrong in calculating the discount percentage written in his answer was 20,000, while he had not calculated what 20% was worth. So the calculation of the money paid also experienced an error because the amount of discount entered was not correct. Thus, based on the results of the answers and interviews, SP was unable to fulfill the indicator of using or choosing a particular operation strategy in the third problem. This is in line with research by Copur-Gencturk & Doleck (2021), which states that students have difficulty in determining problem-solving strategies influenced by a lack of deep conceptual understanding of the relationship between variables and the ability to choose the right mathematical strategy.

CONCLUSION

This study explores students' mathematical concept understanding ability on social arithmetic material in terms of gender differences. The results showed that although male and female students were equally able to fulfill the indicators of concept understanding, such as restating concepts, classifying objects, and applying concepts, they had different approaches. Male students tend to rely more on logic and reasoning in solving problems, while female students are more analytical but sometimes less optimal in mathematical representation. This finding indicates that gender differences need to be considered in designing inclusive and effective mathematics learning strategies. This research provides important implications for the development of gender-responsive learning methods to improve students' conceptual understanding, especially in social arithmetic materials that are closely related to everyday life. Thus, educators are expected to adjust the learning approach according to the cognitive characteristics of students, both male and female, so that learning objectives can be achieved optimally.

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