Strategic competence in solving financial problems: a case study of climbers students

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Abstract. Strategic competence was mental activities apply strategies to formulate, represent, and solve mathematical problems. The aim of qualitative research is to explore strategic competence of climber student in solving financial problems. In this case, we selected from 40 students who have different adversity quotient to 3 climber students. Data based on semi-structured interview was analyzed by some steps that consist of data condensation, data display and drawing/verification conclusion. The result pointed out that student understood the problem by reading and recall prior knowledge. They formulate problem solving by understanding mathematical formulation. Student solving financial problems by numerical and verbal strategy. Finally, they determine effective solution using arithmetical method, then find cheaper solution. For the next research, we could give a suggestion to exploring another students’ adversity quotient.

1. Introduction

One of the learning mathematics purpose by student is mastering the mathematical proficiency include conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, productive disposition[1]. The five strands are interrelated to each other. It is very important for students to developing one of the five strands in mathematical proficiency, that is strategic competence. Students with good strategic competence indirectly mastered four other competences [2]. Strategic competence is a mental activity using formulating strategy problems, represent problems mathematically, and solving as well as choose the most effective solution for the financial problems[1,3,4]. Students must have thinking skills and doing mathematics creatively, productively, critical, independent, collaborative and communicative through appropriate scientific approach being studied in education units and other sources independently[5]. Creative and communicative students will be easier to solve any problems.

Based on data from the assessment results of Programme International for Student Assessment (PISA) in 2015 obtained by OECD [6], the average mathematical competence score of OECD 490, but the Indonesian students score only 386. Where in mathematical competence, there are three parts that are tested, namely literacy mathematical, statistical literacy, and financial literacy. The data shows that students financial literacy in Indonesia still low. The low financial literacy Indonesian students must be addressed so that no negative impact on the country's progress in the future. Lack of financial literacy is one of the factors that led to the financial crisis [7]. In solving financial problems needed perseverance to be able answered. Students often easily give up when solving and do not want to continue if they find an obstacle. This is show that they do not like challenges or difficulties in solving various problems of
mathematics, as well as seek easy course, and generate another difficulty. Therefore, students need try
to motivate their self for not give up easily when solving a math problem, so needed fairly high of
Adversity Quotient (AQ) [8]. Based on Stoltz [9], AQ students grouped into three categories: quitter
(low AQ), camper (medium AQ), and climber (high AQ). Three AQ category has a different response
when solving a problem. Climber students have the high fighting spirit that always fought for various
problems. This makes the researcher is interested in exploring strategic competence climber students in
solving financial problems.

The aim of qualitative research is to explore strategic competence of climber student in solving
financial problems. The result pointed out that student understood the problem by reading and recall
prior knowledge. They formulate problem solving by understanding mathematical formulation. Student
solving financial problems by numerical and verbal strategy. Finally, they determine effective solution
using arithmetical method, then find cheaper solution. For the next research, we could give a suggestion
to exploring another students adversity quotient.

2. Experimental Method
This qualitative study involved 3 of 40 students in a semi-structured interview. Forty students were
given a test in the form of financial problems then given Adversity Response Profile (ARP) to categorize
Adversity Quotient students. Subjects selected for interview subjects that meet the following criteria:
have studied the social arithmetic material, can communicate their ideas clearly to others, and AQ
students included in the category of climber. Interview data was analysed using three stages:
condensation, data presentation, and drawing conclusions [10]. Condensation data refers to the process
of selecting, focusing, simplifying, abstracting and/ or transforming the data that appear in the full corpus
(body) of the written-up field notes, interview transcripts, documents, and other empirical materials.
Presentation of data is in the form of a set of narrative text information/ data are arranged in an orderly
and systematic way so that it can be drawn a conclusion. Based on data obtained through tests and
interviews, researchers identified indicators of strategic competence in each subject of research into
strategic competence indicator as shown in Table 1.

Table 1. Indicators of Strategic Competence.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Description</th>
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<tbody>
<tr>
<td>Formulate</td>
<td>what idea of strategies will be used to understand the information at problems and the strategy of problem solving idea to find problem solution, such as: reading, imagine, etc.</td>
</tr>
<tr>
<td>Represents</td>
<td>The strategy what used to model/ represent problems, such as numeric, symbolic, verbal, graphic, etc.</td>
</tr>
<tr>
<td>Solving</td>
<td>Completion anything that can be used to solve problems, such as: standard algorithms, Arithmetical strategies, estimation strategies (front-end rounding methods or methods), draw a picture strategy, writing an equation strategy, etc.</td>
</tr>
<tr>
<td></td>
<td>Which completion can be selected to solve the problem effectively</td>
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3. Result and Discussion
3.1. Formulating
Students formulate solution of the problem given to understand in advance where a mathematical formula that should be used. The first students directly write the number of the number of students in each class without calculation, comparing discount on selection/ different place, and then choose the
most inexpensive solution that most of the discount. The second student using addition operations and get the total of all the participants, calculate and compare cost reduction and operating expenses using the formula for a discount, and then determine the effective resolution on a more economical choice. The third student wrote down information given and then answer asked on problems such as the second student. First interview subject (S1), second interview subject (S2), and third interview subject (S3) use same and different strategy to formulate completion of financial problems that given by researcher (R). All of them compared two discount option then they choose the cheaper prices. The different side is their mindset about step by step to formulate this problems.

R : Please explain the completion steps that you will to use!
S1 : First i find the key of the problems is “10% from whole prices” then write given and asked information from the problems. Finally, solving the problem with compared both of discounts and choose the cheaper.
S2 : I write the calculation of all touring participants from each class then compared a both discount with a same quantity (210 students) to show the cheaper one.
S3 : In my mind the first is too simple so that people may think to choose it. But i still count both of the discount before decide the cheaper one, i compared prices of tickets with different discount.

3.2. Representing

Student’s representation strategy in financial problems using a numerical and verbal strategies. The first student using words to represent the idea linking between statements and information that exist and explored on the problems. It is verbal strategies in representing problems and problem-solving ideas. The second and third student use a simple strategy such numerical calculations and numbers in representation.

Figure 1. Students Representation
Figure 1 shows that climber students using a strategy of numerical and verbal strategies to represent problems and problem-solving ideas.

### 3.3. Solving

The first student directly determined the cost without calculate but include a process of determining the cost through their words. The second students perform various arithmetic operations such as multiplication, addition and subtraction and use a formula to resolve discount. The third student chose to use a sequence of completion of writing down information on the problem known and asked then do the calculations as well as the second student.

![Figure 2. Students Completion](image)

Figure 2 showed that climber students determined the effective solution use arithmetic calculation and choose the cheapest solution.

### 4. Conclusion

The results showed the students understand the problems with reading and recall previous knowledge relevant to financial problems given that social arithmetic. Students formulate settlement of the problem given to understand in advance where a mathematical formula that should be used. Students represent financial problems with the numerical strategy and verbal strategies. Then the students determine the effective resolution using arithmetic calculations and choose the cheapest solution.

### 5. References

[2] Gardneren D V, Scheurmann A and Poch A 2013 Challenges students identified with a learning disability and as high achieving experience when using diagrams as a visualization tool to solve mathematics word problems (Springer: ZDM Mathematics Education)


