

ANALYSIS STRATEGIES IN COMPLETING LOCAL CULTURE-BASED MATHEMATICS ASSESSMENT WITH PISA STANDARD

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ABSTRACT

This study aimed to determine the learning strategies used by students in working on PISA assessments characterized by local culture. The method used in this study was descriptive using qualitative data. The results of the study showed that the rehearsal strategy and organization strategy were used by all class classifications of high, medium and low classes. However, in the high class, the rehearsal strategy was used in all student while in the low class the rehearsal strategy was only used in certain numbers. For the elaboration strategy it only appears in the medium class. Whereas metacognitive strategy is only seen in the low class. In terms of local culture, after working on the questions given, there were previously unknown tourism which later became known such as the Makam Mbah Batu, Kampung Wisata Kungkuk, Arboretum, etc. In addition, they claimed to be more interested in visiting existing tourism, especially tourism that they just found out from the assessment.

ANALISIS STRATEGI DALAM MENYELESAIKAN SOAL MATEMATIKA BERSTANDAR PISA BERBASIS BUDAYA LOKAL

Kata Kunci:

Kebudayaan lokal

PISA

Strategi belajar

ABSTRAK

Penelitian ini bertujuan untuk mengetahui strategi belajar yang digunakan siswa pada pengerjaan soal PISA berkarakteristik kebudayaan lokal. Metode yang digunakan pada penelitian ini yaitu penelitian kualitatif. Dari hasil penelitian, menunjukkan bahwa strategi mengulang dan strategi organisasi digunakan oleh semua klasifikasi kelas baik kelas tinggi, sedang dan rendah. Namun, pada kelas tinggi dan sedang, strategi mengulang digunakan pada semua pengerjaan soal sedangkan pada kelas rendah strategi mengulang hanya digunakan pada nomor tertentu saja. Untuk strategi elaborasi hanya nampak pada kelas sedang. Sedangkan strategi metakognitif hanya nampak pada kelas rendah. Dari sisi kebudayaan lokal, setelah mengerjakan soal yang diberikan ada wisata yang sebelumnya tidak diketahui kemudian menjadi tahu seperti Makam Mbah Batu, Kampung Wisata Kungkuk, Arboretum dan lain sebagainya. Selain itu mereka mengaku menjadi lebih tertarik untuk mengunjungi wisata yang ada terutama wisata yang baru mereka ketahui dari soal.

1. INTRODUCTION

The fact that humans always try to keep their existence shows that in life, human cannot be separated from culture [1]. Culture is a characteristic of a particular group which includes beliefs, habits, language, food, art and music [2]. The process of creating culture takes a long time [1].

Culture is the identity of a place, both regional and state [3]. In the identity of the community contains the values of local wisdom which is the result of filtering various cultures from many ethnic groups [4]. Culture can be interpreted as the identity of a society, moreover, it can even be interpreted as an identity of a country [5]. It is not impossible when a culture of a place is forgotten then that place will lose its identity as well [6]. It is important for a country to keep its cultural value, because a country that stands with its cultural diversity will be able to survive with its independence and its confidence [7]. Thus, local culture is important to be maintained. Some examples of local culture are languages, traditional dances, traditional clothes, dialects, etc [4].

Kota Wisata Batu (Batu Tourism City) is one of the cities in East Java that has many tourist attractions [8]. These tourism spots are one of the local cultures. Based on the results of interviews with several students at SMP Negeri 02 Batu, it was found that there were many students who did not know the tourism spots in Batu City, even though the students were native. Learning process at school also does not support the preservation of local culture. This statement is proven by the fact that no local culture-based assessment has been developed. The fact that the students do not know about their own local cultures is a problem that requires a solution. One way to preserve local culture is to implement it in PISA-standard assessment (Program for International Student Assessment) [9]. Recently, the development of many assessments referred to PISA [10].

PISA is a large-scale assessment with an international level that assesses a variety of abilities, one of which is students' mathematical literacy ability [11]. The importance of providing PISA-standard assessments is to train and measure students' literacy skills [12]. Furthermore, by implementing local culture in the assessment, students will get to know their local culture as well as trained to think at a high level (critically and creatively) [13]. The characteristic of PISA questions is that they contain literacy that emphasizes the skills and abilities of students, so that they can apply them in their daily lives [14]. Based on the 2012 PISA assessment framework, mathematical literacy is the ability of students to be able to formulate, apply and interpret mathematics in various contexts. So, in making PISA-standard assessments, we have to pay attention to these elements [15].

Based on the results of an interview with one of the mathematics teachers at SMPN 02 Batu, so far, the assessments for students is only sourced from books in school, and students had never worked on PISA assessments, and the assessments given by teachers had never been related to local culture. Whereas PISA-standard assessment contains formulating, applying and interpreting mathematics in various life contexts, so a strategy is needed to solve PISA-standard assessment [16].

Strategy in working on problems is a scheme used to encourage student competence and student mastery, especially in solving a problem [16]. Some strategies in completing PISA-standard assessment include rehearsal strategy, elaboration strategy, organization strategy and metacognitive strategy [17]. Rehearsal strategy helps to place information from short term memory into long term memory, this can be done by marking important words from questions [17]. Elaboration strategy is a technique of adding details of new information so that it becomes more meaningful, with this strategy, symbolization and

coding becomes easier to understand, this can be done by means of making notes and also by PQ4R method (preview, question, read, reflect, recite and review) [17]. Organization strategy increase the value of new information by using new groupings, this can be done by making concept maps [17]. Metacognitive strategy is related to how students use certain strategies appropriately [17].

Previous research on the development of PISA-standard assessment has been conducted, one of which was by Sari in 2016 which focused on measuring student arguments [15]. From this research, it was found that from the PISA model mathematical assessment, students' arguments were quite good but it did not show the process of how to get the answers [15]. This shows that students have difficulty determining learning strategies so that they only focus on the answers but not the process of getting them. However, at present there is still no research that analyzes students' difficulties in determining strategies in solving problems, so that many students work on problems incorrectly, this is the basis of this research, which is to analyze strategies in solving PISA-standard assessments based on local culture.

2. METHOD

The method used in this study is qualitative research method. Qualitative research method is grouping data in a natural setting to define a phenomena where researchers are the key instruments [18]. Data analysis is specific and the results of the study focus more on 'meaning' rather than drawing conclusions in general [19]. 'Meaning' means the actual data, the strategies used by students in working on PISA-standard assessments characterized by local culture [19]. This research begins with the data collection stage. Data in the form of student answer sheets are collected by giving PISA standard assessment with local cultural characteristics to students to find a solution. The items in the PISA standard assessment in this study are shown in the following table:

Table 1. Item of PISA-Standard Assessment

PISA Indicator		Item
<i>Processes: Mathematizing</i> <i>Content: Space and Shape</i> <i>Context: Societal</i>	a	Make a table of Ayu and Linda's tourist itinerary, then make it into a set A and B
<i>Processes: Using Mathematics Tools</i> <i>Content: Quantity</i> <i>Context: Societal</i>	b	Who has the most money left if Ayu brings Rp. 300,000, and Linda brought Rp. 270,000?
<i>Processes: Representation</i> <i>Content: Change and Relationship</i> <i>Context: Societal</i>	c	If Ayu and Linda's money is used to visit the same place, what tourist attractions do they visit together? Then, draw a Venn diagram of the tour rates taken by Ayu and Linda together!
<i>Processes: Using Mathematics Tools</i> <i>Content: Quantity</i> <i>Context: Societal</i>	d	How many tours have Ayu and Linda not visited?
<i>Processes: Communicating</i> <i>Content: Uncertainty and Data</i> <i>Context: Personal</i>	e	What tourist attractions do you want to visit on weekends, if you visit Batu City from Malang City? How much money do you have to carry?

The PISA-standard assessment that has been developed includes tourism elements in Batu City as local cultural characteristics. The analysis is done by identifying the answer sheet based on the indicators of the strategy, then interpreting it as drawing conclusions. The subjects of this study were Grade VII students of SMP Negeri 02 Batu. The procedure

of this research is making questions, testing questions to the subject, analyzing the answers and then drawing conclusions. To test the validity of the items, the questions were validated by experts.

The first step after getting the students' answer sheets is to give a score on each answer sheet using scoring guidelines. Then, the answer sheet is divided into three groups with the following group divisions:

Table 2. Group Divisions

No.	Class	Score
1.	High	$75 \leq score \leq 100$
2.	Medium	$50 \leq score < 75$
3.	Low	$0 \leq score < 50$

Each class was sampled and then analyzed. Samples were taken randomly according to the completeness and the legibility of the writing. Student strategy analysis consists of four kinds of strategies, they are: rehearsal strategy, elaboration strategy, organization strategy and metacognitive strategy. The indicators of the strategy can be seen from the student answer sheet:

Table 3. Indicator of Strategy

No.	Learning Strategy	Indocator
1.	Rehearsal Strategy	<ul style="list-style-type: none"> - Rewrite information obtained from questions. For example, by writing “<i>diketahui</i> (information known)”, “<i>ditanya</i> (asked)”, and “<i>jawaban</i> (the answer)”. - Write the word “<i>Jadi...</i> (So/the conclusion is...)” at the end of the answer to confirm the answer or conclusion that has been found.
2.	Elaboration Strategy	<ul style="list-style-type: none"> - Mark important information. For example, underline the answers, give a frame to the conclusion - Write the answers using mathematical symbols. For example, write “<i>Jadi</i> (so)” with the symbol “<i>∴</i>”
3.	Organization Strategy	<ul style="list-style-type: none"> - Make a table of Ayu and Linda tourist routes precisely - Map out what is known, and what is asked correctly
4.	Metacognitive Strategy	<ul style="list-style-type: none"> - Working on problems randomly - Add information not in sequence but still be marked. For example, by giving an arrow

After being analyzed using the indicators in table 3, interviews were conducted with the students who had the answer sheets, to find out students' knowledge about the culture around them. The interview script is as follows:

1. 1. After working on the questions, what tours did you just find out about?
2. 2. After working on the questions, are you interested in visiting these places?
3. 3. What places do you want to visit?

3. RESULTS AND DISCUSSION

After PISA-standard questions are declared valid by 2 validators, then PISA-standard questions are tested to students in the School. After scoring on each answer sheet, then divided into 3 classes. Then one sample is taken from each class to be analyzed using the indicators in table 3. The answer sheets are marked with a certain color to indicate what strategies are used. The red color represents the Rehearsal Strategy, the blue color represents the Elaboration Strategy, the Green color represents the Organization Strategy, and the orange color represents the Metacognitive Strategy.

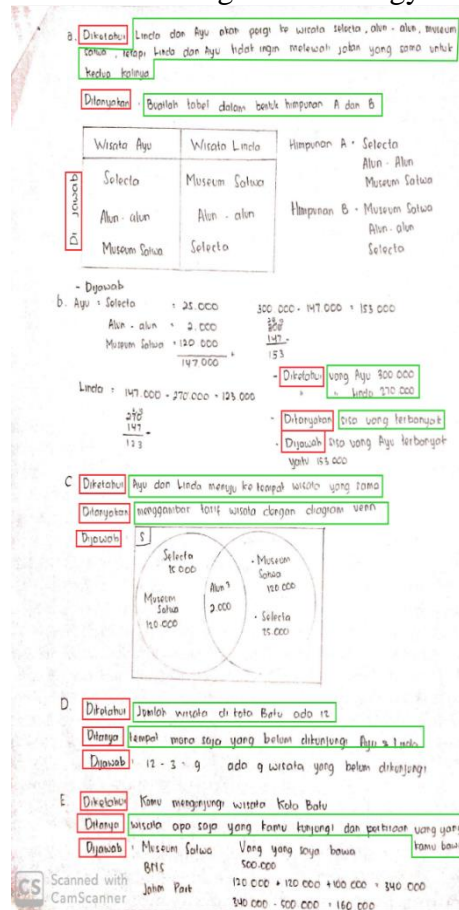


Figure 1. High Class Student Answer Sheet

Figure 1 shows that there are red and green marks. A red sign indicates student was using a rehearsal strategy. Rehearsal strategy is shown in ‘diketahui (information known)’, ‘ditanya (asked)’, and ‘jawaban (answer)’, in parts (a) to part (e). This means student rewrote the information obtained from the problem, so that, it helps to make short term memory information into long term memory. Whereas the green sign indicates student was using an Organizational strategy. This strategy appears in student’s answers in the section on how they map the information he know and what is asked precisely, from the answers in part (a) to part (e), at this point student also write the answer consistently.

As in the answer in part a, student wrote “it is known: Linda and Ayu will go to Selecta tours, Batu Square, and Angkut Museum, but Linda and Ayu do not want to take the same road for the second time; Asked: Make a table, in the form of sets A and B”. The information is right and in accordance with what is contained in the problem. Just as in the answer to part (a), student also write down the correct information in the answers to part (b) and part (e). When interviewed about the local culture, student claimed that there were

some places that he did not know it previously, such as *kampung wisata kungkuk* and *mbah Batu* tomb. Student claimed to be very interested in visiting tourism in Batu city especially the *Mbah Batu* tomb which holds a lot of history.

a

Diketahui
 Ayu berangkat dari Desa Jumberejo ingin mengunjungi selecta -
 alun-alun dan museum satwa. Linda berangkat dari Desa
 Jumberejo ingin mengunjungi museum satwa alun-alun, selecta

Ditanya
 Rute yang dilewati Ayu dan Linda

Jawab

Nama	Rute
Ayu	Desa Jumberejo - Kampung wisata kungkuk - selecta - Desa Bulurejo - Desa Jedomulya - Balai Kota Batu - Alun alun Batu - Pasar brisar batu - museum satwa
Linda	Museum satwa - alun-alun batu - balai kota Batu - POM - Desa Jumberejo - kampung wisata kungkuk - selecta

b

Diketahui
 Ayu membawa uang Rp 300.000 Linda membawa uang Rp 270.000

Ditanya
 Siapa yang terbanyak

Jawab
 Ayu : Rp 300.000 - (Rp 25.000 + Rp 2000 + Rp 120.000)
 Rp 200.000 - Rp 147.000
 Rp 153.000
 Linda : Rp 270.000 - (Rp 120.000 + Rp 2000 + Rp 25.000)
 Rp 270.000 - Rp 147.000
 Rp 123.000

Jadi jika uang terbanyak adalah milik Ayu

c

Diketahui
 tempat yang dikunjungi bersamaan adalah alun-alun

Ditanya
 dari dua te 3 tempat wisata dibuat diagram venn

Jawab

d

Diketahui
 tempat wisata yang dikunjungi Ayu dan Linda
 hanya alun-alun, museum satwa, selecta
 yang tidak dikunjungi, meiseka

Ditanya
 Diketahui

Jawab
 agar semua petik buah, arboretum, cangar, jatimpok, kaliwatu, rampung
 Hdi, Kerajinan cabek tirta nilwana

e

Diketahui
 tempat wisata di Batu dari arah kota Malang

Ditanya
 tempat wisata yg dikunjungi dan tarif perkearaan

Jawab
 Jatim parkir 3
 Rp 100.000

Figure 2. Medium Class Student Answer Sheet

Figure 2 shows that there are 3 different colored markings, red, green and blue. On the red mark the students write down what was known and asked from the question, and answered consistently from parts (a) to parts (e) that indicate students are using rehearsal strategy. The rehearsal strategy also shown on the answer “so, the most money left is Ayu’s money” that was written in part (b). This indicates that students repeat the information that has been obtained. Beside the red mark, there is also a green mark on the students’ answer sheets that indicates students are using organizational strategy. This strategy is seen through the results of an appropriate mapping of information obtained from the questions in the answers section from part (a) to part (e).

As in the answer in part (b), student wrote “it is known: Ayu brought Rp. 300,000, Linda brought Rp. 270,000”; Asked: Who has the most money left?”, student mapped out the information known and asked precisely. Besides, Ayu and Linda's tour route tables written correctly was also indicate students are using organization strategy. The blue mark on the answer sheet signifies that student is using the Elaboration strategy, where student put underline sign to confirm the conclusions of the answers obtained. When interviewed about the context of their local culture, student claimed that there was one place that she

did not know about it before, it is Arboretum. Student claimed to be interested to visit existing tourism, especially Cangar hot spring.

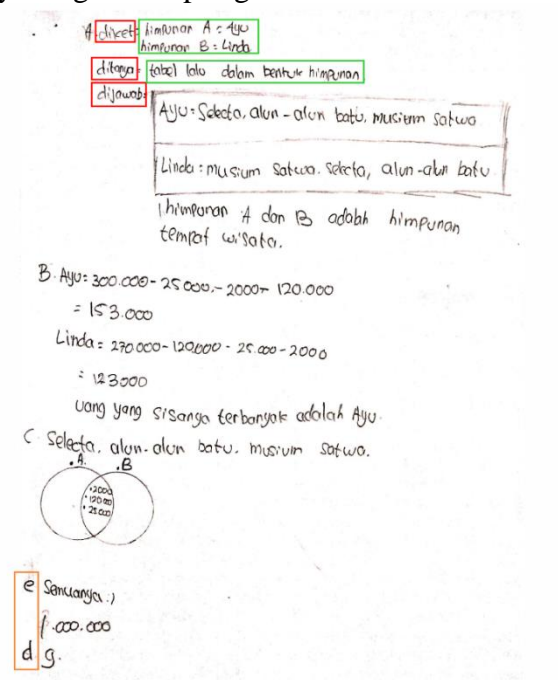


Figure 3. Low Class Student Answer Sheet

Figure 3 shows that there are 3 different colored markings, red, green and orange. Almost the same as the previous explanation, where the red sign indicates student is using a rehearsal strategy. However, in this picture there are fewer red marks because student only write the information known, asked and the answer of the questions on part (a). Similar to the red mark, the green mark found on this student's answer sheet is also only found in part (a). The student wrote: "the information known: set A = Ayu, set B = Linda; Asked: make a table and a set". Even though it is only in the answer to part (a), students still make a map of what is known and asked correctly according to the information contained in the problem.

While the orange sign indicates student used metacognitive strategy, where student worked on part (e) first then part (d). Metacognitive strategy is seen when students work on problems not in sequence. During the interview, student claimed to work on problems that were considered easy to problems that were considered difficult. Besides, in the context of local culture, student claimed that his insight about tourism in Kota Batu increased, he just knew about Kampung Kids. Student also claimed to be more interested to tourist attractions such as Kampung Kids and Arboretum.

Writing 'diketahui (information known)' and 'ditanya (asked)' needs to be written in full, in accordance with previous research [15]. However, this study is different from previous research, in previous research student wrote back the questions on the answer sheet, while in this study, students did not write back the questions, but made points for and wrote it on the answer sheet. In addition, in previous studies, researchers did not divide the class based on student grades, but from the overall data obtained was taken one sample and then analyzed.

4. CONCLUSION

Based on the discussion above it can be concluded that, rehearsal strategy and organization strategy were used by all class classifications, high, medium and low. However, in the high and medium classes, the rehearsal strategy was used in all steps, while in the low class the rehearsal strategy was only used in certain numbers. For the elaboration strategy only appears in the medium class, this is because students in the class are lacking in confidence, so, even though students had written the word as a sign of the conclusion, student still underlined these answers. This is different with high and low classes that they did not underline the conclusion of the answer because they feel confident in what they wrote on the answer sheet.

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