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Analyzing student's character values in high order thinking skills problems

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Abstract. This research is a qualitative descriptive study that aims to find out how the character values of students in learning use HOTS questions with PBL models. Data collection methods used were observation, written tests, and interviews. The focus of this research is the value of the character of curiosity, hard work, thorough, and creative. The results showed that the dominant character values that emerged were curiosity and hard work, which was due to the lack of HOTS type questions making students often ask the teacher how to solve these problems. Then because of the dominant curiosity, students work on the problem with hard work. While the character values the dominant does not appear are thorough and creative characters, it happens because of the lack of student training in working on various math problems making students only focus on what has been taught in the classroom without developing their thinking.

1. Introduction

Nowadays, character education is very important for Indonesia, it can be seen from the implementation of the 2013 curriculum which focuses on character education, which is based on several regulations in Indonesia [1-4]. It can be integrated into every subject at school to prevent the increasingly severe moral crisis in the younger generation, one of the subjects that can be integrated character education is mathematics, namely in the process of learning mathematics and the process of solving math problems [5-9]. But in reality in the field based on the results of research in solving non-routine problems students are not able to answer all the problems themselves to appear insecure or can be said students do not have the character of hard work. Then students also cannot solve with other alternative solutions because students do not understand the concept so students also cannot bring up the creative character [10]. Furthermore, the results of research in problem solving students lacked in connecting the data obtained to prove the truth so the lack of rationalism. Students cannot solve the problems given in order and correctly so that the lack of discipline in students [11].

In the 2013 curriculum, in addition to character become important in learning, facilitating higher-order thinking skills is also important so that Indonesian students can master the abilities available in HOTS. Higher-level thinking skills are the process of thinking at a high level not only memorizing but includes critical thinking, creative thinking, abilities of problem solving and wider use of thinking order to connect a new challenge with existing information and then provide conclusions that can be a solution of a difficult problem[12-14]. Based on the PISA and TIMSS survey, Indonesian students are



still weak in solving HOTS type problems [15, 16]. So, in this 21st century students need to have the ability to answer HOTS type questions. The characteristics of HOTS include non-algorithmic meaning that action steps cannot be determined at the beginning, are complex meaning steps cannot be guessed directly from a particular point of view, have many solutions, involve variations in decision making and interpretation, application of many criteria, involve uncertain, demands independence in the thought process, involves impressive meanings and requires a lot of effort [17, 18]. Therefore, the researcher conducted in this study aimed to look at the value of the character (curiosity, hard work, creativity, and thorough) that appears when junior high school students in high order thinking skills problems.

2. Method

This research is a descriptive qualitative type that aims to find out how the character values of students in HOTS-based learning use PBL models on the material variable linear equation system. Descriptive qualitative presents the data in such detail that the reader is placed in context and creates something like being there [19]. The focus of this research is the character values of students namely curiosity, hard work, meticulous and creative while working on HOTS-based questions after the PBL model is applied. The method of selecting subjects from this research is by the purposive technique in class VIII.1 students at SMPN 18 Palembang. The criteria for selecting subjects are seen from their academic abilities, teacher recommendations, and students' willingness. From 32 students in the 8th class was ranked based on previous math grades, 9 students were selected as candidates for the 3 category. The first category with the the highest grades, the second category with medium grades and third category with the lowest grades. Furthermore, from the 9 prospective subjects recommended by the teacher only become 6 students. The researcher asked the availability of the 6 students to be further investigated namely by being interviewed and those who were willing to be interviewed were 4 students with category 1 high ability students, 2 medium ability students, and 1 low ability student.

Then for data collection techniques done in several ways, namely from the test questions, observation, and semi-structured interviews. For the test questions given are questions with the type of High Order Thinking Skills. At the implementation, the stage consists of 4 meetings, with 3 meetings teaching and learning process using the PBL model and 1 meeting for the test. Observations were made when students were working on HOTS-based student worksheet that given at meetings 2 and 3, and when the students working on HOTS-based test questions which amounted to 3 questions at meeting 4. The data analysis stage was data reduction, presentation and drawing conclusions [20].

3. Result and Discussion

After the data is obtained, then summarized into a table that shows the appearance of each descriptor that matches the character you want to see. Based on the table, the character values seen are curiosity, hard work, thorough and creative.

Table 1. Subject character values.

Subject	Question	Curiosity			Hard Work			Thorough			Creative		
		1	2	3	1	2	3	1	2	3	1	2	3
M	Student Worksheet 2	√	√	√	√	√	√	×	×	√	√	×	√
	Student Worksheet 3	√	√	√	√	√	√	√	√	√	√	×	√
	Test	√	√	√	√	√	√	√	√	√	×	×	√
R	Student Worksheet 2	×	×	√	√	√	√	√	×	√	×	×	√
	Student Worksheet 3	×	√	√	√	√	×	√	×	×	×	×	√
	Test	√	√	√	√	√	√	√	√	√	√	×	×
I	Student Worksheet 2	√	√	√	×	√	√	√	√	×	√	×	×
	Student Worksheet 3	√	√	√	√	√	√	√	×	×	√	×	×
	Test	√	√	√	√	√	√	√	×	×	×	×	×
S	Student Worksheet 2	×	√	√	√	√	√	√	√	√	×	×	√
	Student Worksheet 3	×	√	√	√	√	×	√	×	×	×	×	√
	Test	√	√	√	√	√	√	×	×	√	×	×	×

3.1. Curiosity

Curiosity is an attitude and action that always seeks to find out more deeply and extensively from something that is learned, seen, and heard [21]. In working on HOTS-based problems the subject generally has raised a character of curiosity that is by bringing up descriptors (1) asking something related to the System of two-variable linear equations problem given (2) determining important information from the problem (3) working a solution to the System of two-variable linear equations problem. From the table, it can be seen that in general, each subject can come up with three descriptors of curiosity characters. This is known from the results of observations made while subject M is working on LKPD 2, from the results of the worksheet and from interviews with subject M.

The figure shows a student worksheet with handwritten mathematical work. Two red boxes highlight specific parts of the work. The top box contains a list of prices and percentages for cars and motorcycles. The bottom box contains a system of linear equations and its solution. Two callout boxes provide commentary on these parts.

Subject M can find problem solving from the problem that given

Subject M can determine important information from the problem that given

Figure 1. Student Worksheet 2 has subject M.

Figure 1 is the result of Student Worksheet 2 which is done by subject M, the picture shows that subject M can determine important information from the problem by writing down what is known from the problem. This fulfills the second descriptor of the character value of curios and is in line with the results of the study which says "students have a curiosity if they are seeking information from a mathematical problem to completion. To know students' understanding in the search process, it can be known by students knowing the information available from the questions [21]. Then from Figure 1, subject M has also sought a solution by making an example and determining the method used. This fulfills the third descriptor of the character of curiosity. Then reinforced by the answer of subject M when asked about his understanding of the problem given, subject M answered "but there are few who do not understand at the end, when looking for the number of cars and motorcycles, so asking with mother" from the statement it appears that the subject M has to know important information about the problem, and subject M has worked through the problem-solving process. Then subject M had difficulty in the final steps, so subject M asked the teacher, which was the first descriptor of the character of curiosity. Before subject M, asks subject M has fulfilled the second and third descriptors. So from the observation results, student worksheet results and the answers during the interview, subject M has raised the character of curiosity in HOTS-based learning using PBL models.

3.2. The character of Hard Work

Hard work is a behavior that shows earnest effort in overcoming various learning barriers and assignments, and completing assignments as well as possible [22]. In general, all subjects also have raised the character of hard work during learning and when working on HOTS-based questions. It is known from the results of observations, the results of working on Student Worksheet, and the results of interviews of each subject by looking at descriptors (1) still solving problems despite experiencing difficulties (2) working on all the problems even though not finished (3) working on all the problems in accordance with their abilities. The following is one of the data obtained, which is a sample of student worksheet's work from subject R, then there are also pieces of interviews with subject R that can support the fulfillment of hard work character descriptors.

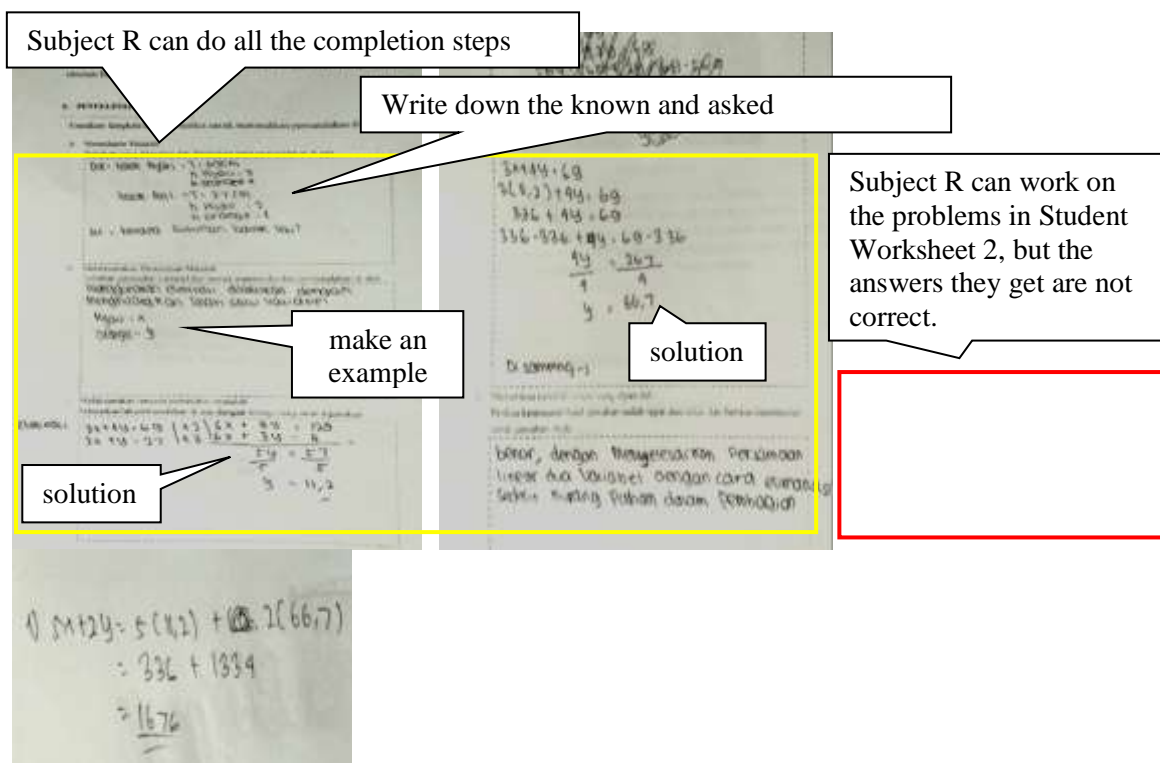


Figure 2. Student Worksheet 2 has subject R

Figure 2 is the result of the Student Worksheet 2 that is done by subject R by making known and being asked of the problem, then subject R continues by specifying variables, after that subject R works on the problem until the last step but the answer obtained by subject R is not right. From the results of the Student Worksheet, it is seen that despite the difficulties R subjects can work on problems according to their abilities, even though the answer is not right. This was reinforced by the subject R's answer when asked the process he completed the answer.

- T* : Are you stuck in doing this problem?
R : Yes
T : Then what do you do when you are choked up? Is giving up, continued the second problem, still working to get it or what?
R : I did until find the answer

From the answers of the subject R, said that the subject R kept working on the problem until it can. This means that subject R has tried to solve the problem with the ability he had even though subject R had difficulty resulting in an incorrect answer. So subject R has worked hard to solve the given problem. From the results of the interview, the subject fulfills the first descriptor of the value of the character of hard work. Then for the second and third descriptors have also been fulfilled from the results of the student Worksheet. So subject R has worked hard to solve the given problem.

3.3. The character of thorough

Accurate is the attitude or action of someone who shows carefulness and caution in every activity or task [23]. From table 1 it can be seen that in general meticulous characters do not appear in each subject, only a few meet the three descriptors of the meticulous character, the descriptors are (1) the accuracy of choosing the method used (2) there are no errors in working on problems (3) recheck all answers that have been made. One that is able to fulfill the three descriptors is subject M, when working on test questions subject M is able to meet the first descriptor seen from the results of

observations and the results of the answer sheet of the test in Figure 3, then for the second descriptor of the answer sheet results that show no errors in working on the problem.

Subject M uses the method that is correct, namely the method of substitution

There were no errors in arithmetic and algebraic operations performed by subject M.

Answer subject M is correct

Figure 3. The result of test answer from subject M

Figure 3 is the result of tests that have been done by subject M. From Figure 3 it can be seen that subject M can do this problem correctly, the answer from subject M in this problem is the number of chickens to be cut is 40 and the number of ducks to be cut is 16 tails. Subject M also uses the correct method or method in solving the problem by using the substitution method. Then in working on solving this problem, it can be seen that there were no errors in both arithmetic and algebraic operations by subject M. This is reinforced by the questions given on subject M.

G : What method do you use to solve this problem?
M : This is a substitution.

From the answers given, subject M directly answers using the method of substitution, this means subject M has understood the intent and question of the problem so that subject M can choose the correct way and make it easier to solve the problem correctly. Then after that, subject M gives an answer that shows that subject M meets the third descriptor.

G : after getting this answer do you check again or not ?
M : yes, check again, then ask the teacher whether our answer is incorrect or not

Then from the answer, subject M said that after getting the answer from test question no 1, subject M checked the answers that were made, so subject M fulfilled descriptor 3. This is also supported by the previous study that states that the character is not careful in answering problems can be found in mathematical calculations [24]. Based on these statements it can be said that careful character can be seen from mathematical operations. If a student's math is correct, the student already has a thorough character. From this, the subject M has been thorough in working on the type HOTS problem

3.4. The Character of Creative

Creative character is thinking and doing something to produce a new way or result from something already owned [21]. Based on the data that has been taken in general, creative characters also appear less on each subject, it can be seen from the table that shows that of the three descriptors (1) using various solving strategies to solve complex problems (2) finding other strategies that are unusual in solving problems (3) immediately working on the solution after reading the questions, each subject only fulfills only two creative descriptors in answering questions. In the second descriptor of creative character, all subjects cannot fulfill it, it is caused by several factors. One of the subjects gave a reason for not being able to use a strategy other than what was given.

- G* : *Can you use a method other than the strategies we have learned?*
M : *I can't, the problem in that group is just using a mixture*
G : *So the group's decision is mixed?*
M : *Yes*

Based on the statement of subject M, while working on the Student Worksheet the subject M cannot use other strategies. The reason is because of the agreement of the group to use mixed methods. So that subject M focuses on using a mixed-method. But from the answers to the subject M can be categorized as meeting a communicative character. That is caused by the response of subject M "because the group is already using a mixture of it" means that subject M does not mind to prioritize the group rather than yourself. This is by following the understanding of the communicative character itself, which is an action that shows a sense of pleasure in talking, socializing, and cooperating with others [19]. Furthermore, from the observations it can be seen that subject M also fulfilled the first descriptor, it was strengthened from the results of the interview when working on the test questions.

- G* : *What method do you use to solve this problem?*
M : *This is a substitution method*
G : *Can you use another method that was given before?*
M : *Yes you can, using a mixture, elimination, and graphic*

Subject M said that it can use mixture method elimination, and graphic. It shows that subject M can do or solve the problem in various ways or strategies. So subject M fulfills the first descriptor. Then not only that when subject M was asked about the fluency in solving the problem, subject M answered being able to do it smoothly.

- G* : *When working on this problem is it difficult or not? Is there choking or not? Or Fluently*
M : *Fluently*
G : *Then you understand the meaning of the problem and do it right?*
M : *Yes*

From this statement, it can be seen that the subject can work out the solution smoothly after reading the questions. So subject M fulfills the third descriptor of creative characters. So that from the analyzed, the first and third descriptor of creative character values when working on test appear for subject M, but for the second descriptor it does not appear which is finding another strategy that is unusual in solving problems.

4. Conclusion

Based on the results of the analysis and discussion it can be seen that with HOTS-based learning that uses the PBL model, when students work on HOTS type questions can bring up the value of the character of curiosity, hard work, thorough, and creative. Dominant descriptors appear when students work on HOTS type questions on HOTS-based learning using PBL models are descriptors of curiosity characters and hard work character descriptors. This happens because of the lack of giving the type HOTS questions makes students often ask the teacher how to solve the problem. Then because of the dominant curiosity in students, students work hard to work on the given problem. While the descriptors that rarely appear are descriptors in meticulous and creative character. It was influenced by the lack of students' understanding of the supporting material, namely algebraic arithmetic operations which resulted in the lack of thorough student solving the problems so that the answers obtained were less precise. Then because of the lack of students in working on various mathematical problems, students only focus on what has been taught in class without developing their thinking.

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