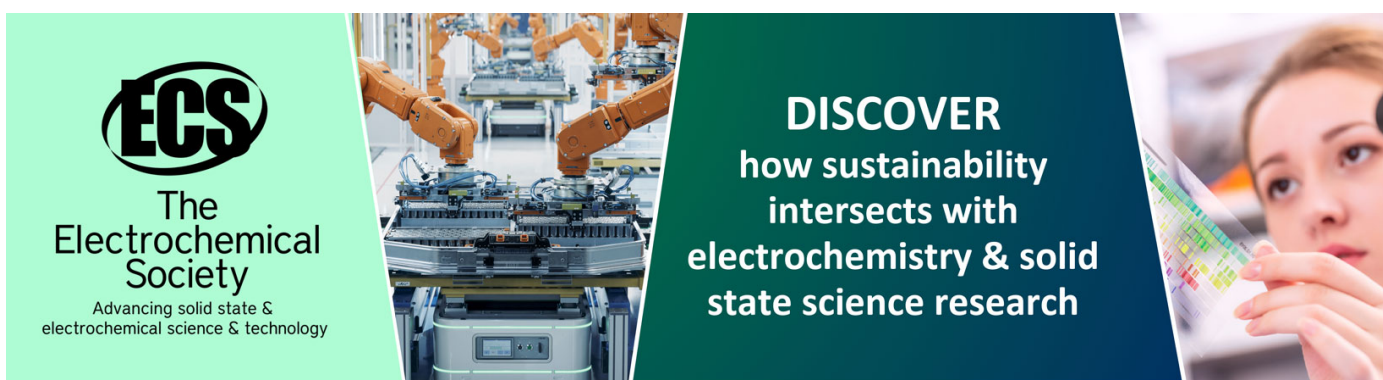**PAPER • OPEN ACCESS**

Students' characters in solving higher-order thinking skill questions assisted with technology

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Students' characters in solving higher-order thinking skill questions assisted with technology

A Suci[1], N Aisyah[2*], Meryansumayeka[2]

[1]Student of Mathematics Education Sriwijaya University, Palembang, Indonesia
[2]Lecture of Mathematics Education Sriwijaya University, Palembang, Indonesia

[*]Corresponding author's email: nys_aisyah@yahoo.co.id

Abstract. The purpose of this study was to describe students characterr in solving HOT (Higher order thinking) questions assisted with ICT (Information and Communication of Technology). Research conducted is a descriptive qualitative research. This study have 4 focus characters namely hard work, creative, thorough, and curiosity. The subject in this study is 4 students of class XI IPS SMA Srijaya Negara Palembang. Data collection in this study include tests, interview, observation, documentation, and using triangulation techniques of data collection to check the validity of the data instrument. The results of this study indicate that the most dominant character values appeared during the learning process with HOT and ICT-assisted media are the value of hard work and curiosity.

1. Introduction

Character is psychological traits, morals, internal state, and way of thinking that influence the way to act to others and yourself [1-4]. In Indonesia, character education is one of the goals of education [5-6]. Not just in Indonesia, other countries also pay attention to it for their people [9, 10]. Its show that character its really needed in this world. Therefore the teacher must be able to instil the value of character in learning in school [11-13]. Furthermore, the 2013 curriculum implemented in Indonesia also demands to improve human resources due to competition for the development of attitude (spiritual and social), knowledge, technology, and language [14]. This shows that students must have character values after learning in school.

Although character education is the goal of education in fact students in Indonesia still do not meet the educational goals. Student admission rate increases every year, students commit violence against teachers, skip class, and etc [15, 16]. The problem of the students' character is a concern among researchers, educators, and parents, But in fact in indonesia character education is still in less attention [17, 18].

Learning mathematics can be a medium to instill character values in students. like the results of previous studies found that with mathematics the character values of students appear during the learning process [19-21]. In mathematics learning process, characters related to civil education is the character of thorough, creative, hard work, and curiosity [23]. However, there is no description of the student's character with HOTS questions and the ICT media. Meanwhile, character values can be applied not only in learning process but also in the process of solving matematical problem [23, 24]. HOTS (Higher Order Thinking Skill) question is one of problem that can be use in matematics learning process. The characteristic of HOTS questions are non-algorithmic, tend to be complex, often have many solutions, involve differences of opinion and interpretation, and effortful [25]. Which means a lot of character values involved in solving HOTS problems.

Reviewing the limitation of previous studies and considering the goal of education in Indonesia that pay attention not only in students' intellectual but also students' character values, this study purposed to analyze students' characters in mathematics learning using HOTS questions assisted with technology.

2. Method

This research is a qualitative descriptive study that aims to analyze the character values of high school students that appear during the learning process with HOTS questions and assisted with ICT. This research was conducted in odd semester of the 2019/2020 academic years at Srijaya Negara Palembang High School. The focus of this study is students' character values namely hard work, thorough, curiosity, and creative. The subjects in this study were 4 high school students that were divided into 2 students with high abilities, 1 student with medium ability, and 1 student with low ability. The research instruments used by researchers in this study were observations, interviews, tests, and HOTS questions that were used during the learning process.

Observations were made to see what character values emerged during learning with ICT-assisted learning media and HOTS questions. Observation contains about any aspect that shows that the character values appear. The interview aims to dig deeper information from research subjects based on predetermined indicators. The test is used for interview material and observation sheets with data obtained at the time of the test will be clarified from the results of interviews and observations. Data collection was conducted in four meetings. The first meeting with one hour class of students educated about equations about the inequality of the two-variable linear program. In the second meeting of the three-hour lesson, students were explained about the linear program and guided to work on HOTS problems that exist in ICT media and have been connected with GeoGebra. At the third meeting in a three-hour class meeting students are asked to work on HOTS questions that exist on the learning media independently, but if they ask questions teachers are still guided. The fourth meeting of the activities carried out was a test. The test consists of three HOTS questions and is carried out for 2 hours of study.

3. Result and Discussion

During the learning process conducted in four meetings assisted by HOTS and ICT media in linear program material, researchers used an observation sheet, then continued with interviews to the subject and obtained the most character values that emerged during the learning process based-HOTS and ICT media. The character values were hard work and curiosity.

3.1 Hard Work Character

Based on the results of the analysis of the test sheet, it was known that students work on all HOTS questions that were given. Even though it is not correct, it raises the first hard work character value indicator, in addition, the subject also worked on the questions with the correct steps and used the time provided effectively in solving the given questions.
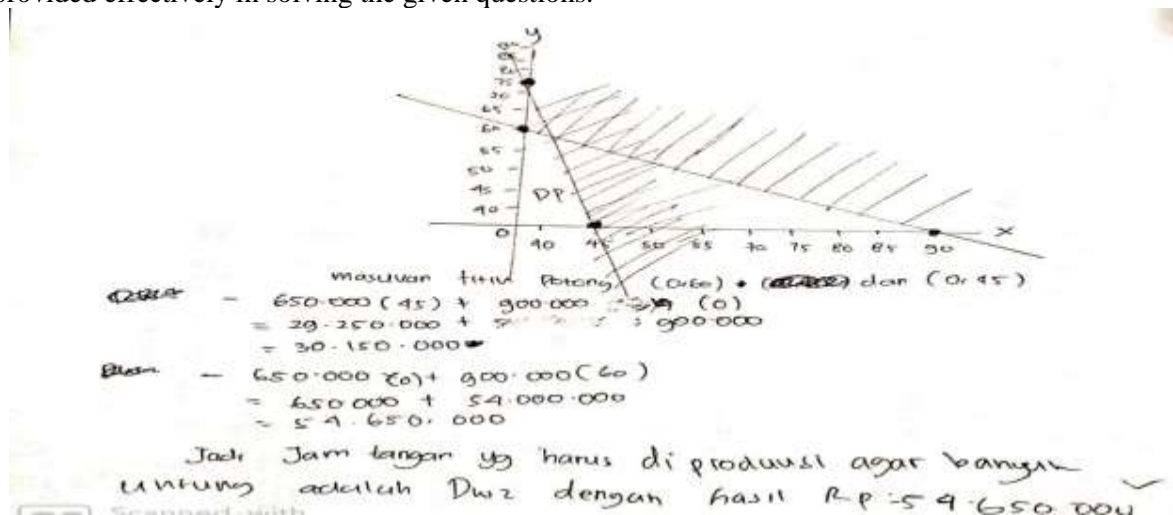

Figure 1. The student answer all problems.

From figure 1 we can see students worked on the problem until the final step. The emergence of the first indicator of hard work character was also supported by the results of interviews conducted to the subjects, the subject felt that the problem was difficult, but she still resolved it. When the researcher asked why she still answered the problem, subject replayed that she just felt it was not good if it was just emptied, even though she could not solve it till done at last it was not empty. From the statement, the first indicator emerges where students continue to work on the questions even though it is considered difficult for her. In addition, the second indicator also appeared, subject answered the question step by step. We also could see it by the answer given when researcher asked how to solve the problem and the subject answered "*first make example for variable, then make a model, next draw a graph, and look for a value that satisfies the equation*." It indicated that the student had worked with the correct procedures and steps. The third indicator was also appeared, where the subject used the time provided efficiently, in other words, they focused on answering the question. It could also be seen from the results of interviews conducted when the subject was asked.

Researcher   : *Is there anything else that you did when you work on the problem?*
Subject   : *No, I cannot finish the question test if I do anything else.*

From the results of tests and interviews conducted on the subject, it appears that the subject has the character value hard work. These results are in line with previous studies where it was found that with HOTS the value that emerged during the learning process was hard work [26,27].

3.2 Creative Character
From the results of the observation sheet and interview test, it could be seen that the subject still did not have all character value of creative character. This can be seen from the non-emergence of a creative value descriptor that is using another method than the one exemplified. When the subject was interviewed the subject answered "*if not following the way taught by the teacher where problems could be resolved*". From the interviews conducted it was found that the subject had thought that the questions could only be solved if they followed the example of the teacher so that the second indicator did not appear. The answers given by students are contrary to the proper understanding of creative, creative people have the ability to devise new ways to carry out tasks, solve problems, and meet challenges[28-30]. It shows that students have not been able to think creatively if they just follow the procedure used by their teacher. Students also did not show the first creative indicator that is directly working on the problems given after reading this problem. It can be seen from the results of interviews when student answer *"it's hard to answer the question, so need more time to understand this problem"* These student's answers indicate that the student need more time before they can answer the problem given and cannot answer the question directly. This is following the characteristics of the HOTS question that is not immediately predictable how to solve it [25].

3.3 Thorough Character
The results of interviews, observations, and tests that have been done show that there were students who bring up thorough character but not as dominant as hard work and curiosity. It can be seen from the results of student tests in figure 2.
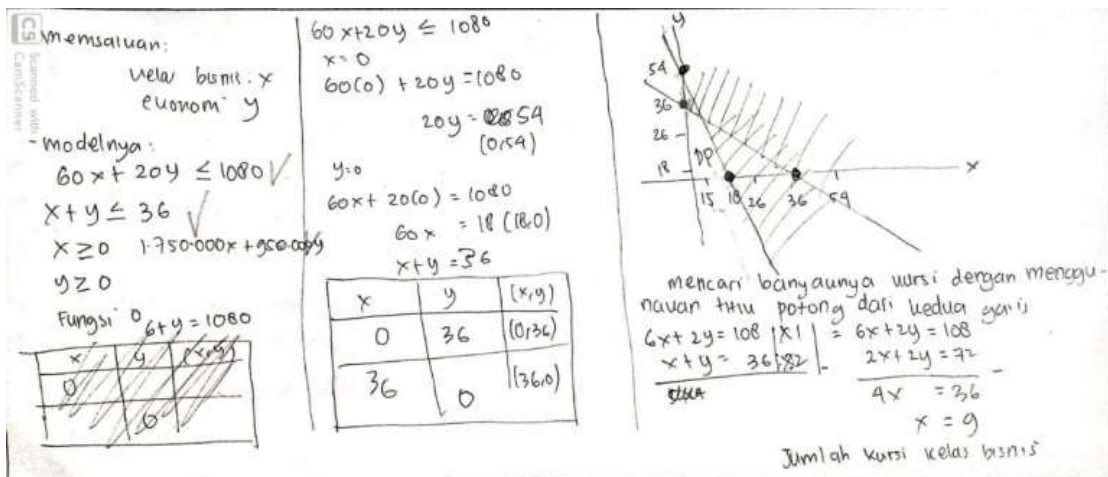
Figure 2. The student get the right answer.

Figure 2 shows that students have thorough character values since they did not make mistakes in calculations and the results achieved by students are true. Not just not making mistakes in calculations, the other indicators also appeared, which is rechecking, it can be seen from the results of interviews conducted when researchers asked if student have made a mistake and how student know that if he or she made a mistake. The subject answered "*I check again.*" The sentence "I check again" shows that students are careful in their calculations. It shows that the third indicator appeared. This is in line with the results of research conducted by previous researchers, where they obtain results by using HOTS questions thorough character values will appear during the learning process [31].

3.4 Curiosity Character
The character value of curiosity is the dominant character value that appeared during the learning process. This can be seen from the results of observations and interviews conducted. During the learning process, students often asked about the meaning of problems. For example, one of the students asked "What is the purpose of this question, ma'am?". In addition, students also meet the indicator of curiosity. When the material is explained, students asked "teacher do we have to use plus sign when making models of problems?" she wanted to know if another sign couldn be used. In line with previous research, it turns out that HOTS can indeed be a medium so that students' curiosity arises or becomes dominant[32,33].

Figure 3. The student used book and note to solve the problem.

Figure 3 shows students fulfilled the third indicator of curiosity namely using tools to work on a given problem. Students use notes and books to solve the problems given. The student who uses the book to solve the given problem is one of the students who exude curiosity [34]. Table 1 summarizes character values that appear.

Table 1. Subjects' character values.

Subject	Meeting	Hard Work Indicator			Creative Indicator			Curuosity Indicator			Thorough Indicator		
		K1	K2	K3	I1	I2	I3	R1	R2	R3	T1	T2	T3
Si	1	-	-	-	-	-	-	√	√	√	-	-	-
	2	√	√	√	√	√	-	√	√	√	√	√	√
	3	√	√	√	√	-	-	√	√	√	√	√	-
	Test	√	√	√	√-	-	-	√	√	√	√	-	√
Zk	1	-	-	-	-	-	-	√	√	√	-	-	-
	2	√	√	√	√	-	-	√	√	√	√	√	√
	3	√	√	√	√	√	√	√	√	√	√	√	√
	Test	√	√	√	-	√	-	√	√	√	√	-	√
Ji	1	-	-	-	-	-	-	√	√	√	-	-	-
	2	√	√	√	-	√	-	√	√	√	√	√	√
	3	√	√	√	√	√	√	√	√	√	√	√	√
	Test	√	√	√	-	-	-	√	√	√	-	√	√
Ai	1	-	-	-	-	-	-	√	√	-	-	-	-
	2	√	√	√	-	-	-	√	√	√	√	√	√
	3	√	√	√	√	√	√	√	√	√	√	√	√
	Test	√	√	√	√	-	-	√	√	√	-	-	√

Information:

√ : Appear

- : Not Appear

K1: Doing all the problems in a given linear program even if they are not finished.

K2: Doing all the problems given with the right procedures and steps

K3: Working on problems that are given using the available time effectively.

I1: Working on the problem directly after reading the problem

I2: Proposing various interpretations of a problem, story or picture relating to a linear program.

I3: Using a different method from the example to solve the linear programming problem given.

R1: Asking the teacher and friends about the linear program material being studied.

R2: Asking a friend or teacher when finding linear program problems that are not yet understood or understood.

R3: Using a variety of learning resources such as books or the internet in solving given problems.

T1: Doing not do wrong input when using GeoGebra

T2: Doing not make a calculation error in solving a given linear program problem

T3: Re-checking the results of the completion of the given linear program problem.

From table 1 we can see that the subject most fulfills the indicators of curiosity and hard work. Because most subjects show indicators of curiosity, this indicates that curiosity dominant appears in the ongoing learning process. This result is in line with previous studies where HOTS curiosity of students increased [32]. Besides, ICT is also one of the effects of children's curiosity [35]. In addition, the value of hard work character is also a dominant value that appears during the learning process. This is in line with previous research where the most dominant character value appears when students work on HOTS problems is the value of hard work [36].

4. Conclusion

This paper provides the results of an analysis of the dominant character values of students appearing during learning with HOTS problem assisted by ICT media in this study. The dominant character value

appeared in the learning process with HOTS questions and assisted by ICT media were the character value of hard work and curiosity.

5. Acknowledgments

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