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Mathematical Creative Thinking Ability and Self-Regulation Character of Class X Students in Problem Based Learning assisted by Google Classroom in terms of Goal Orientation

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Abstract

This research aims to find students' creative thinking skills by learning Problem Based Learning assisted by Google Classroom in terms of Goal Orientation. This research is a mixed method type of concurrent embedded design with a quasi-experimental quantitative research design. The research subjects were students of class X SMAN 1 Purwodadi Grobogan. The results obtained are that students with the mastery goal category can achieve the four indicators of mathematical creative thinking skills, namely fluency indicators, flexibility indicators, detail indicators, and authenticity indicators while students with performance goal categories can only meet two indicators of mathematical creative thinking ability. The indicators of flexibility and authenticity are not met. Students with the mastery goal category tend to have a high independence character, while students with the performance goal category tend to have moderate or even low independence characteristics.

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INTRODUCTION

Students need creative thinking ability as a provision for the future (yunianta, rusilowati, & rochmad, 2012). While the opinion of aiken (2015) that the definition of creative thinking ability is the ability to produce original or unusual mathematical problem solving solutions. Given that some math problems can not only be solved in one way, if training in creative thinking is necessary for students to solve creative problems, the need for mathematics can be conveyed to society with formal education in schools.Same way with Dwijanto, Mevi, & Rahayu (2019) by developing mathematical creative thinking skills, students will be able to solve mathematical problems in various alternative ways and can also apply them to solve complex mathematical problems in the real world with various alternative solutions.

SMAN 1 Purwodadi is a reference school located in Grobogan district. The reality in the school field has not been able to produce students who think creatively optimally. This is marked by the low ability of students in issuing completion ideas, almost all of the completion ideas given by students are the same. Apart from this, teachers in teaching tend to be monotonous or less varied, have not been able to take advantage of existing technology and teachers are not able to develop students' creative thinking ability by providing challenging questions. Mathematical creativity as a source of development is an area that has not been well explored in the world of mathematics and mathematics education in the world (Rohmatin & Suyitno, 2016).

The results of research by Azis, Rochmad, & Wijayanti (2015) state that students' creative thinking ability are better by applying an appropriate learning model, as well as Hapsari, Supriyono, & Hendikawati (2015) who state that strategies or appropriate learning models can facilitate students in improve creative thinking ability. This is in accordance with the statement from Rochmad & Masrukan (2016), that the main support in the success of learning carried out in class is because the teacher uses the right, varied learning model, teaches well (good teaching) and uses good questions (good questions). One of the abilities of students in learning completeness is the ability to process mathematical creative thinking (Suyitno, Rochmad, & Dwijanto.2017). From the above research results, the ability to think mathematically creatively increases after the application of a learning model. Learning model innovation by applying the right learning model can optimize creative thinking ability (Istiqomah, Rochmad, & Mulyono, 2017).

Creative abilities which are cognitive abilities require the involvement of affective and psychomotor abilities (Mawaddah, Kartono, & Suyitno, 2015). One of the affective aspects that are important for students to have is independent learning. Self-regulation in learning refers to learning that occurs mainly from the influence of the thoughts, feelings, strategies, and behaviors produced by students, which are oriented towards achieving goals. Zimmerman (2002) states that the center of self-regulation is how students are involved in learning. Puspitasari, Purwanto, & Indah (2013) research results state that one of the causes of differences in student self-regulation is the difference in Goal Orientation for each student. Independent learning provides the widest possible opportunity for students to be independent in understanding mathematical concepts and solving problems in mathematics (Saleh & Abdullah, 2015). Self-regulation in learning mathematics is one of the important factors that determine student learning success, especially those related to students' mathematical problem solving abilities (Delina, Surya & Minarni. 2015), while Nanang (2016) argues that student self-regulation is influenced by the form of habituation by the teacher, the way of communication. , and the types of tasks / problems presented in the lesson.

There are differences in the self-regulation of students due to different Goal Orientations. This is because students who have learning goals make students direct themselves to activities that support the achievement of these goals (Lumaáti, Mulyono.2016). Similar to previous research, students with Goal Orientation can optimally achieve their learning goals (Wijayanti, Waluya, & Masrukan 2018).

The learning process is monotonous and uses less technology, so efforts must be made to improve the learning process (Bimantara & Djuniadi. 2016). One of the efforts that can be done is to innovate in learning, one of which is learning assisted by Google Classroom. This is in accordance with Nurlaili &

Sugianto's (2016) study of learning using online / web-based media. Ivan (2016) states that learning using Google Classroom is effective in the learning process. Likewise Pratama & Sopryadi (2016) stated that the use of Google Classroom is effective in learning.

The formulation of the problems in this study are (1) how is the quality of Problem Based Learning with the help of Google Classroom in improving students' mathematical creative thinking ability? (2) how is the student's creative thinking ability with Problem Based Learning assisted by Google Classroom in terms of Goal Orientation? (3) what is the character of student self-regulation with Problem Based Learning assisted by Google Classroom in terms of Goal Orientation? This research aims to find students' creative thinking skills by learning Problem Based Learning assisted by Google Classroom in terms of Goal Orientation.

METHOD

This research was a mixed method, quasi experimental design. This research begins with a preliminary study, then collects quantitative as well as qualitative data followed by data analysis and interpretation.

The research was conducted at SMAN 1 Purwodadi Grobogan with the research population being class X MIPA students in the 2017/2018 school year. From the X MIPA classes at SMAN 1 Purwodadi, their homogeneity and normality were tested, after homogeneity, 2 classes were taken randomly as samples. The technique of determining the quantitative research sample is based on random sampling. From these techniques, you can get class X MIPA 1 as an experimental class and class X MIPA 2 as a control class. In qualitative research, research subjects are focused on class X MIPA 1, namely the class that is subjected to problem-based learning assisted by google classroom. The research subjects were 36 students for a class with Problem Based Learning assisted by Google Classroom.

The data sources in this study were students obtained from the results of the Mathematical Creative Thinking Ability (MCTA) test, the results of the independent learning questionnaire, and the results of the MCTA interview results. The results of the MCTA are a source of quantitative research data, while the data sources for qualitative research are student MCTA answer sheets, student learning self-regulation questionnaire results, goal orientation questionnaire results, and MCTA interview results. The quantitative data were tested using the normality test, homogeneity test, average test, learning completeness test, different test for the average MCTA and different test of the proportion of MCTA. Meanwhile, qualitative data analysis was carried out by validating data, making verbal data transcripts, data reduction, data presentation, and data verification.

RESULTS AND DISCUSSIONS

The results of the validation of learning tools and instruments are listed in table 1 below.

Table 1. Validation Score

Instrument	Score	Category
Syllabus	4.16	Good
Lesson Plan	4.19	Good
Text Book	4.19	Good
Worksheet	4.15	Good

From table 1, it can be concluded that the average score for all assisting instruments is 4.17 in the good category, so that the mentoring tools that have been compiled are suitable for use in research.

The results of the research instrument validation are presented in table 2 below.

Table 2. Results of Research Instrument Validation

Instrumen Penelitian	Score	Category
Mathematical Creative Thinking Ability Test	4.2	Good
Observation Sheet Mathematical Creative Thinking Ability	4.14	Good
Self-Regulation Questionaire	4.14	Good
Goal Orientation Questionaire	4.07	Good

Table 2, it can be concluded that the average score of the instrument is 4.16 with a good category, so that the instrument that has been prepared is suitable for use in research.

Based on the results of the average calculation carried out in the experimental class with problem-based learning assisted by Google Classroom, it can achieve the minimum completeness criteria. The minimum completeness criterion (KKM) used is the school minimum completeness criterion, namely 70. The right-side test criterion used is if tcount > t (1-α) (n-1) using a significant level of 5%, then H1 is accepted. Because 9.65 = t count> t (1-α) (n-1) = 1.694 using the 5% significance level, then H1 is accepted. So, the average creative thinking ability of students in problem-based learning assisted by google classroom has a value of more than 70. Based on the results of the calculation of classical learning completeness in the experimental class using the proportion test, it is obtained z count = 3.079. At α = 5%, z table = z ((0.5-0.05)) = z 0.45 = 1.64. Because z count> z table, H1 is accepted. So it can be concluded that the percentage of completeness of students who were taught using problem-based learning assisted by google classroom who obtained a value of mathematical creative thinking ability was more than 75%. Based on the results of the calculation of the average difference test between the experimental class and the control class, the value is 3.79 = tcount> t1-α = 1.99, then H1 is accepted. So, the average mathematical creative thinking ability of students who are taught using problem based learning assisted by google classroom is better than students who are taught using problem based learning.

Based on the results of the calculation of the difference in the proportion zitung is 2.07. At α 5%, the z value (0.5-α) is 0.4808. zcount ≥ z (0,5-α), then H1 is accepted. So, the proportion of students' mathematical creative thinking abilities taught using problem-based learning assisted by google classroom is higher than students who are taught using problem-based learning.

Problem based learning assisted by google classroom has quality towards the mathematical creative thinking ability of class X students in solving mathematical creative thinking ability. This is because (1) students in the experimental class achieve KKM individually. (2) the proportion of students in the experimental class who reached KKM had reached 75%. (3) the proportion of students' mathematical creative thinking abilities in problem-based learning assisted by google classroom is more than the proportion of students' mathematical creative thinking abilities in problem-based learning alone. (4) Students' mathematical creative thinking ability in problem-based learning assisted by google Classroom is better than mathematical creative thinking ability in problem-based learning only. As stated by Herma (2014), the learning process is more interesting and more efficient in terms of time management, and there is no reason students forget about the assignments that have been given by the teacher. The use of learning media is also expressed by Hamiyah and Jauhar (2014). The learning model is a design that has been programmed through visual media to help visualize the messages contained therein and achieve learning objectives as a guide in carrying out teaching and learning activities.

Analysis of students' mathematical creative thinking abilities in problem-based learning assisted by google classroom in terms of goal orientation, based on a goal orientation questionnaire from 36 students obtained 20 students with the mastery goal category, 11 students with the performance goal category, and 5 students without can be distinguished between the two. In Munandar (2012), the ability to think creatively includes four criteria, including fluency, flexibility, authenticity in thinking and elaboration or detail in developing ideas. The

following is an example of the participant's work in the mastery goal category on each component of the mathematical creative thinking ability process.

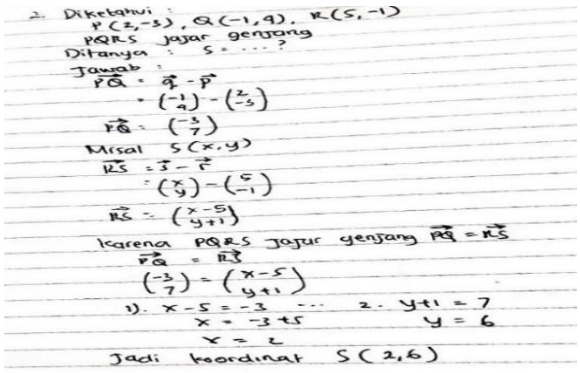

Figure 1. The results of the work of students in the category of mastery goals on indicators of fluency

Figure 1 shows that students can find the information contained in the problem and can determine the correct solution, according to the indicators of fluency.

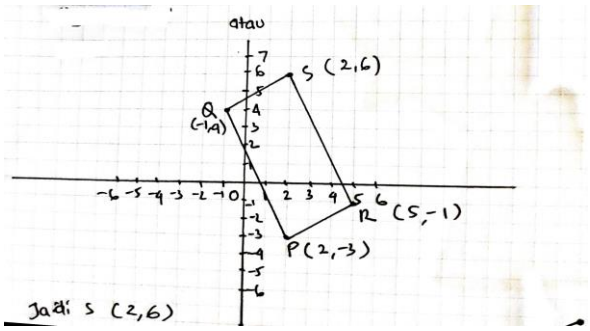

Figure 2. The results of the work of students in the category of mastery goals on indicators of flexibility

Figure 2 shows that students can create a variety of solutions qualitatively, according to the indicators of flexibility.

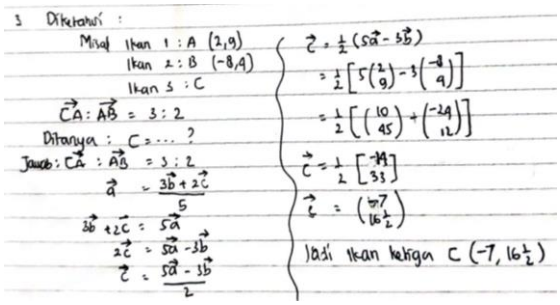

Figure 3. The results of the work of the Mastery Goal Category Students on the Detail Indicator

Figure 3 shows that students can describe the ideas or answers that have been obtained in detail or in coherent steps, according to the indicator of detail.

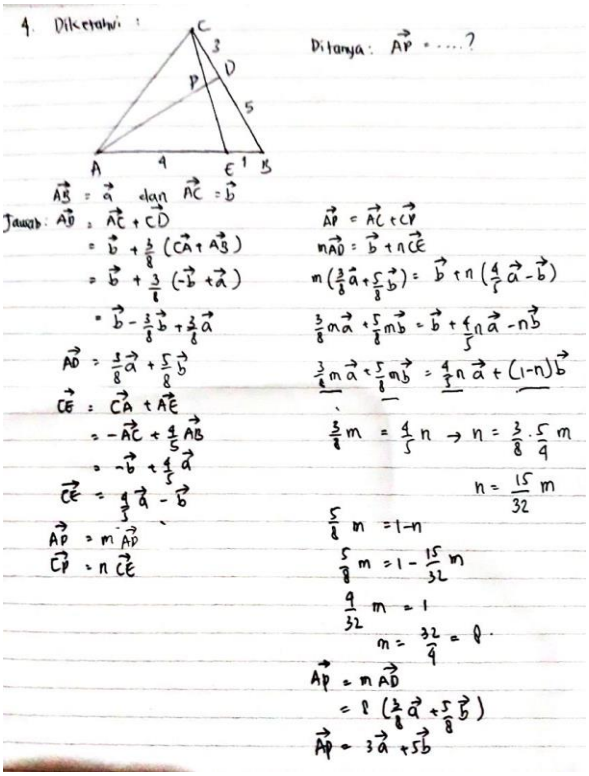

Figure 4. The results of the work of students in the category of mastery goals on authenticity indicators

Figure 4 shows that students can come up with new ideas according to their own thoughts or in other words, they do not copy from other people's work, according to the authenticity indicator.

Based on the analysis of students' work results and student interviews with the mastery goal category, it can fulfill the four indicators of mathematical creative thinking abilities, while students with the performance goal category only meet the indicators of fluency and detail.

Analysis of the character of self-regulation based on goal orientation, Nurzaman (2016) in Hendriana, Eti & Sumarmo (2017) states that the indicators of the character of self-regulation are not dependent on others, self-confidence, behaving discipline, having own initiative, having a sense of responsibility and self-control. Based on the questionnaire, the distribution of self-regulation character conditions was obtained based on the goal orientation in table 3 below.

Table 4.6 Distribution of self-regulation characters based on goal orientation.

Category	Mastery Goal		Performance Goal	
	Frekuensi	Persentase	Frekuensi	Persentase
High	4	11%	0	0
Moderate	10	28%	5	14%
Low	6	17%	6	17%
Jumlah	20	56%	11	31%

The category of students who have mastery goals will tend to look for challenges, have specific strategies to improve understanding of the material better than students who have performance goals. This is supported by (Wolters & Daugherty, 2007). Students who use mastery goals will continue to work on academic assignments even though they are difficult, take a long time, are willing to be involved in tasks, use effective cognitive processing strategies, are less likely to have harmful behavior, and choose to continue completing tasks even though they are optional. This is because mastery goals have more intrinsic motivation, where students are concerned with how to understand and master the subject matter which will create a high level of self-regulation.

Student performance goals have more extrinsic motivation, where students are concerned with how to get good grades and social recognition of their competence which will make the students less independent. This is consistent with research results (Urdan & Midgley, 2003) that performance goals are not positively related to adaptive results. More specifically, studies indicate that performance goals are associated with low academic achievement, low levels of academic involvement, and avoidant behaviors such as self-harm.

CONCLUSION

The results obtained are the mathematical creative thinking skills of class X students in solving problems of mathematical creative thinking skills in terms of goal orientation are as follows: students with the mastery goal category can achieve the four indicators of mathematical creative thinking skills, namely fluency indicators, flexibility indicators, detail indicators , and indicators of authenticity while students with the category of performance goals can only meet two indicators of mathematical creative thinking ability. The indicators of flexibility and authenticity are not met. The character of the independence of students in problem based learning assisted by Google Classroom in terms of goal orientation is as follows: students with the mastery goal category tend to have high independence characters, while students with the performance goal category tend to have moderate or even low independence characters.

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