



Creative Thinking Skill in Solving Mathematics Story Questions for Eight Graders

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Abstract

Mathematics creative thinking skills of learners are still low. Mathematics learners could not solve mathematics story questions in non-routine manner. The success of mathematics learning is based on the capability of learners to remember and apply the given steps, rules, and examples from the teachers. These low performances make learners less creative to solve mathematics story questions. This research aims to (1) analyze the mathematics creative thinking skill in solving mathematics story questions for learners taught by CPS and learners taught by discovery learning, and (2) describe the mathematics creative thinking skills in solving the questions. The researchers used a test to collect the data. The results showed that (1) the mathematics creative thinking skills of learners in solving story questions for learners with CPS were better than those taught by discovery learning. Secondly, the learners with mathematics creative thinking skills could solve high-level mathematics story questions based on creative thinking indicators and four-stage solution. On the other hand, learners with moderate mathematics creative thinking skills could solve questions with an indicator of creative thinking. However, they could not solve the questions with four-stage solution. Learners with low-level mathematics creative thinking skills could not solve the questions with the indicator of creative thinking skills. The research results are useful to enrich knowledge about mathematics creative thinking skill development in solving mathematics story questions with the CPS model.

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INTRODUCTION

Mathematics is an important lesson for each educational level, including Junior High School (JHS). An excellent mathematics understanding comes from effective learning and problem-solving (Ayele, 2016). Problem-solving is important to initiate creative thinking (Tsai, 2013).

Mathematics has five objectives: (1) respect mathematics; (2) build self-confidence to work on mathematics; (3) develop mathematics problem-solving skills; (4) communicate mathematically; and (5) learn to think mathematically (Rezky, 2019). From those objectives, learners must master the skills to generate new ideas and respond to problems (Nasution et al., 2017). Creative thinking skill refers to the reasoning process that focuses on idea exploration, probability realization, and correct answer search (Octaviani, 2019).

Creative thinking skill exists in the learners' skills to observe the connections between the previous objects and new product or idea creation to apply or solve problems (Arvyati, 2015). Creative thinking skills to solve problems in mathematics lesson should include relevant problems with the learners' daily life, presented in story questions (Bahtiar, 2019). The story question should deal with daily life matters (Sari, 2021). Solving story questions requires four stages: (1) identifying the problems; (2) devising the plan; (3) executing the plan; and (4) rechecking the works (Argarini, 2018). Learners that could solve story questions are observable from the implementation of the four-stage solution (Fajariah, Dwidayati & Cahyono, 2017). The use of non-routine story questions is important to improve the cognitive skills (Ulger, 2016).

The observation in JHS 4 Kudus found the school applied teacher-center learning. The teacher delivered the materials and questions from books, textbooks, and worksheets without further development. The mathematics teacher of JHS 4 Kudus, gave examples of the questions and discussions

each time the teacher had story question learning. Then, the teacher provided an exercise for learners to solve based on an example. This routine did not improve learners' creative thinking skills.

The teacher of the learners attempted to apply the discovery learning model to prevent the learners' unsystematic behaviors. However, the learners remained unable to solve the problems. Therefore, the researchers applied the *Creative Problem Solving* model (CPS). CPS is effective in managing problems dealing with solving story questions (Permata, Sukestiyarno & Hindarto (2017), Utami et al., (2019). They found that learners with CPS learning could think actively and creatively in solving problems without relying on textbooks. CPS has some superiorities to the other problem-based models. There are (1) training the learners to design a finding; (2) thinking and acting creatively; (3) solving problems realistically; (4) identifying and investigating; (5) interpreting and evaluating; and (6) stimulating the reasoning process of learners to solve problems immediately (Malisa, 2018). CPS provides the opportunity to develop creative thinking skills continuously. Thus, learners could apply mathematics knowledge in daily life.

Therefore, the mathematics learning in the class required innovation that focused on learners. Then, with this innovation, the learners should understand the problem, improve their creative thinking, and find the problem solution.

From the background, this research aims to: (1) test the creative thinking skills in solving story questions for learners taught by CPS and learners taught by discovery learning; and (2) analyze the creative thinking skills in solving the questions for learners taught by CPS with high, moderate, and low criteria.

METHOD

This descriptive quantitative research used a *quasi-experimental design*. The quantitative research was useful to determine

the CPS learning effectiveness and the creative thinking skill in solving story questions based on high, moderate, and low criteria of CPS learning. The researchers conducted this research at JHS 4 Kudus. The population of the research consisted of eight graders from VIII A, VIII B, VIII C, VIII D, VIII E, VIII F, VIII G, VIII H, and VIII I. The VIII class received the CPS learning model, while VIII B received discovery learning.

The data sources were from pretest and posttest results of learners' creative thinking skills in solving story questions and interview sheets. The research instruments included a lesson plan, syllabus, creative thinking skill test in solving story questions, and interview guidelines. The researchers tested the instruments in terms of reliability. The researchers also validated the research instruments with experts from lecturers and teachers.

The applied data analysis was a mean-difference test. The indicator of creative thinking skills includes fluency, flexibility, originality, and elaboration (Munandar, 2014). Fluency refers to creating ideas, and fluent thinking Flexibility refers to providing various ideas Originality refers to expressing ideas uniquely Elaboration refers to elaborating and developing objects (Mustikasari, 2019).

RESULTS AND DISCUSSION

The Mean Difference Test of Creative Thinking Skills in Solving Story Questions

The mean difference test was useful for determining the creative thinking skill comparison in accomplishing story questions for CPS and discovery learning learners. The researchers used SPSS version 16 to test the mean difference (Ochieng, 2016) Table 1 shows the results of the mean difference test.

Table 1 shows the posttest mean difference average of creative thinking skills in solving story questions for learners taught by CPS, 80.17. On the other hand, the mean difference average of learners with discovery learning is 65.83. The mean difference results

obtain a t_{count} of 4.519 with t_{table} 2.001. Thus, $t_{\text{count}} > t_{\text{table}}$ or the average of learners' problem-solving skills on story questions taught by CPS, is higher than those taught by discovery learning Luthifa et al., (2018) also found that learners taught by CPS had excellent accomplishment. Isrok'atun (2015) explains that CPS model implementation could improve the achievement of minimum mastery standard Zubaidah (2017) also found that learners with DSIMM learning model achieved higher creative thinking skills Runisah (2016) also found that CTSM achievements of learners with LC were better than those taught by CL.

Table 1. the Independent Sample T-Test of the Posttest

\bar{x}_1	\bar{x}_2	t_{count}	t_{table}	Criter ia	Conclusi on
80.1	65.8	4.52	2.00	t_{count}	accepts
7	3	9	1	$>t_{\text{table}}$	H_1

Creative Thinking Skills in Solving Story Question on Learners with High Criterion

The results of learners with high creative thinking skills in solving story questions showed excellent problem understanding. These learners had smooth thinking flows and had many ideas, notions, uncommon answers, and broader insights. Learners with high creative thinking skills in solving story questions could write the given information, write the question, arrange the solution stages, confirm the calculation result with the existing data, and create conclusions based on the problems. Hidayat (2018) found that the creative thinking skill category of CIL class with *the open-ended* class was on moderate category.

The researchers used interviews to support the story question-solving skill test results. The learners could explain appropriately and correctly from the beginning until the end of the written answers. It showed that the writing results were from their original reasoning. Larasati (2021) found the mathematics creative thinking skills of learners

with high activity could be better than the mathematics creative thinking skills of learners with moderate and low effectiveness.

Creative Thinking Skills in Solving Story Question on Learners with Moderate Criterion

The results of learners with moderate creative thinking skills in solving story questions showed excellent problem understanding. These learners had smooth thinking flows and had many ideas and broader insights. However, they did not produce many uncommon answers. Learners with moderate creative thinking skills in solving story questions could write the given information, write the question, arrange the solution stages, and promote the calculation result. However, their calculations were not complete. They also could not confirm the calculation results with the given data in the questions. They also could not create a conclusion based on the problems. Jayanti (2021) found that mathematics creative thinking skills of learners with originality and elaboration indicators were in the low category. Rahmi et al., (2017) found the procedural mistakes of learners included incomplete works in terms of the given and the questioned matters. Then, the learners did not finish their work on their questions.

The researchers used interviews to support the story question-solving skill test results. The learners could explain their works excellently, but they missed several parts. Then, they admitted that they were not fully completed their jobs. It showed that the learners could not solve story questions with four-stage pattern. Vilianti, Pratama & Manpouw (2018) explain that learners with higher skills could settle all Polya's stages. Simegn (2017) also found moderate category learning achievement. Corebima (2019) also found excellent creative thinking skills of learners influenced the learning outcomes. Yayuk (2020) also found moderate creative thinking skills learners were rushing to solve

the problems and had difficulties determining the problem-solving strategy.

Creative Thinking Skills in Solving Story Question on Learners with Low Criterion

The results of learners with low creative thinking skills in solving story questions showed under average problem understanding. These learners did not have smooth thinking flows and many ideas. They also did not produce uncommon answers and broader insights. Learners with low creative thinking skills could write the information based on the given question. However, they skipped the planning stage and directly calculated the problems. The learners also only wrote what they wanted to write. They left some parts blank without any writing. The learners also could not conclude the solution results. Nurainah (2018) explains this matter is caused by a lack of conceptual understanding of the learners. Although the learners have received descriptions about the concept. Usman (2020) concluded that low-skill subjects had lower-creative thinking skills.

The researchers used interviews to support the story question-solving skill test results. The learners seemed confused when the teacher asked them to explain. The learners admitted that they asked for help from their peers. It showed that the learners could not solve story questions with four-stage pattern. Vilianti, Pratama & manpouw (2018) explain that learners with low skills could not settle all stages. Asmarawati (2018) found lower thinking skills of learners in solving story questions included: lack of asking the given materials with personal language, lack of mentioning the questioned items with personal language, lack of a plan, lack of capabilities to state the stages in solving the questions with the given concept, and lack of capabilities to revise the answer. Hobri (2018) also found lower-skilled learners could only meet two indicators.

CONCLUSION

From the result and discussion about creative thinking skills in solving story questions with the CPS learning model, the researchers concluded that the creative thinking skills in solving the story question with the CPS model were better than those taught by discovery learning. Also learners with high creative thinking skill in solving story questions had smooth thinking flow, various notions, uncommon answers, broader insights, and capability to solve the questions with a four-stage solution of Polya's strategy. However, learners with moderate creative thinking skills could not do so. Then, the low creative thinking skills learners seemed confused to work on the questions with creative indicators.

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