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An Analysıs Of The Applıcatıon Thınk Aloud Protocol Strategy In Identıfyıng Students' Creatıve Thınkıng Skılls In Elementary Schools

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ABSTRACT
Creative thinking skills can encourage students to develop their thinking broadly, but in reality creative thinking skills will only develop if students practice continuously. Therefore, special strategies are needed to increase students' creativity, especially in learning mathematics. The aim of this research is to analyze the use of the Think Aloud Protocol strategy in identifying students' creative thinking abilities in elementary schools. This research uses qualitative research using a descriptive approach. The research subject was class V many as 16 students which was carried out in the odd semester of the 2023/2024 academic year. Data collection techniques through written tests and interviews. The validation process uses triangulation of sources and methods using 4 stages of analysis from Miles and Huberman. The results of the research showed that students in the very high creative thinking ability category mastered all 4 indicators of creative thinking ability, while those in the low creative thinking ability category mastered 1 of the 4 creative thinking ability indicators, this can be seen from their lack of fluency, flexibility, and lack of innovation in presenting. presentation of problem solving in questions. In conclusion, students' creative thinking abilities show different levels, especially in understanding the questions, describing the meaning of the questions, and explaining the answers to the questions. Therefore, involving students in habits of thinking will help students come up with different perspectives.
***Keywords**: Creative thinking skills; Think Aloud Protocol; Mathematics Learning*

ABSTRAK
Keterampilan berpikir kreatif dapat mendorong peserta didik dalam mengembangkan hasil pemikirannya secara luas, namun kenyataannya kemampuan berpikir kreatif hanya akan berkembang apabila peserta didik berlatih secara terus menerus. Oleh sebab itu, diperlukan strategi khusus dalam meningkatkan kreativitas peserta didik, terutama dalam pembelajaran matematika. Tujuan penelitian ini adalah untuk menganalisis penggunaan strategi *Think Aloud Protocol* dalam mengindentifikasi kemampuan berpikir kreatif peserta didik di sekolah dasar. Penelitian ini menggunakan jenis penelitian kualitatif melalui pendekatan deskriptif. Subjek penelitian adalah kelas V sebanyak 16 siswa yang dilaksanakan pada semester ganjil tahun ajaran 2023/2024. Teknik pengumpulan data melalui tes tertulis dan wawancara. Proses validasi menggunakan triangulasi sumber dan metode dengan menggunakan 4 tahapan analisis dari Miles dan Huberman. Hasil penelitian menunjukkan peserta didik dengan kategori kemampuan berpikir kreatif sangat tinggi mengusai keseluruhan 4 indikator kemampuan berpikir kreatif, sedangkan kategori kemampuan berpikir kreatif rendah menguasai 1 dari 4 indikator kemampuan berpikir kreatif, hal ini terlihat

dari kurang fasih, fleksibel, serta tidak adanya pembaharuan dalam memaparkan sajian pemecahan masalah dalam soal. Kesimpulannya kemampuan berpikir kreatif peserta didik menunjukkan tingkat yang berbeda terutama dalam memahami soal, mendeskripsikan maksud soal, serta pemaparan jawaban soal. Oleh sebab itu, melibatkan peserta didik dalam kebiasaan berpikir akan membantu peserta didik memunculkan cara pandang yang berbeda.
Kata Kunci: Kemampuan berpikir kreatif; Think Aloud Protocol; Pembelajaran Matematika.

INTRODUCTION

Creative thinking ability is basically a thought process in collecting and building new ideas by involving experience in solving problems in learning (Febrianingsih, 2022). Ritter & Mostert, (2017) say that someone with creative abilities can modify, create new ideas, digest information obtained with different perspectives, be able to be flexible, make opportunities an opportunity, and be able to face the challenges of an increasingly developing world. Worthington in (Kurniawati, 2018), (Yayuk et al., 2020), and (Kampylis & Berki, 2014) state that the creative thinking ability of students is a cognitive activity in representing the thinking process through problem solving activities, namely by involving aspects of fluency (finding many solutions), flexibility (relating to various ideas), novelty (uniqueness of students' answers) and detail (orderliness of answers).

Creative thinking in a person tends to be mentally healthy, productive in life, and flexible in facing every problem and challenge. (Mursidik et al., 2015), (Sitorus & Masrayati, 2016), (Maulana & Pujiastuti, 2020), and (McGuire, 2015) stated that creative thinking skills can facilitate each individual through the learning process. (Samura, 2019), (Hadar & Tirosh, 2019), (Perry & Karpova, 2017), (Febriyanto et al., 2023), and (Huliatunisa et al., 2020) also stated that creative thinking skills help learners obtain challenges and find difficulties in different ways. The hope is that creative thinking skills can encourage learners to develop their own ideas/ thoughts without having to stick to the methods taught by the teacher. In fact, creative thinking will only develop if learners practice continuously and continuously (Dermawan & Andartiani, 2022).

One of the ways used to develop creative thinking skills is through learning mathematics. (Manurung et al., 2020), (Aripin & Purwasih, 2017), and (Khoiriyah & Purwanti, 2021) stated that learning mathematics is a mental activity that requires creative thinking skills compared to memorization in solving mathematical problems. (Santoso et al., 2014) and (Siswono, 2014) stated that the ability to think creatively in mathematics is needed in obtaining, managing, utilizing information, and surviving in competitive conditions, one of which can be done through providing problem exercises, especially open problems presented in the form of stories. Therefore, a metacognition strategy is needed that can improve mastery of mathematical concepts in students (Dermawan, 2023).

The strategy that can be used is to use the think aloud protocol (TAP) which focuses on the thinking process that is conveyed orally. The trick is to ask questions about the problem to be solved and to find out the level of mastery of students from the exposure presented. (Cole & Busk, 2019) states that the use of the Think Aloud Protocol strategy on different learning abilities in students can help in understanding perceptions about mathematics. (Oh et al., 2013) said that the Think aloud protocol can be used as a method of providing instruction and assessment of students. Henjes & Lincoln (2007) said that in applying the

Think aloud protocol strategy several things are done; 1) the teacher can ask students to express the things they think about in solving problems; 2) the pronunciation conveyed by students is presented in the form of a recording to be listened to continuously. The goal is that the teacher can analyze every pronunciation conveyed by students on the problems given (nurwalidainismwati et al., 2021). Furthermore, (Ashari et al., 2023) added that if students can express their thoughts verbally, then these students will get a good enough understanding in asking the right questions, and increase their understanding of each problem given.

The results of research conducted by (Afifi, et al, 2016) showed that mastery of physics concepts in class X using the think aloud protocol (TAP) strategy based on the discovery learning learning model showed an increase of 80.25% after treatment. Furthermore, the results of research by (Manurung et al., 2020) show that creative thinking skills contribute to determining math learning outcomes. It is one the main aims of education to raise creative and productive individuals who can meet the necessities of the times we live in and relate with everyday life (Sener & Tas, 2017). The difference between this and previous research lies in the material analyzed, school level, strategy, and research methods used. So this research answers current and future educational challenges because this research will obtain information about the creative thinking abilities of elementary school students, especially class V elementary school students, in solving problems in mathematics. Based on this identification, the purpose of this study is to analyze the success rate of using the TAP (Think Aloud Protocol) strategy in identifying the creative thinking skills of students in elementary schools, especially in grade V elementary schools in solving problems in mathematics problems. The focus of the research lies on the process of students' oral delivery/responses juxtaposed with written answers..

METHODS

Type and Design

This research is a type of qualitative-descriptive research through the Think Aloud Protocol approach (Fonteyn et al., 1993), which is one of the instructional strategies in analyzing students' creativity in solving mathematical problems.

In simple terms, the use of the Think Aloud Protocol strategy is carried out through recording activities (presentation of answers that are presented orally in the form of recordings). The goal is that researchers can repeatedly analyze the results of students' exposure in solving problems. Toit and Kotze (2009) in (nurwalidainismawati et al., 2021) state that using the Think Aloud Protocol, each learner will be asked to use four questions when solving the problem, including; 1) What is the problem?; 2) How do I solve it?; 3) What plan do I use? and; 4) What about the way I have done it?. The four questions used were then categorized based on how the learners answered.

Data and Data Sources

The subjects of this study were fifth grade elementary school students in Bajo Village, Soromandi District, Bima-NTB Regency as many as 16 students. This research was conducted in the odd semester of the 2023/2024 school year in mathematics subject matter of addition and subtraction of fractions with the same denominator and different denominators.

Data collection technique

Data collection techniques were carried out by written tests through working on description questions and open interviews using the TAP strategy. Validation of research data using triangulation of sources and triangulation of methods in collecting data from interviews which are compared with the results of observations and document analysis.

Data analysis

The data analysis technique refers to the qualitative analysis of Miles and Huberman which includes four stages of analysis including data collection (through observation, teacher and learner interviews, and documentation activities), data reduction (summarizing all data found to facilitate analysis and conclusions), data presentation (presented based on the data analysis carried out), and conclusion drawing (Nurlaily et al., 2019), (Nurwalidainismawati, 2022).

RESULTS AND DISCUSSION

Based on the results of the research conducted, it shows that there are differences in concept mastery of the material presented in the form of questions. The test questions given to students show differences in the level of creativity of students in solving problems. The percentage of mastery of the concept of students on the questions given is described as follows:

Table 1. Behavior of Students' Creative Thinking Ability in Solving Problems

No	Ability Level Creative Thinking	Category	Total Learners	Percentage
1	Very creative		4	25%
2	Creative	Very high	3	18.75%
3	Quite creative	High	6	37.5%
4	Less creative	Medium	3	18.75%
5	Not creative	Low	0	0%
Total				**100%**

Table 1 shows the different creative levels of students in solving problems. The difference in the level of creative thinking ability is caused by differences in understanding the meaning of the problem. In general, the results of the analysis show students who are still confused in describing the denominator of different denominator fraction material, still have difficulty in determining the KPK (smallest common multiple), or cannot mention the relationship of the problem in the problem.

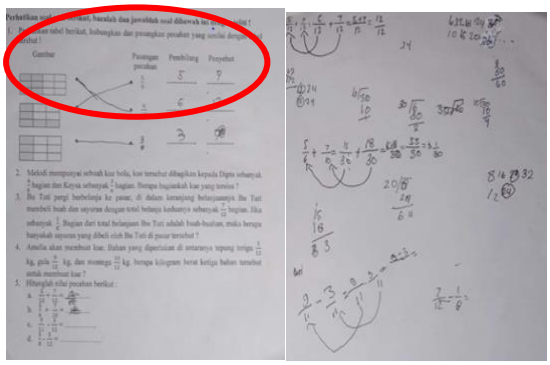
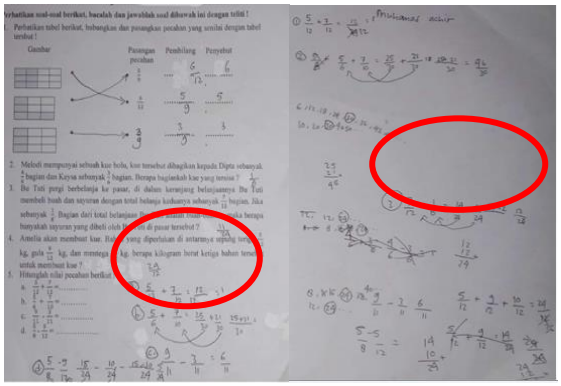
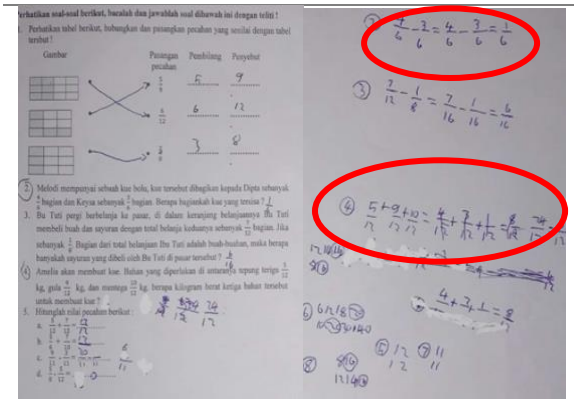
First, learners with a very high KBK category (very creative) show that they are flexibly able to solve and explain the problems in the problem. The results of the analysis show that learners are able to solve problems with more than one alternative answer, and the way of solving is conveyed smoothly and also fluently. Second, learners with high KBK category (creative) show that learners are able to flexibly show fluency and novelty in proposing and solving problems in the problem, and present new answers with different ways of solving.

Although not fluent in making various answers in different ways, but learners can propose different problems fluently (fluent).

Third, students with moderate KBK category (quite creative) show that students are able to present novelty in solving problems in the problem. In addition, learners are able to create a different answer even though it is not fluent. Fourth, students with low KBK category (less creative) show that students are able to show fluency in solving problems in the problem.

The results of identification using the TAP (Think Aloud Protocol) strategy show success, namely students with very high, high, medium and low creative thinking ability categories have their own way of answering questions. The results are described as follows:

Table 2. Implementation of Think Aloud Protocol strategy

Result of Learner's Answer	Concept and Results of TAP Identification
	**Concept:** Fractions **Identification result:** In problem number 1, students explain simply related to the problem presented. In this problem, students do not solve the problem based on the interpretation of the picture presented. Solve the problem smoothly, re-examine the solution method used, and are able to discuss the problems obtained.
	**Concept:** Addition and subtraction of fractions with unequal denominators **Identification result:** In problem number 3 and 5, students fluently solve the problem in the problem. The description given provides a different point of view in answering the problem in the problem, has its own way of solving the problem, conveys that fractions with the same denominator are not found KPK and re-checks each answer in re-analyzing the answers given.
	**Concept:** Addition and subtraction of fractions with the same denominator **Identification result:** In questions number 2 and 4, students fluently mention the problem in the problem through what is known and asked in the problem. Participants describe flexibly the concept of the problem and the relationship in the problem, originally saying that fractions with different denominators are found KPK. As for the updates made, namely finding the KPK can use multiples or directly multiplied using

multiplication of worth.

Table 2 presents the results of applying the Think Aloud Protocol strategy to each learner's answer to the question. The results presented are cumulative interviews conducted by researchers based on the KBK category owned by students. This means that each KBK category has a different description in solving fraction problems. The results of interviews with grade V math teachers show that the way teachers teach fraction material uses 2 ways of searching, namely using cross multiplication and the second using the KPK. This also strengthens the creative way that students do in solving problems. In line with that, (Fasha & Ruqoyah, 2020), (Dewi et al., 2019), and (Sitepu, 2019) said that the dominant factor influencing creativity in students is influenced by the creativity possessed by teachers, including in learning activities, choosing the right techniques and strategies in learning activities.

On the other hand, (Khoiriyah & Purwanti, 2021), (Muttaqin et al., 2020), and (Johanes et al, 2023) different creative thinking abilities in students are influenced by several factors, both internally and externally. Internal factors are caused by the learners themselves who are less active during the learning process, lack of practice, shy in expressing opinions/ideas, and still focusing on examples of problems given without wanting to learn more about different forms of problems, not mastering the concept of arithmetic operations, especially in finding the KPK, learners do not master the multiplication calculation operation, and confusion in understanding the problem. External factors are influenced by the use of gadgets, no support from parents in the child's learning process, and a play culture that lacks discipline. (Kartikasari et al., 2020), (Munandar, 2012), and (Suherman & Vidákovich, 2022) states that the ability to think creatively is influenced by individual factors and influenced by the environment, therefore introducing individuals to creative activities will help raise curiosity and do new things. (Johnson, 2014) states that creative thinking comes from habits of mind that are trained through imaginative activities, opening different perspectives, and generating new understanding. Furthermore, (Ginting & Surya, 2017) and (Sari, 2019) also strengthened this opinion by stating that creative thinking skills are part of the thinking process by developing alternatives, imagination, intuition, and finding many ways to parse different answers. Therefore, teacher involvement and student cooperation in the learning process can provide a broad understanding for students in developing creative thinking skills.

CONCLUSION

Based on the presentation of research results and discussion, it is found that the creative thinking ability of students has a different level of understanding. The application of the Think Aloud Protocol strategy carried out to students shows differences in the level of understanding, especially in understanding the problem, describing the meaning of the problem, and explaining the answer to the problem. Learners with a very high creative thinking ability category mastered all 4 indicators of creative thinking ability, although there were mistakes when answering, students with a very high category could correct it again

with intuition of the answers presented. Learners with high creative thinking ability categories mastered 3 of the 4 indicators of creative thinking skills even though in the fluency indicator, students were not so fluent in conveying their arguments.

Learners with moderate creative thinking ability category mastered 2 of the 4 indicators of creative thinking ability, this can be seen from the lack of fluency, flexibility, and the absence of renewal in presenting the problem solving presentation of the problem. Meanwhile, students with low creative thinking ability category can only explain 1 of the 4 indicators of creative thinking ability. Learners in this category can only flexibly solve problems in problems. This means that the ability to think creatively in students can be developed through continuous practice.

Suggestions in this study are that teachers should provide more opportunities for students to express their opinions during the learning process, design learning methods that focus on creative activities such as using discussion and question and answer methods. Creating problem-based learning methods can hone the creative abilities in each learner. Regarding the ability to think creatively, it is hoped that students can present their ideas very boldly through continuous practice, namely by not focusing on memorization alone, teachers can direct students to argue according to their abilities.

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