



Honey and Mumford: Application of interactive e-LKPD to improve students' creative thinking abilities

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Abstrak. Penelitian ini bertujuan untuk meningkatkan kemampuan berpikir kreatif gaya belajar Honey dan Mumford dengan menggunakan E-LKPD Interaktif pada materi bangun ruang sisi datar. Gaya belajar yang digunakan dalam penelitian ini adalah gaya belajar Honey dan Mumford yang terdiri dari empat jenis: reflektor, pragmatis, ahli teori, dan aktivis. Penelitian ini merupakan penelitian deskriptif dengan menggunakan pendekatan kualitatif dengan wawancara dan penelitian berbasis eksperimen. Untuk mengetahui gaya belajar siswa, peneliti memberikan angket gaya belajar yang diklasifikasi oleh Honey dan Mumford. Subjek penelitian ini adalah siswa kelas VII A SMP Negeri 26 Malang yang berjumlah 30 siswa. Berdasarkan penelitian, setiap siswa mempunyai gaya belajar yang berbeda-beda dan mempunyai kemampuan berpikir kreatif yang berbeda-beda. Subjek dengan gaya belajar aktivis hanya mampu menyelesaikan pertanyaan yang diajukan dengan menggunakan metode satu solusi. Namun aspek kebaruan dapat terpenuhi karena dapat merencanakan jawaban yang berbeda. Subjek reflektor belum memenuhi aspek keluwesan, tetapi dapat memenuhi aspek kebaruan dan kefasihan. Pada gaya belajar teoritis, siswa hanya dapat menyelesaikan soal-soal yang diajukan dengan satu cara penyelesaiannya. Subjek pragmatis belum memenuhi aspek fleksibilitas karena hanya dapat menyelesaikan soal-soal yang diajukan dengan satu cara penyelesaiannya. Namun dapat memenuhi aspek kebaruan dan kelancaran.

Kata kunci: berpikir kreatif, e-LKPD, gaya belajar

Abstract. This research aims to improve the creative thinking skills of Honey and Mumford's learning style by using Interactive E-LKPD on polyhedra materials. The learning style used in this research is the Honey and Mumford learning style which consists of four types: reflector, pragmatist, theorist, and activist. This research is descriptive research using a qualitative approach with interviews and experimental-based research. To determine students' learning styles, researchers administered a learning style questionnaire classified by Honey and Mumford. The subjects of this research were 30 students in class VII A of SMP Negeri 26 Malang. Based on research, each student has a different learning style and has different creative thinking abilities. Subjects with an activist learning style were only able to solve the questions asked using the one-solution method. However, the novelty aspect can be fulfilled because you can plan different answers. The reflector subject does not fulfill the flexibility aspect but can fulfill the novelty and fluency aspect. In the theoretical learning style, students can only solve the questions asked with one way of solving them. Pragmatics do not fulfill the flexibility aspect because they can only solve the questions asked with one way of solving them. However, it can fulfill the aspect of novelty and refinement.

Keywords: creative thinking, e-LKPD, learning style

Introduction

Creative thinking is a cognitive skill students need to solve problems and produce new solutions or ideas (Sitorus & Masrayati, 2016). Students' problem-solving ability depends on their creative thinking in processing new ideas or solutions (Breuer, 2011). Creative thinking is one of the abilities that students need to master, but conditions show that creative thinking has not been mastered well (Shofi & Wulandari, 2023). The ability to think creatively is an ability that must be developed in mathematics so that students can solve problems (Rakhmawati, et.al, 2022, Lee, 2018). So, it is not surprising that the Program for International Student Assessment (PISA) states that the ability to think creatively in mathematics is a competency that students must have in changing the world (Nusantara et al., 2020). Creative thinking can be defined as different thinking, which is seen as based on flexibility, fluency, and novelty (Leikin & Lev, 2013). Guilford defines creativity as solving a problem from a different perspective.

Improving creative thinking requires time and experience that require creative thinking (Ferdiani & Pranyata, 2022), one of which is through education at school. Education can significantly influence three essential components of creative thinking: skills, original thinking, and intrinsic motivation, which underlie students in developing their creative thinking potential (Asih et al., 2021). Developing creative thinking potential can start from learning mathematics at school. Teachers provide a learning environment that encourages students to think creatively (Ferdiani, 2022). Teachers must be creative thinkers in designing appropriate learning and assessment tools to improve students' creative thinking abilities. Developing students' creative thinking abilities can be done by providing opportunities to solve non-routine and open-ended problems, make mistakes, and find different solutions to the same problem.

However, traditional mathematics learning still emphasizes procedures, calculations and algorithms. Some mathematics lessons that have been carried out tend not to provide students with opportunities to develop their creative thinking skills. For example, learning is done by providing material, asking example questions, and giving routine questions (Pranyata et al., 2023). Teachers also need to give students more opportunities to solve problems. Lack of teacher support and motivation in class causes students to feel less confident in working on mathematics problems. Most students fear doing math problems wrongly and think they must be more creative. (Im et al., 2015) states that many students who are talented in mathematics consider themselves less creative.

The ability to think creatively in solving problems is influenced by learning style (Kassim, 2013). This is because learning style is a person's characteristic in solving a problem (Yousef, 2016). Learning style is a typical way of learning to absorb information from outside oneself (Ferdiani et al., 2021). Each individual's learning style is capital that can be used when studying. Every individual certainly has a different learning style (Massey et al., 2011). These differences in learning styles can also cause differences in the formation and understanding of information. (Duff & Duffy, 2002) explain learning styles as a combination of cognitive, affective and psychological factors so that they can interact and respond to the learning environment. Many experts group learning styles, one of which is Peter Honey and Alan Mumford. Honey and Mumford classify learning styles into four types: activist, reflector, theorist, and pragmatist. The pragmatic learning style favours problem-based learning



practical and opportunistic learning. The reflector learning style prefers learning through books, discussions, mutual arguments, and participating in seminar activities (excavating information). The theoretical learning style prefers analogies. In their learning activities, they prefer to understand the theory before taking action, read books, and make decisions based on theory. The activist learning style tends to involve learning that involves facts (Honey & Mumford, 2006a).

“Increasing creative thinking skills in problem solving can be achieved by using Interactive E-LKPD. E - LKPD is an ICT (Information and Communication Technology) based learning facility that can be used for learning activities (Endang et al., 2022). E - LKPD is a means for teachers to equip students with knowledge, attitudes and skills so as to create interaction and fun so that learning is not monotonous (Meishanti & Lutfiyah, 2021) The types of questions contained in E-LKPD are very diverse, such as multiple-choice questions, drop down questions, matching answers, drag and drop, listening and essay answers (Agung et al., 2022). This research has been studied by several other researchers, including (Hadiyanti et al., 2021; Niswah & Nisa', 2022; Nurramadhani et al., 2020). The difference between this research and previous research is that this research focuses more on the application of E Interactive LKPD to improve students' creative thinking by selecting subjects based on the Honey-Mumford learning style. For this reason, research is needed on the application of E LKPD to improve creative thinking abilities in terms of Honey and Mumford's learning styles.

Method

This research is descriptive research using a qualitative approach. Qualitative research results are not obtained by statistical procedures or computational forms. The types of research used are interview research and experimental-based research, which aim to gain a deeper understanding of the creative thinking abilities of students with different learning styles in the learning process. The subjects of this research were 30 students in class VII A of SMP Negeri 26 Malang. The subject selected consists of a minimum of 1 (one) activist-type subject, a minimum of 1 (one) pragmatic-type subject, a minimum of 1 (one) reflector-type subject, and a minimum of 1 (one) subject theorist type. Hence, the minimum number of subjects is four students. At the time of data collection, some requirements/criteria had not been found for the subject in question, so additional subjects with activist, pragmatist, reflector, and theorist learning styles were added. Then, data collection relating to requirements/criteria that have not appeared on the previous subject is carried out. The conditions specified are: (1) Same gender, (2) Equal mathematical ability, (3) Pretest score between 80-100, (4) Same age. Data collection was used in this research using a learning style questionnaire, interactive E-LKPD-based written tests, interviews, observation results and documentation. The E LKPD display in Figure 1.

The learning style questionnaire used in this research is Honey and Mumford's Learning Style Questionnaire (LSQ), which consists of 80 questions and several indicators that will be given and filled in by students. This aims to determine research subjects based on Honey and Mumford's learning styles. Next, a written test was carried out using the

Interactive E-LKPD, consisting of several questions: drop-down, matching, and essay questions on polyhedra material. The data analysis used in this research is the Miles and Huberman model: data reduction, data presentation, and drawing conclusions (Cresswell, 2015).

Result and Discussion

The Honey and Mumford Learning Style Questionnaire (LSQ) was distributed to class VII A students at SMP Negeri 26 Malang. Table 1 shows the results of distributing the learning style questionnaire.

Table 1. Results of Distribution of the Learning Style Questionnaire

Learning Style	The number of students
Activist	2
Reflector	17
Pragmatic	6
Theorist	3
Reflector & Pragmatist	1
Reflector & Theorist	1

From the table of learning style grouping results above, it can be concluded that class VII A students of SMP Negeri 26 Malang have different learning styles. A total of 17 students with a reflector style dominate when compared to students with an activist, pragmatic and theorist learning style. Because only one subject was selected from each type of learning style, the researchers took several student criteria, including (1) Same gender, (2) Equal mathematical ability, (3) Pretest score between 80 -100, and (4) Same age. Table 2 show four subjects were selected based on student criteria according to Honey and Mumford's learning styles:

Table 2. List of Selected Subjects Based on Criteria for Students with Honey and Mumford

Learning Style	Student's initials	Average Ability	Gender	Age
Activist	DRP	82.5	Woman	12
Reflector	DG	83.3	Woman	12
Theorist	JTP	81.2	Woman	12
Pragmatic	KSA	82	Woman	12

Based on the analysis of the distribution of learning style questionnaires, four students whose learning style criteria met the expected criteria were selected. Next, the selected subjects were given written test questions using E-LKPD flat-sided building material. This E-LKPD is a student worksheet containing material and several questions to measure creative thinking students with different learning styles. Next, an interview was conducted to find out in-depth about students' creative thinking abilities. The following are the results of the student work. Figure 1 is a display of the E - LKPD used in this research.



Figure 1. E-LKPD View of Building a Flat Side Room

This E-LKPD is a student worksheet that contains material and several questions about flat-sided geometric shapes which are used to measure the mathematical problem-solving abilities of students with different learning styles. This e-LKPD is distributed via the WhatsApp group in the form of a link that can be accessed using a cellphone, computer, or other internet-based media. Apart from measuring students' mathematical problem-solving abilities, this e-LKPD also aims to facilitate conditions during the research process in the classroom when researchers focus on students who are used as subjects to work on test questions and interviews based on learning styles. The following is a presentation of data from each subject.

1. Subject Activist Learning Style



Figure 2. Results of Student Work with Activist Learning Style

Based on the results of student work, it can be concluded that:

a. Subject Character with an Activist learning style

Based on observations of subjects with an activist learning style type while attending lectures, subjects actively participate in class learning. The subject is open-minded; this is proven when discussing the subject in groups, able to accept other people's opinions and make changes when given suggestions or criticism. In social situations, the subject often becomes the trendsetter for his friends and prefers to lead his friends. However, the subject's weakness is his tendency to make decisions hastily. This can be seen when leading discussions or working on assignments, so he often revises them repeatedly when submitting them.

Meanwhile, based on the researcher's observations when the subject was working on the questions given during this research, information was obtained that the subjects felt challenged and looked enthusiastic in working on the questions. However, subjects tend to be in a hurry when working on the questions and need to be more thorough in solving the questions given. The subject likes to observe the environment and prefers to learn from experience; this is proven by asking questions originating from the subject's experience. The typical characteristics of the subject are that they tend to act first, then think about the next step, like challenges, learn from experience and prefer to try new things.

b. Analysis of Subject Answers with Activist Learning Style

Based on the analysis of written test answers and interviews using E-LKPD on the results of solving test questions with the subject of activist learning style, the results showed that they were able to write down what they knew and were asked, were able to make a solution plan using mathematical formulas, were able to complete the solution plan to the final stage, and were able to conclude from the results of the answers. The subject needs to meet the aspects of fluency and flexibility because he cannot provide various answers to problems, even though the answer is correct. Subjects can only solve the questions asked with one solution method. However, the subject fulfils the aspect of novelty because it can plan the characteristics of the questions so that they are different from existing questions.

2. Subject Reflector Learning Style

Ayo berlatih !

Ika akan membungkus kado menggunakan kardus berbentuk persegi dengan panjang setiap sisinya 5 cm. Tentukanlah luas permukaan dan volume dari kardus yang digunakan Ika...

Mari Menjawab !

Luas = $6 \times s^2$ = 6×5^2
 $= 150$

Volume = s^3 = 5^3
 $= 125$

Mari Menyimpulkan !

Jika, luas permukaan kardus 150 cm, volume kardus 125 cm.

LIVEWORKSHEETS

Figure 3. Results of Student Work with Reflector Learning Style

a. Reflector Style Student Character

Based on observations made on the subject while attending lectures, it is known that the subject is a person who likes to observe events around him, observe the reactions of the people around him, and make conclusions or decisions. Subjects tend to think about everything that will happen before doing a job. So, it gives the impression of being very careful and afraid of making mistakes. Subjects prefer to learn from experience and have little fear when trying new things. This also happens during classroom learning. When discussing or working in groups, subjects prefer to observe other people's reactions, listen to other people's opinions, and then express their opinions.

Meanwhile, based on the researcher's observations of the subjects while completing the questions, the subjects tended to be careful in solving the questions. Before solving the questions given, subjects tend to observe their surroundings, so they must arrive on time to collect answers compared to other subjects.

b. Analysis of Subject Answers Reflector learning style.

Based on the results of work and interviews regarding the results of solving test questions with reflector learning style subjects, the results were that the subjects were able to understand the questions so they could write down what they knew and were asked, were able to make a solution plan using mathematical formulas, were able to complete the solution plan to the final stage, and were able to conclude from the results of the answers. Subjects can solve problems based on initial ideas quickly, in detail and logically, although they could be more varied in solving problems. At the problem-solving stage, the subject implements his ideas to solve the problem posed correctly but carefully. The subject's character is cautious when working on questions, as shown by the statements of (Honey & Mumford, 2006b)

When solving problems, the subject needs to fulfil the flexibility aspect because he cannot provide various answers to the problem, even though the answer is correct. Subjects can only solve the questions asked with one solution method. However, the subject meets the aspects of novelty and fluency because the questions that solve the problem are developed answers based on observations made by the subject.

3. Subject theorist learning style



Figure 4. Results of student work with a theorist learning style

a. Theorist Learning Style Subject Character

Based on the researcher's observations during the lecture, subject two was known as an individual who was very careful in his actions, so he seemed to lack self-confidence. Subjects tend to think step by step; this can be seen when doing assignments or group discussions. The subject's advantage is that he has logical thinking compared to his classmates; this can also be seen when studying in class. When conducting group discussions or answering a question or problem, the subject always answers systematically.

Subjects want to do their work perfectly and feel uneasy about improving their task or work. Subjects tend to be careful in making decisions. Before deciding, subjects tend to analyze first and study theories by reading books.

Based on observations while working on the questions given, the subject worked very carefully, so he lacked confidence in the answer. However, the subject can be worked on systematically and in detail. Subjects get ideas for solving problems based on literature review or knowledge gained during class.

b. Analysis of Subject Answers in theorist Learning Styles.

Based on the analysis of written test answers using E-LKPD, the subject can understand question number 3 so that he can write down what is known and asked, can make a solution plan using mathematical formulas, can carry out the steps to complete the solution plan to the final stage, and can conclude the results answer. When solving problems, the subject needs to fulfil the flexibility aspect because he cannot provide various answers to the problem, even though the answer is correct. Subjects can only solve the questions asked with one solution method. However, the subject meets the aspects of novelty and fluency because the answers are development questions with existing questions.

4. Pragmatic Learning Style Subjects



Figure 5. Results of student work with a Pragmatic learning style

a. Pragmatic Learning Style Subject Character

Based on the researcher's observations of the subject while attending lectures, it is known that the subject is a person who is cheerful, full of enthusiasm, and has practical thinking, but he does not like things that bother him. This can be seen when learning in class and discussing with the group. When discussing with their group, subjects tend to provide new ideas compared to their friends. The new idea was immediately implemented and confidently presented to his friends or lecturer. Even though his friends do not always accept his new ideas, subject four will not be offended and remains confident. Subjects tend to have an open mind and like to experiment (trial and error).

Meanwhile, based on the researcher's observations of the subjects while solving the questions given, it was discovered that the subjects got ideas for solving the questions based on observations around the class. To illustrate his idea, subject 4 carried out a simple experiment by drawing according to his idea.

b. Analysis of Pragmatic Learning Style Subject Answers

Based on the results and interviews regarding the results of solving test questions with the pragmatic learning style subject, the subject needs to fulfil the flexibility aspect because it can only solve the questions asked with one way of solving. However, the subject meets the aspects of novelty and fluency because the questions asked are development questions based on the subject's experience in everyday life.

Conclusion and Suggestion

Based on research, each student has a different learning style and has different creative thinking abilities. This creative thinking ability can be assessed based on three aspects, namely flexibility, fluency and novelty. Subjects with an activist learning style were only able to solve the questions asked using the one-solution method. However, the novelty aspect can

be fulfilled because you can plan question characteristics that are different from existing questions. Reflector learning style subjects do not fulfill the flexibility aspect because they cannot provide answers to various problems; Even though the answer is correct, the subject fulfills the aspect of novelty and fluency because the problem solving question is an answer that was developed based on observations made by the subject. In the theoretical learning style, students can only solve the questions asked with one way of solving them. However, it can fulfill aspects of novelty and fluency because the answers are built based on existing questions. In the pragmatic learning style, students need to fulfill the aspect of flexibility because they can only solve the questions asked with one way of solving them. However, it can fulfill aspects of novelty and fluency because the questions asked are developmental questions based on experiences in everyday life.

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