
Students' Creative Thinking Ability in view From The Level of Understanding in Waste Management

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ABSTRACT

KEYWORDS:

creative thinking skills,
environment,
student understanding,
managing waste.

Creative Creative thinking is an important nature in the learning process, the weak ability of students' creative thinking is caused by a static learning process. This study aims to analyze the factors that cause high and low students' creative thinking abilities in terms of their level of understanding and identify other factors that influence creative thinking abilities. The subjects of this study were students of class XI MIPA at SMAN 1 Ciomas, Bogor Regency. The research was conducted in November 2022 – May 2023. The method used in this study was a mixed method with a sequential explanatory research design. The research sample was 123 students, the sampling technique used proportional random sampling technique. Quantitative data analysis techniques use descriptive and inferential analysis or hypothesis testing, namely correlation and regression, and qualitative data analysis techniques include data reduction, data presentation and drawing conclusions. The instrument used for Y and X variables is a multiple choice test instrument and for qualitative use interview guidelines, observation and documentation studies. The results showed that there was a fairly high positive correlation, with an r^2 value of 24.1%, students' creative thinking ability was influenced by understanding and the remaining 75.9% was influenced by internal factors including interests, hobbies and external factors including teacher guidance, environment, and some school activities. such as organization, performing arts, social media. The solution to overcome these problems is to develop learning designs for environmental materials that can increase understanding so that students are better trained to have the ability to think creatively in solving environmental problems. The existence of collaboration between schools in developing learning designs can increase understanding so that students have the ability to think creatively.

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1. INTRODUCTION

Thinking is a mental activity that helps in solving problems, making decisions and fulfilling desires. This shows that someone who is solving problems and making decisions is doing thinking activities. Creative thinking has a very important role in the educational process, because students will play a role as a driver of social change.

Creative thinking is a cognitive characteristic of creativity or the process of seeing things from a new perspective forming new concepts from several concepts that have been mastered, creative thinking helps students create new ideas to solve problems from different perspectives, creative thinking skills are also needed to produce innovation new approach involving analysis and intuition, a new component in creative thinking refers to an emphasis on acquiring new insights, new approaches, and new perspectives on understanding things (Pratiwi et al. 2019). It can be assumed that creative thinking is the ability to solve problems by forming new concepts or a process of seeing things from a different perspective in order to form new concepts. Creative thinking has a very important role in the educational process, because students will play a role as

a driver of social change. Creative thinking refers to the concept of mental activity in students which refers to five aspects including fluency, flexibility, originality, detailing, and judging (Tri Agustiana et al. 2020).

Creative education and environmental education are related fields, not all creative efforts are good for the environment. cultivating the ability to think creatively results in good consequences so that it is not ignored in the field of education, several governments around the world have identified the development of the ability to think creatively (Cheng 2019). Several countries have curricula that also focus on the ability to think creatively. The aim of their curriculum is to increase students' ability to think creatively to manage the environment (Putra et al. 2019). With the ability to think creatively students can create ideas and ideas to solve environmental problems, especially waste problems that can damage and pollute, so that the environment looks clean and comfortable.

Waste management requires creativity and the active role of the community in reducing the amount of waste, classifying the types of waste, selecting types of waste that can be reused to meet the needs of the community and the surrounding environment. Several areas in Bogor City have provided waste banks, if one pays attention to their existence they are very effective in reducing the amount of waste and empowering waste to be managed with the aim of protecting the environment (Nasution et al. 2021). Protecting the environment by managing waste is not difficult, everyone can do it, but if everyone is not used to protecting the environment from an early age then it will be difficult to do, so families need to instill awareness in protecting the environment (Çelik and Yüce 2019)

Based on the results of interviews in qualitative research that understanding contributes quite a bit in creating ideas to solve problems, especially environmental problems, there are several inspirations to solve waste problems for example plastic bottle waste that is used as a planting medium, apart from the problem of waste understanding also influences the concepts that will be assembled to make a waste reuse product. Based on the level of understanding that triggers the ability to think creatively, the research aims to analyze the factors that cause the high and low levels of students' creative thinking ability in terms of the level of understanding and identify other factors that influence the ability to think creatively besides understanding.

Understanding in managing waste is the ability of humans to understand and know how to deal with waste problems by looking at various points of view in solving them. Learning at school has an important influence on the level of students' understanding, especially on the introduction of the environment which can provide an overview of good waste management patterns such as the 3Rs, namely: reduce, reuse, and recycle. The (reduce) pattern of reducing waste is that students are expected to reduce the use of materials that are difficult to recycle such as plastic. Patterns (reuse) of reusing waste such as utilizing organic waste left over from food and vegetables as compost. The pattern of (recycle) waste is recycling waste into new items of use value such as packaging waste into various types of bags, flower vases, and others (Purnami 2021).

Waste is a substance that is produced from a production process of human activities, both household, industrial and mining. The more people, the more waste is produced. The presence of waste can have a negative impact on the environment, especially for health, so it is necessary to deal with waste problems. The increase in population makes more and more community settlements, so that it has an impact on the production of waste that is produced, whether it is waste from household activities or other waste (Sunarsih 2014). Waste has a small volume but there will be a lot of waste production because it can be seen from the amount produced by humans every day for a long period of time, this small volume of waste will become a mountain of problems that will cause air, soil and water pollution which will cause global problems (Abdulredha et al. 2017).

There needs to be sufficient understanding and good creative thinking skills in order to be able to deal with waste problems properly and get ideas for waste management so that the environment is better. The level of understanding in waste management is needed to regulate waste management starting from the selection, utilization as well as the destruction of the waste (Wahdah et al. 2020). The ability to think creatively here involves understanding related to experience factors whether students are in difficulty either to generate ideas based on knowledge or understanding they have

or get out of control by doing something without considering the impact. Based on this research, most students can master how to think and consider what needs to be done, this shows that learning outcomes that link understanding with experience can produce good ideas (Mulatti and Treccani 2023).

The low ability of students' creative thinking affects students' concern for the environment, based on school observations that students' creative thinking skills regarding waste management reach an average score of 78 in the moderate category, this is due to the absence of school activities for students to develop their creativity. So that researchers are interested in conducting research on creative thinking analysis in terms of students' understanding of waste management at SMA Negeri 1 Ciomas with the aim of knowing whether there is a relationship between creative thinking abilities and students' understanding of waste management and what factors influence creative thinking abilities besides understanding.

2. MATERIALS AND METHODS

2.1. Methods

The method used is sequential explanatory. The sequential explanatory combination research method is a research method that combines quantitative and qualitative research sequentially (Khairunnisya 2017).

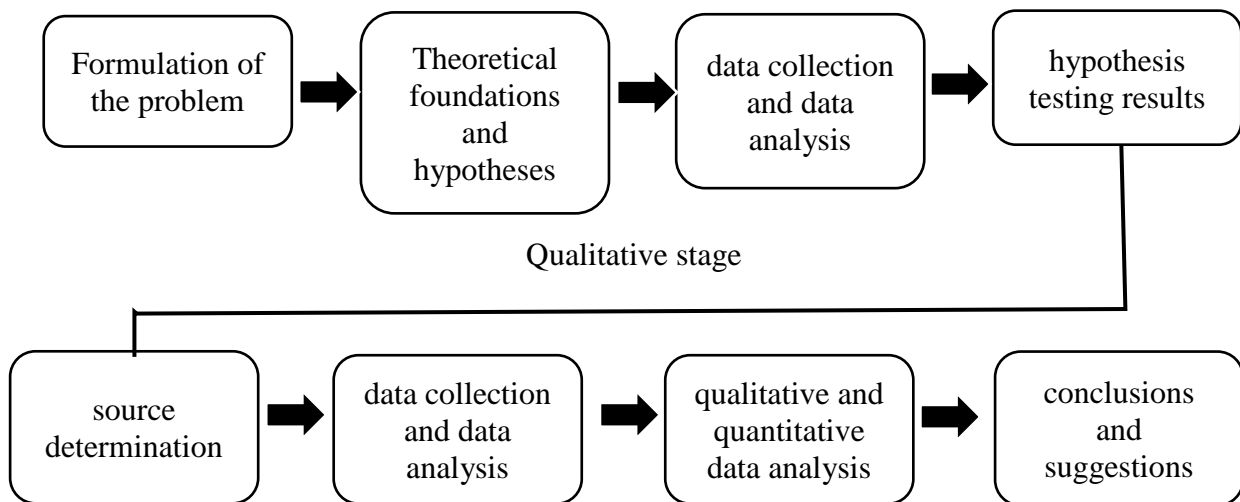


Figure 1. Sequential explanatory design research steps

2.2. Time and research instruments

When the research was conducted in February-March 2023, the instrument used to examine creative thinking skills (Y) and understanding (X) used multiple choice with a variable number (Y) of 25 questions and a variable (X) of 30 questions, variable question indicators (Y) includes (1) Developing knowledge about waste management, (2) Conceptualizing waste management, (3) Knowing current waste management issues, (4) Solving waste management problems in creative and innovative ways, (5) Managing or conserving natural resources so that damage does not occur. Variable indicators (X) include (1) Categorizing recyclable and non-recyclable waste, (2) Distinguishing between organic and inorganic waste, (3) Providing examples of proper waste management, (4) Estimating the impact of indiscriminate waste disposal, (5) Determining products to be made based on waste.

2.3. Data analysis technique

Quantitative data analysis technique uses the estimated error normality test using the Liliefors test and homogeneity test using the Barlett test with the help of Excel 2016 software. If the data is normally distributed and homogeneous, then hypothesis testing is carried out using descriptive

statistics in the form of a simple Pearson Product Moment regression correlation technique using the t test. Qualitative data analysis includes data reduction, data presentation and conclusion.

3. RESULTS AND DISCUSSION

The results of the study are strongly recommended to be presented in tables and figures. The table is made in an open form and given the title above which describes the contents of the table as shown in the example (**Table 1**).

Table 1. Summary of Normality Test Results

group variance regression ($Y-\hat{Y}$)	Price	L	Conclusion
	X ² count	X ² table	
	0,067	0,079	Normal

Table 1 shows the results of the calculation (Lomax) of the estimated book error ($Y-\hat{Y}$) of 0.067 and Lt of 0.079, thus $L_o < L_t = 0.067 < 0.079$, so the estimated book error ($Y-\hat{Y}$) comes from a normally distributed population. The normality test is carried out to see whether the data obtained is normally distributed or not because if the data is normally distributed there will be little possibility of bias (Doddy et al. 2018).

Table 2. Summary of Homogeneity Test Results

Group Varians Y score in terms of X	Price	L	Conclusion
	X ² count	X ² table	
	116,07	149,88	Homogen

Table 2 is the result of calculating the X² price with the X² table. if X² count (116.07) < X² table (149.88) then the data comes from a homogeneous population. This homogeneity test is carried out to find out whether the variance in each population is the same or not and to find out differences between groups of variables (Sianturi 2022). This homogeneity test is carried out when the data is normally distributed.

Table 3. Correlation test calculation results

N	Correlation coefficient	Coefficient determination	Tcount	Significance	Conclusion
	(r)	(r ²)		5%	
123	0,490	0,240	2,011	1,979	HO Rejected

This shows that there is a positive relationship between understanding (X) and creative thinking (Y) at a significance level of $\alpha = 0.05$, the coefficient of determination (r^2) is 0.2401 or 24.1%, which means an increase or decrease in students' creative thinking skills in managing waste is determined by an understanding of 24.1% while the remaining 75.9% is another factor that plays a role in students' creative thinking abilities.

Based on qualitative research that the ability to think creatively is not only important for driving schools but also for public schools because creative thinking is the most important essence during the learning process, with the ability to think creatively students will be more active in participating in the learning process so that the atmosphere will be more comfortable during learning going on. Creative thinking will also affect the variety of questions students ask so that it refers to increasing student knowledge so that it plays an important role when solving problems. Students' creative thinking abilities can be seen when formulating problems, looking for solutions to every problem they experience, there will be lots of ideas from students conveyed at the time of completion. Such as environmental problems, students will deal with these problems through two aspects, namely

environmental friendliness and entrepreneurship, students will use used bottles as planting media and use trash around their homes to make fertilizer, then sell the crops to meet the needs of class equipment. The ability to think creatively is influenced by several factors besides understanding including teacher guidance factors, environmental factors, hobby factors, organization and several school activities as well as participating in creativity webinars and finally social media factors.

Understanding plays an active role in students' creative thinking abilities, with understanding students will know what to do to deal with waste so that the environment is maintained, waste greatly contributes to environmental damage, educational institutions need to provide understanding and also emphasize creative thinking skills so that students can reduce use waste that is difficult to recycle and recycle waste into items that can be reused (Lee and Lee 2023). The ability to think creatively with students' understanding of waste management are two interrelated aspects. When students have the ability to think creatively, they will have many ideas that can be created and channeled properly. In learning, the ability to think creatively needs to be developed, especially learning based on solving problems such as environmental problems (Evans and Jirout 2023).

Intelligence and creative thinking are two things that are related to each other based on knowledge and with the ability to think creatively, a person can be said to be intelligent because he is able to argue based on strong references so that when people have this ability they can be said to be intelligent people (Corazza et al. 2021). This intelligence can occur in students on the basis of encouragement from educational institutions, because the low ability to think creatively in students is based on a learning process that does not dominate students so that students are not trained in expressing their knowledge (Ernaeni and Gunawan 2019). Therefore the ability to think creatively is something that needs to be fostered in 21st century learning so that students' knowledge can develop according to changing times, learning based on changing times can encourage students to compete in the 21st century with good skills and intelligence. so as to encourage progress in educational institutions (Bullard and Bahar 2023).

The ability to think creatively is currently the most important goal of educational institutions, because learning is currently all based on problems so that students are trained to solve various problems, students need to be based on sufficient understanding so that they are able to know effective ways of solving problems (Swanzy-impraim et al. 2023). It can be assumed that the ability to think creatively is closely related to understanding, because understanding can be realized so as to generate ideas in solving various problems effectively.

4. CONCLUSIONS

Based on the results of the study it can be interpreted that there is a positive relationship between understanding and the ability to think creatively, with a regression value of $\hat{Y} = 44.464 + 0.458X$ and a correlation coefficient / $r = 0.490$ and a coefficient of determination / $r^2 = 0.2401$. in accordance with qualitative research that students' creative thinking abilities possessed by students can affect the learning process seen from the price of r^2 means that 24.1% of students' creative thinking abilities are influenced by understanding and the remaining 75.9% are influenced by internal factors (hobbies) and external factors (teacher guidance, environment, and several school activities such as organizations (osis) and performing arts (pensi), social media). There is cooperation between schools and teachers in developing learning designs so as to improve the quality of education which encourages the achievement of learning outcomes in order to improve students' creative thinking skills.

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