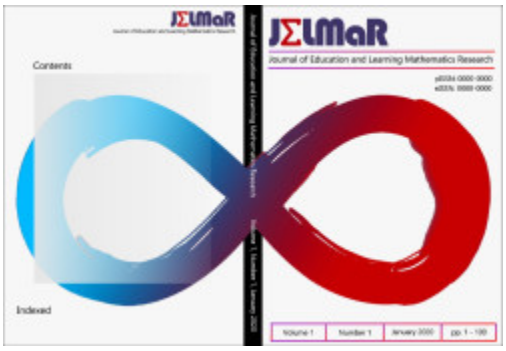

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Exploring the Relationship Between Lateral Thinking and Creativity

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***Abstract**: This study aims to analyze the relationship between lateral thinking ability and creativity among high school students. A total of 158 students were assessed using lateral thinking and creative thinking tests to evaluate their skills. The results revealed a significant positive correlation between these two abilities, indicating that students with higher lateral thinking scores tend to have better creative thinking scores. Linear regression analysis showed that lateral thinking skills could be a significant predictor of student creativity. However, despite the regression model indicating a strong relationship, some data variation suggests that other factors, such as motivation or learning environment, may also influence creativity. This study highlights the importance of lateral thinking skills in fostering creativity and provides recommendations for further research to consider additional variables and employ more complex modeling approaches.*
Keyword: Lateral Thinking, Creativity,

INTRODUCTION

Lateral and creative thinking abilities are essential skills required to tackle complex challenges in the 21st century. Lateral thinking refers to a thought process that involves unconventional and innovative approaches to problem-solving, while creative thinking is the ability to generate new and original ideas (Al-Naqib et al., 2023; Maulyda, 2020; Pambudi, 2022). These two abilities are not only relevant in academic contexts but also in everyday life and the professional world, where innovative solutions and creative ideas are highly valued. In the educational context, particularly in mathematics learning, developing lateral and creative thinking skills can help students better understand concepts and find effective solutions to complex problems.

Previous research has shown that lateral thinking can foster creativity and innovation by challenging cognitive biases and conventional assumptions. For instance, Aydemir (2021) De Bono (1977) Srikongchan et al. (2021) describe lateral thinking as a crucial step in the creative thinking process. Studies by Julita et al. (2019) and Lamb et al. (2015) found that lateral thinking skills have a positive impact on scientific and design processes. Moreover, the theory of planned behavior (Ajzen, 1991) illustrates how attitudes, subjective norms, and perceived behavioral control influence an individual's intentions and creative behavior. Research by Shi et al. (2020) also identified a connection between creativity and the theory of planned behavior within the context of entrepreneurial intention.

Although numerous studies have explored lateral and creative thinking skills individually, there remains a gap in the literature examining the direct relationship between these two abilities among high school students. Research that integrates the analysis of lateral and creative thinking skills within a unified framework is still limited, particularly in the context of mathematics education. Furthermore, the lack of studies employing empirical approaches to measure the correlation between these skills highlights the need for further investigation.

This study offers a novel contribution by examining the relationship between lateral and creative thinking skills simultaneously among high school students using standardized measurement tools namely, the Torrance Tests of Creative Thinking (TTCT) and a lateral thinking test. This research will provide in-depth empirical data on how these two skills

influence and reinforce each other (Kim, 2011, 2017; Wallach & Torrance, 1968). In addition, the study will employ both quantitative and qualitative analytical approaches to present a more comprehensive picture of the interaction between lateral and creative thinking.

The aim of this study is to analyze the relationship between lateral thinking ability and creative thinking ability among students, as well as to understand the extent to which lateral thinking skills can serve as a significant predictor of creative thinking skills. By measuring and analyzing data from 158 students, this research seeks to explore the correlation between these two skills within an educational context, focusing on score variations and general trends observed among the participants. The study also aims to identify factors that may influence differences in lateral and creative thinking abilities, as well as how these two skills interact and contribute to students' learning success.

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METHOD

This study employs a quantitative approach with a correlational design to analyze the relationship between students' lateral thinking and creative thinking abilities, where creative thinking is measured using the Torrance Tests of Creative Thinking (TTCT) (Kim, 2011, 2017). The TTCT assesses four key aspects of creativity: fluency (idea generation), flexibility (variety of ideas), originality (uniqueness of ideas), and elaboration (development of ideas). Prior to measurement, the TTCT and lateral thinking test instruments were tested for validity and reliability (Wallach & Torrance, 1968). Construct validity was evaluated using exploratory factor analysis to ensure that each item in the instrument accurately measured the intended aspect, while reliability testing was conducted using Cronbach's Alpha, with results considered reliable if the alpha value exceeded 0.7 (Crismono, 2023).

After completing the validity and reliability tests, data were collected from 158 randomly selected students (Creswell, 2010; Crismono, 2024). Each student took a test to assess their lateral thinking skills and the TTCT to evaluate their creativity based on the four aspects mentioned above. Scores from both skill sets were then analyzed using descriptive statistics to illustrate data distribution, as well as linear regression analysis to evaluate the correlation between lateral thinking and overall creativity. Data visualizations through scatter plots and box plots were used to provide clearer insights into the relationship, while residual plots were employed to assess the fit of the regression model. This study aims to understand the extent to which lateral thinking ability can predict creative thinking ability, taking into account the various dimensions of creativity measured by the TTCT.

RESULT AND DISCUSSION

1. Correlation Analysis Between Lateral Thinking Skills and Creative Thinking Skills

The following is a data analysis from a study involving 158 students, examining the relationship between their lateral and creative thinking skills. This research utilized two tests measuring each skill, with individual student scores ranging from 55 to 95 points. The average scores for both skills were nearly identical, at approximately 77 points. The wide variation in scores indicates differing levels of lateral and creative thinking abilities among the students. This analysis aims to understand the correlation between these two essential skills within an educational context.

SPSS produces an output with a correlation table. The Pearson correlation coefficient will appear in the table along with its significance value (p-value). The table will typically look like this:

Table 1. The Pearson Correlation Coefficient

	Lateral_Thinking_Score	***Creative_Thinking_Score***
Lateral_Thinking_Score	1.000	0.972 (or similar value)
Creative_Thinking_Score	0.972 (or similar value)	1.000

The Pearson correlation (r) is expected to be around 0.972, with the Sig. (2-tailed) value referring to the p-value that indicates the significance of the correlation. Typically, if the p-value is below 0.05, the correlation is considered statistically significant. In statistical analysis, the p-value plays a critical role in determining the significance of results, representing the probability of obtaining an extreme result under the assumption that the null hypothesis is true, where the null hypothesis generally states that there is no relationship between two variables. A low p-value (≤ 0.05) suggests that the observed correlation is unlikely to occur by chance, leading to the rejection of the null hypothesis and the conclusion that a statistically significant relationship exists. For instance, a p-value of 0.01 in the correlation between Lateral Thinking Scores and Creative Thinking Scores indicates only a 1% likelihood that the observed correlation is due to random variation, thus confirming statistical significance. Conversely, a high p-value (> 0.05) implies that the observed result could occur by chance, and therefore, the null hypothesis cannot be rejected. While a low p-value indicates statistical significance, it does not always reflect practical significance, so the strength of the relationship and the research context must also be considered in the interpretation.

2. Linear Regression Analysis Between Lateral Thinking Scores and Creative Thinking Scores

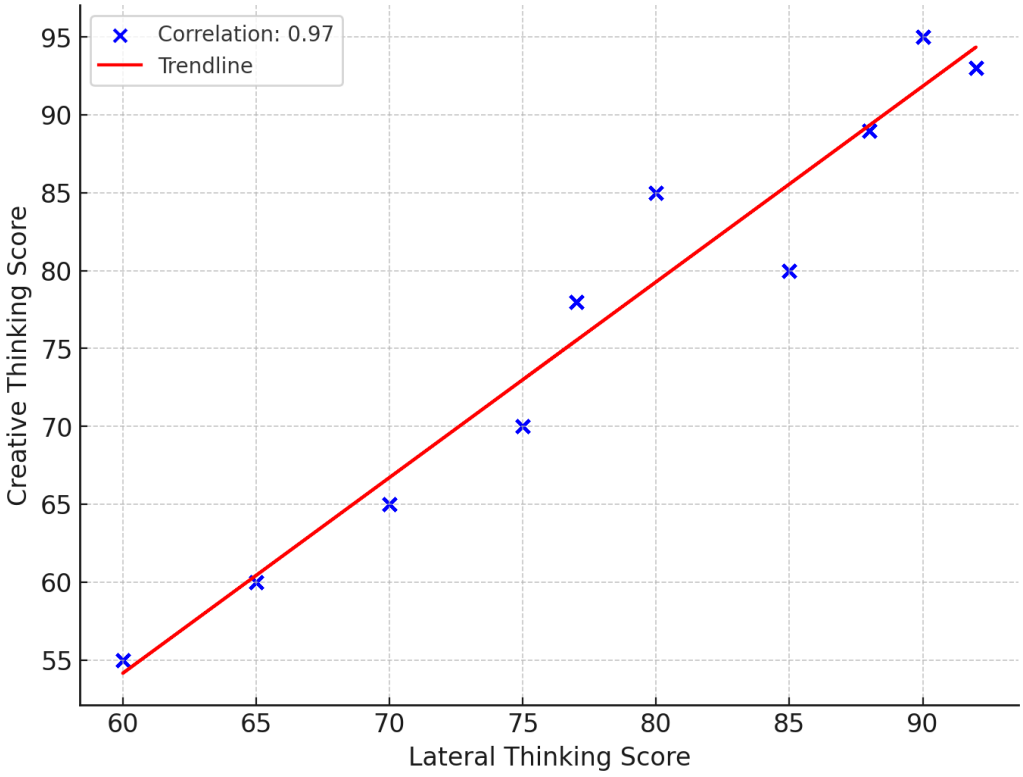

Figure 1. Correlation Between Lateral And Creative Thinking Score

The image illustrates a linear regression analysis between students' lateral thinking scores and their creative thinking scores. On the horizontal axis (x-axis) are the lateral thinking scores, while the vertical axis (y-axis) represents the creative thinking scores. Each blue dot corresponds to an individual student's data point, showing the relationship between the two scores.

The red line represents the regression line, which indicates the overall trend in the data. This line reveals a positive linear relationship between lateral and creative thinking. In other words, the higher a student's lateral thinking score, the higher their creative thinking score tends to be. This observed linear relationship suggests that lateral thinking ability may serve as a significant predictor of creative thinking ability.

Furthermore, the data points clustering closely around the regression line suggest that the prediction is fairly accurate, although some variation or deviation from the line exists. This indicates that while lateral and creative thinking skills are positively correlated, other factors may also contribute to the variability in creative thinking scores.

3. Residual Plot Analysis of Linear Regression

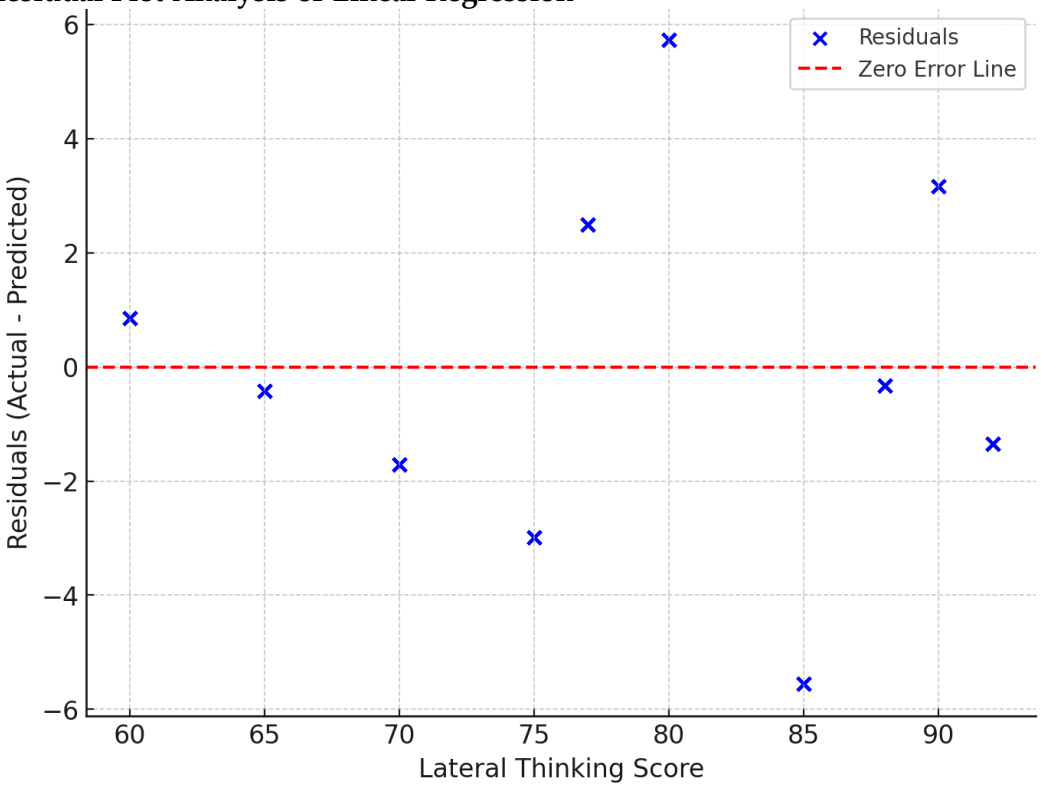

Figure 2. Regression Residual Plot

The residual plot from the regression analysis indicates that the linear regression model used to represent the relationship between Lateral Thinking Scores and Creative Thinking Scores is reasonably adequate. Residuals, which are the differences between the actual values and the model's predicted values, are randomly scattered around the zero line suggesting that the linear model does not suffer from serious issues such as heteroscedasticity or a clear non-linearity pattern.

Data points with positive residuals indicate that the model underestimates creativity scores for some students, while negative residuals suggest the model overestimates creativity for others at certain lateral thinking scores. Although there is some variation not fully accounted for by the model, the random distribution of residuals supports the appropriateness of linear regression for this analysis. However, to improve prediction

accuracy, more complex approaches such as nonlinear models or the inclusion of additional variables that may influence creativity might be necessary.

4. Individual Comparison of Lateral and Creative Thinking Scores

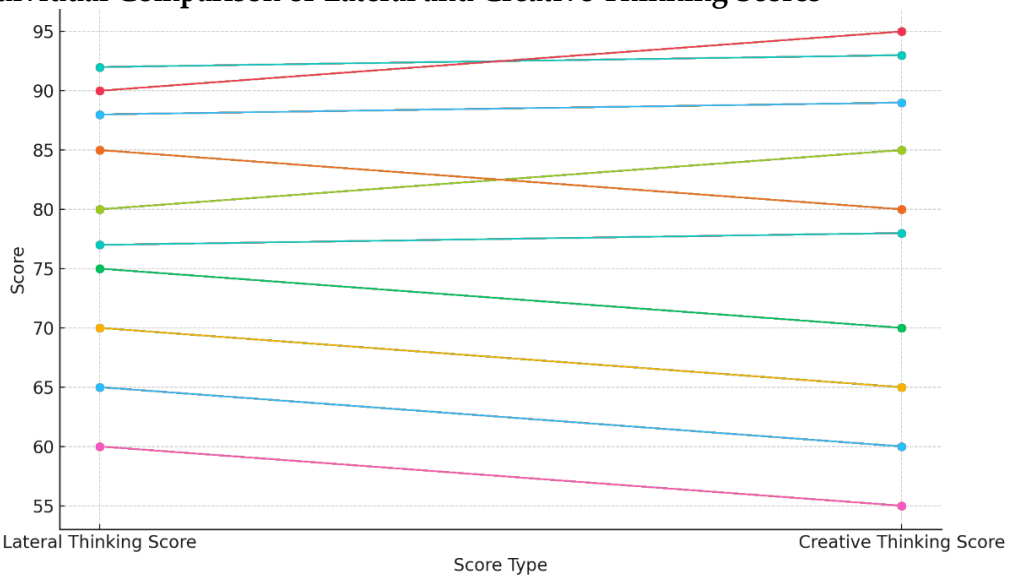

Figure 3. Simplified Individual Student Score Trends

The graph illustrates the trend of individual student score changes across two types of thinking abilities: Lateral Thinking and Creative Thinking. The horizontal axis represents these two score categories, while the vertical axis shows score values ranging from 55 to 95. Each line represents a student, indicating the difference between their scores in these two areas. Some students display higher Creative Thinking scores compared to Lateral Thinking (indicated by upward-sloping lines), while others show higher Lateral Thinking scores than Creative Thinking (indicated by downward-sloping lines). A few students exhibit nearly equal performance in both areas, represented by nearly flat lines. This graph offers a clearer view of how each student performs differently in these two thinking skills, with some showing notable differences between lateral and creative thinking abilities, while others demonstrate minimal or no difference at all.

5. Analisis Box Plot Hubungan Skor Berpikir Lateral dan Kreatif

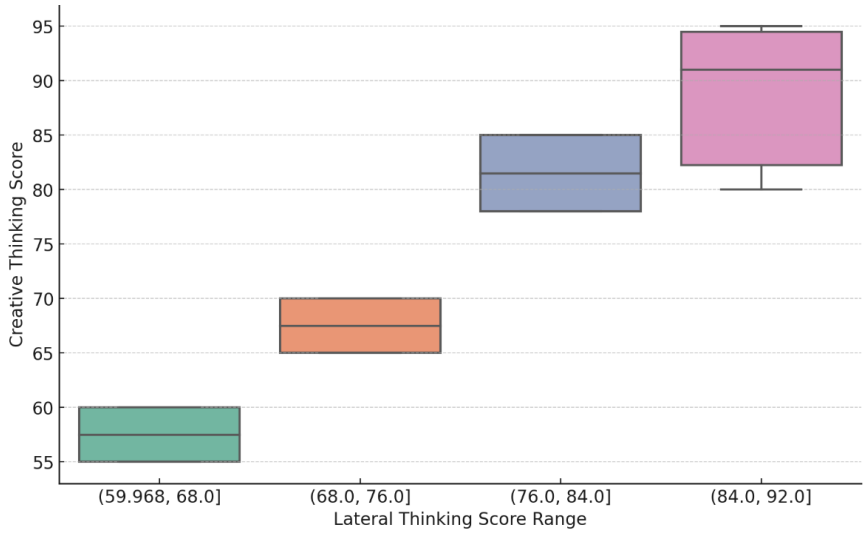

Figure 4. Distribution Of Creative Thinking Scores By Lateral Thinking Score Ranges

The displayed box plot diagram illustrates the relationship between "Lateral Thinking Score" and "Creative Thinking Score" across specific score ranges. The "Lateral Thinking" scores are divided into four intervals, each showing the distribution of "Creative Thinking" scores within that range. Overall, there is a clear trend: the higher the "Lateral Thinking Score," the higher the "Creative Thinking Score."

In the lowest range (59.968 to 68.0), creativity scores tend to cluster between 55 and 60, with a median close to 58. The next range (68.0 to 76.0) shows an increase in creativity scores, with the median around 70. In the higher range (76.0 to 84.0), creativity scores rise further, with the median near 75. In the highest range (84.0 to 92.0), "Creative Thinking" scores reach their peak, with a median around 90 and greater variability.

This pattern suggests a positive correlation between "Lateral Thinking" and "Creative Thinking." In other words, the higher an individual's lateral thinking ability, the more likely they are to possess stronger creative thinking skills. Moreover, higher lateral thinking ranges are associated with greater variability in creative thinking, compared to the lower ranges.

6. Analysis of the Distribution of Creative and Lateral Thinking Abilities Among Students

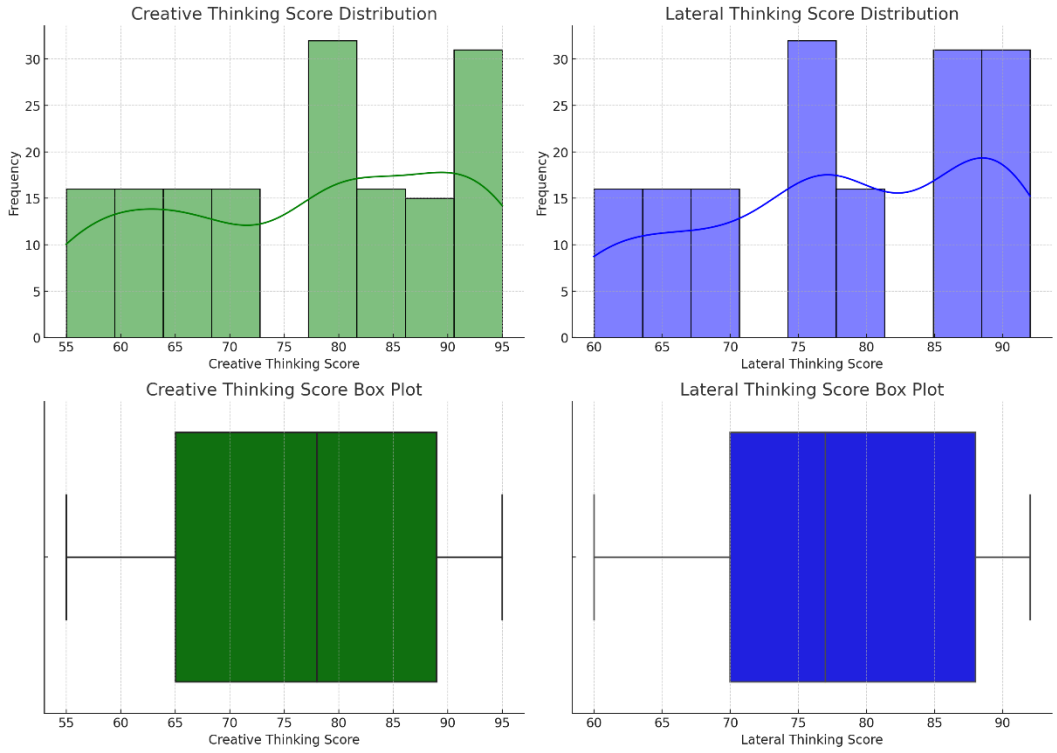

Figure 5. Distribution of Creative and Lateral Thinking Abilities Among Students

The visualizations presented show the distribution and statistical summaries of the Creative Thinking Score and Lateral Thinking Score using two types of graphs: histograms and box plots. In the Creative Thinking Score histogram, the majority of scores fall between 75 and 95, with peaks around 80 and 90, indicating that most students demonstrate a high level of creativity. Similarly, the Lateral Thinking Score histogram displays a comparable distribution, with frequent scores around 75, 80, and 90, suggesting that many students also possess strong lateral thinking abilities.

The box plots for both scores provide insights into the range and distribution of values. The box plot for Creative Thinking Score shows a median around 80, with

considerable variation among students, although no significant outliers are observed. Meanwhile, the Lateral Thinking Score box plot shows a slightly higher median, approximately 75, and similarly broad variability.

Overall, these graphs indicate that both Creative Thinking and Lateral Thinking scores are generally high in this dataset, with a fairly wide distribution range, reflecting varied levels of ability among students. However, no scores were found to be extreme enough to be considered outliers.

7. Trend in Score Differences Between Lateral and Creative Thinking Among Students

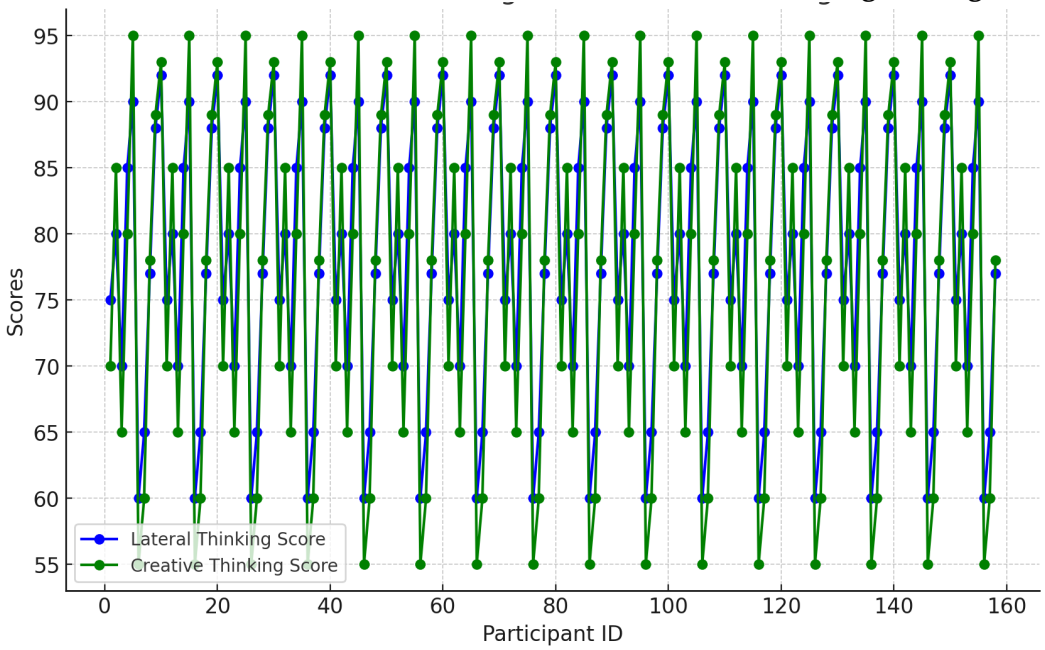

Figure 6. Trend in Score Differences Between Lateral and Creative Thinking scores

The image illustrates the trend of *Lateral Thinking* and *Creative Thinking* scores for each participant based on their ID. The horizontal axis represents participant IDs, while the vertical axis displays scores ranging from 55 to 95 for both categories. The blue line represents the *Lateral Thinking Score*, and the green line represents the *Creative Thinking Score*.

Overall, it is evident that *Creative Thinking* scores tend to be higher than *Lateral Thinking* scores for most participants. The green line, representing creativity, frequently appears above the blue line, indicating that participants generally perform better in creative thinking. However, there are some participants for whom the scores are more balanced or where *Lateral Thinking* scores are actually higher. This visualization highlights that while there is notable variation among participants, a general trend suggests that creativity tends to exceed lateral thinking ability.

The results of this study reveal a significant positive correlation between lateral thinking ability and creative thinking among students. This finding aligns with previous research, such as that of De Bono (1977) and studies by Abbood (2023) and Aydemir (2021), which emphasize the importance of lateral thinking in fostering creativity and innovation. The study indicates that the higher a person's lateral thinking ability, the higher their creative thinking ability. This is supported by linear regression analysis, where lateral thinking scores emerged as a strong predictor of students' creative thinking ability. This trend is further confirmed by data visualizations showing that students with higher lateral thinking scores tend to exhibit greater creativity, especially in the areas of fluency and originality.

Although a positive correlation was found, the residual analysis suggests that some variation remains unexplained by the linear regression model. This indicates that other factors may influence differences in students' creativity, such as learning environment, personal motivation, or social support, as also identified by the Theory of Planned Behavior (Ajzen, 1991) and studies by Mustofa & Hidayah (2020) and Shi et al. (2020) in the context of creativity and entrepreneurship.

Additionally, another key finding reveals that creativity tends to be more varied among students with higher lateral thinking abilities, consistent with Kim (2011) research that highlights the importance of diverse approaches in nurturing creativity. The box plot diagrams also demonstrate that students with higher lateral thinking scores exhibit greater variability in creative thinking, reinforcing the assumption that lateral thinking facilitates the emergence of more diverse and original ideas.

Overall, this study provides valuable insights into how lateral and creative thinking skills interact. It supports the existing literature which emphasizes that these skills are not only individually important but also mutually reinforcing. This research can serve as a foundation for developing more effective learning strategies aimed at simultaneously enhancing both skills particularly within the 21st-century educational landscape, which increasingly demands innovative solutions and creative ideas.

CONCLUSION

This study demonstrates a significant relationship between lateral thinking ability and creative thinking ability among students, with lateral thinking emerging as a strong predictor of creativity. Students with higher lateral thinking skills tend to exhibit greater creativity, and the variability in creativity scores is also more pronounced among those with stronger lateral thinking abilities. Nevertheless, some variation in creativity scores is not fully explained by the linear regression model, suggesting the influence of additional factors such as motivation or environmental support. For future research, it is recommended to include other variables, such as emotional intelligence, and to incorporate qualitative approaches to enrich understanding of the thinking process. The use of nonlinear models and application in other learning contexts may also provide a more comprehensive view of the relationship between these two abilities.

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