Proceedings Series on Social Sciences & Humanities, Volume 25
Proceedings of International Conference on Social Science (ICONESS)
ISSN: 2808-103X

The Influence of Critical and Creative Thinking of Elementary School Students of Kuripan Kidul 03 on the Material of Energy Changes: Analysis of the Role of Gender and Age

Aprilia Ariestiani Wijayanti[1], Subuh Anggoro[2]
[1]SD Negeri 03 Kuripan Kidul, Kesugihan, Cilacap
[2]Universitas Muhammadiyah Purwokerto

ARTICLE INFO

Article history:

DOI:
10.30595/pssh.v25i.1691

Submited:
July 22, 2025

Accepted:
August 11, 2025

Published:
August 24, 2025

Keywords:

Critical Thinking; Creative Thinking; Age; Gender

ABSTRACT

This study investigates the relationship between critical thinking and creativity among elementary school students, considering the influence of age and gender. A quantitative correlational approach was employed, involving 167 students aged 9-13 years. Non-parametric statistical methods, including Spearman's correlation, Kruskal-Wallis H test, and Mann-Whitney U test, were used due to the non-normal distribution of the data. The results revealed a strong positive correlation between critical thinking and creativity ($\rho = 0.902$, $p = 0.023$). Creativity significantly differed by age ($H = 1.756$; $p = 0.041$), with the 9-10 year age group exhibiting the highest creativity scores. A significant gender difference was also found in creativity ($p = 0.029$), with males scoring higher on average. Conversely, females exhibited slightly higher critical thinking scores. The study concludes that critical thinking and creativity are closely related in elementary students, with age and gender playing a significant role. Educational interventions should aim to foster both skills, considering the decline in creativity with age and the observed gender differences.

Corresponding Author:
Aprilia Ariestiani Wijayanti
SD Negeri 03 Kuripan Kidul, Kesugihan, Cilacap
Email: aprilia.a.wijayanti@gmail.com

1. INTRODUCTION

The development of the current era is very rapid in all fields, including in the field of education. Schools as one of the educational institutions are expected to be able to develop skills that students must have. 4C skills are very much needed and known in the 21st century. These skills include creative thinking, critical thinking, communication and collaboration (Septicasari and Frasandy, 2018). Thinking skills that will then become a basic capital to improve other skills (Gloria, 2012). Critical thinking and creativity are very closely related. Both complement each other. Both are important skills needed in various aspects of life, namely education, work, and decision making.

Critical thinking can be developed when solving tasks or problems in a specific domain when students need to apply analytical, selective, evaluative, and rule-based skills. Creative thinking usually transcends a specific context or domain, being imaginative, generative, spontaneous, inventive, and non-evaluative. The complementary approach promotes the idea of teaching critical and creative thinking skills as interrelated cognitive abilities. For example, critical thinking plays an important role in the field of innovation, when individuals create new product ideas and establish appropriate strategies that are not only novel but also

valuable. Skills such as critical judgment, evaluating alternatives, selecting information, assessing reliability, etc. are certainly involved in the creative process (Ivanna Shubina, 2019).

However, it is impossible to separate critical thinking and creativity in reality. The relationship between critical and creative thinking in elementary school students is influenced by factors such as age and gender. Research shows that these elements can influence children's creativity and critical thinking skills, highlighting the importance of understanding these dynamics in educational settings. (Prof. Dra. Tatat Hartati, 2022). Critical thinking skills are important for students' cognitive development. Critical thinking skills can help students adapt to the rapid development of this era. With the many innovations and new information, students are required to have high critical thinking skills. Based on data from the Program for International Student Assessment (PISA) in 2012, Indonesia's literacy score was ranked 64th out of 65 countries with a score of 382.

PISA stated that students in Indonesia could only reach level 1 and level 2 of 6 levels of questions. So PISA concluded that students' thinking skills in Indonesia are very low. However, it shows that the results of the 2018 PISA study released by the OECD show that Indonesian students' reading ability achieved an average score of 371, with an average OECD score of 487. Then for the average mathematics score reached 379 with an average OECD score of 487. Furthermore, for science, the average score of Indonesian students reached 389 with an average OECD score of 489. (Aurelia, 2023). Various studies examining the description of the creative, critical, and innovative thinking skills of students in elementary schools show mixed results. One important factor that supports these thinking skills is the teacher's ability to provide stimulation to students.

For example, research conducted by Wijayanti and colleagues in 2015 showed that the creative thinking skills of elementary school students in Buleleng District were relatively low. The study also revealed that the critical thinking skills of students, especially in elementary schools, had not been optimally developed. This can be seen from the design, implementation, and assessment of learning that has not focused on developing students' critical thinking skills (Wijayanti et al., 2015). In addition, research by Azizah and team in 2018 and Mursidik and colleagues in 2014 also stated that the critical thinking skills of Indonesian students are still relatively low. This finding is reinforced by the results of research by the Center for Educational Assessment (2019) which showed that the ability of Indonesian students to work on questions that require reasoning and critical thinking is still very limited.(Prof. Dra. Tatat Hartati, 2022).

As children grow, their cognitive abilities develop, which influences their critical and creative thinking skills . Younger students may demonstrate more imaginative thinking, while older students often develop more structured critical thinking skills. The context in which children learn, including their age, can shape their engagement with creative tasks. Older students may benefit from more complex problem-solving scenarios that require critical analysis. Research suggests that boys and girls may approach problem solving and creative tasks differently. For example, boys may engage in more competitive scenarios, while girls may excel in collaborative environments, which impacts their critical and creative output.(Alifia Kurnia, 2021).

This study offers a new approach to understanding the relationship between critical thinking and creativity among elementary school students by considering demographic factors such as gender and age. This study aims to provide deeper insights into how these factors interact with each other and influence students' reasoning abilities, as well as provide practical recommendations for the development of more effective curricula and teaching methods. One of the factors that indirectly affects critical thinking skills is gender differences. In addition to physical differences, men and women also have differences in emotional and intellectual aspects. Amir MZ (2013) explains that gender differences cause physiological variations that impact psychological differences in the learning process.

Mahanal (2016) also states that gender affects critical thinking skills. In addition, research by Salahshoor and Rafiee (2016) shows differences in critical thinking skills between male and female students in the EFL context, although the differences are not statistically significant. Age also affects critical thinking skills. Research shows that as we age, critical thinking performance tends to decline. This may be related to cognitive changes that occur with age, although education remains an important factor in improving critical thinking skills in adulthood. From the author's perspective, critical thinking ability is an essential skill that must be developed early on.

Education should pay more attention to the development of this skill through teaching methods that encourage the analysis and evaluation of information. In addition, it is important to overcome gender and age stereotypes in education so that all students, regardless of gender and age, can develop their critical thinking potential to the fullest. In this way, we can create individuals who are able to face complex challenges in the future in a more effective and rational way.

2. RESEARCH METHODS

The type of research conducted is quantitative research with a correlational approach. This study aims to identify the relationship between the variables studied, namely critical thinking, creativity, gender, and age.

Data were collected through the distribution of questionnaires containing 10 questions on critical thinking skills analysis and 15 questions on creativity assessment. Participants in the study were elementary school students in a sub-district of Kesugihan.

Samples were taken randomly from several elementary schools to ensure representativeness. The number of samples can be determined based on statistical formulas for valid analysis, as many as 167 students. Respondents were both male and female and ranged in age from 9 to 13 years. Participants were selected from grades 4, 5, and 6 because students in higher grades can already understand the test instruments in the questionnaire. They can adjust to what they experience without the influence of others.

3. RESULTS AND DISCUSSIONS

Based on the results of the normality test, the Critical Thinking and Creative Thinking data are not normally distributed, as indicated by the significance value (Sig.) in the Kolmogorov-Smirnov and Shapiro-Wilk tests which are less than 0.05 for both variables, so further analysis uses non -parametric methods such as Spearman, Kruskal-Wallis, and Mann-Whitney. The Spearman correlation test shows a very strong and positive relationship between Critical Thinking and Creative Thinking with a coefficient of $\rho = 0.902$ and a p value = 0.023, which means that the relationship is statistically significant; the higher the critical thinking ability, the higher a person's creativity.

In addition, the Kruskal-Wallis test revealed a significant difference in creativity based on age ($H = 1.756$; $p = 0.041$), with the highest creativity score in the 9-10 age group (Mean Rank = 93.09), followed by 11-12 years (Mean Rank = 83.52), and the lowest at age 13 (Mean Rank = 47.00), indicating a tendency for creativity to decline with age, possibly influenced by cognitive, social, or academic pressure factors. Meanwhile, the Mann-Whitney test showed a significant difference between genders in creativity ($p = 0.029$), with males having a higher mean rank (Mean Rank = 84.04) than females (Mean Rank = 73.95), while in critical thinking skills, females had a slightly higher mean score (62.15) than males (60.15), with relatively similar score variations (standard deviation around 8-8.7).

The results of the study showed that the Critical Thinking and Creative Thinking data were not normally distributed , so further analysis used non-parametric methods such as Spearman, Kruskal-Wallis, and Mann-Whitney which were appropriate for the data. Spearman's correlation revealed a very strong and positive relationship between critical thinking skills and creativity ($\rho = 0.902$; $p = 0.023$), indicating that increasing critical thinking skills goes hand in hand with increasing creativity. In addition, there was a significant difference in the level of creativity based on age ($H = 1.756$; $p = 0.041$), where the 9-10 year old age group showed the highest creativity score, followed by the 11-12 year old age group, and a significant decrease at the age of 13 years, which is likely influenced by cognitive, social factors, and academic pressure.

Differences were also found based on gender, where boys had a slightly higher level of creativity significantly than girls ($p = 0.029$), but girls showed slightly higher critical thinking scores with relatively similar score variations in both genders. These findings indicate that despite differences based on age and gender, critical thinking skills and creativity are closely related and need to be developed simultaneously in educational contexts, with particular attention to the decline in creativity in pre-adolescents and the existing gender differences.

4. CONCLUSIONS

This study concludes that the critical thinking ability and creativity of elementary school students have a close and positive relationship, although influenced by age and gender factors. Creativity tends to decline with age, especially at age 13, while males show slightly higher levels of creativity than females. Conversely, females tend to have slightly better critical thinking abilities than males. Therefore, education needs to develop both aspects simultaneously, taking into account the characteristics of students' age and gender.

REFERENCES

Alifia Kurnia, SW (2021). Creative Thinking Ability Patterns Reviewed from the Gender of Middle School Students in Science Learning. *Risenology* .

Amir, Z. MZ. (2013). Gender Perspective in Mathematics Learning. Marwah: Journal of Women, Religion, and Gender12(1), 15—31. DOI: http://dx.doi.org/10.24014/marwah.v12i1.511

Aurelia, KR (2023). Critical Thinking Skills of Students in Indonesia: Low or High? *Bulletin of the Nusantara Scientific Psychology Consortium* .

Cahyono, B. (2017). Analysis of Critical Thinking Skills in Solving Problems Reviewed by Gender Differences. Aksioma.

Discipline. International Journal of Teaching and Learning in Higher Education, 17(2), 160—166. Retrieved from http://www.isetl.org/ijtlhe/pdf/IJTLHE55.pdf .

Ennis, R.H. (2011). The Nature of Critical Thinking: An Outline of Critical Thinking Disposition and Abilities. Last Revised. Professor Emeritus: University of Illinois. Duron, R., Limbach, B., & Waugh., W. (2006). Critical Thinking Framework for Any

Facione, P. A. (2011). Critical Thinking: What It Is and Why It Counts. Millbrae: Measured Reasons and The California Academic Press. Jack, G.U. (2013). *Concept Mapping and Guided Inquiry as Effective Techniques for Teaching Difficult Concepts in Chemistry: Effect on Students' Academic Achievement. Journal of Educational and Practice* , 4(5), 9—16. Retrieved from http://www.iiste.org/Journals/index.php/JEP/article/view/4782 .

Fisher, A. (2001). *Critical* thinking an introduction. Cambridge: press syndicate of the university Cambridge.

Gilang, P. Cognitive Development: Definition, Theory and Stages. Accessed April 19, 2025. https://www.gramedia.com/literasi/perkembangan-kognitif/

Gloria, R.Y. (2012). *Scientiae Educatia Journal Volume I Issue I* , 1-17.

Ivanna Shubina, AK (2019). Critical Thinking, Creativity and Gender Differences for Knowledge. *Literacy Information and Computer Education Journal (LICEJ)* .

Mahanal, S. , Kurniawati, Z.L., & Zubaidah, S. (2016). *Remap CS (Cooperative Script) Learning Model for Empowering Students' Critical Thinking Skills* . Proceeding Biology Education Conference, 13(1), 399—403.

Novianti, W. (December 2020). THE URGENCY OF CRITICAL THINKING IN ADOLESCENTS IN ERA 4.0. *Journal of Education and Counseling, Vol. 1, No. 1,* , pp. 38 – 52 .

Prof. Dra. Tatat Hartati, MP (2022). *CRITICAL AND CREATIVE THINKING OF ELEMENTARY SCHOOL STUDENTS.* Bandung: Indonesian Brilliant House Association (PRCI).

Reni Lestari1*, LJ (2024). ANALYSIS OF FACTORS INHIBITING CREATIVE THINKING IN STUDENTS IN SCIENCE LEARNING IN ELEMENTARY SCHOOLS. *ELSE (Elementary School Education Journal)* .

Salahsnoor, Rafiee , 2016 – Salahsnoor, N., Rafiee, M. (2016). The Relationship between Critical Thinking and Gender: A Case of Iranian EFL Learners. Journal of Applied Linguistics and Language Research, 3(2): 117-123.

Septikasari , R., & Frasandy , RN (2018). *21st Century 4C Skills in Elementary Education Learning . Journal Tabiyah AlAwlad* , 8(2), 112-122.