

## The Correlation between Critical and Creative Thinking Skills to Learning Outcomes in Cell and Tissue Materials

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**Abstract.** Optimizing student competence begins with empowering fundamental skills, namely critical and creative thinking skills. This study aims to investigate the correlation between critical thinking skills and creative thinking skills simultaneously on cognitive learning outcomes of 162 students in grades XI and XII who have learned cell and tissue material at the Movement School in Biringkanaya District, Makassar City in the even school year 2022/2023. Research data were collected using integrated essay questions as many as 10 items that were valid (4.73) and reliable (0.853). The data obtained from the research sample in the form of quantitative data will be analyzed with two kinds of analysis techniques, namely descriptive analysis and inferential analysis. The results of statistical inferential analysis showed a correlation between critical thinking skills, creative thinking skills, and cognitive learning outcomes of students in movement schools on cell and tissue material ( $r=0.730$ ,  $p<0.001$ ,  $N=162$ ). The correlation is positive with a regression equation  $\hat{Y}=7.796+0.322X_1+0.402X_2$  with an effective contribution of 53.26%. Therefore, learning needs to empower critical and creative thinking skills to support the optimization of students in facing the challenges of everyday life problem.

**Keywords:** Cell and Tissue Materials; Cognitive Learning Outcomes; Creative Thinking Skills; Critical Thinking Skills; Movement School

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## INTRODUCTION

Low student cognitive learning results are the result of inadequate support for high-level thinking competencies, particularly critical and creative thinking in Indonesian 21st-century education. Due to this issue, Indonesia's poor educational standards are affected (Kurniawati, 2022; Masbullah & Bahri, 2022), despite the fact that the 21st century demands highly skilled human resources, critical and creative thinking is one of the most important cognitive abilities since it can inspire people to constantly approach problems critically and come up with novel solutions, leading to the creation of something new which is better for him and advantageous to his life (Mursidah et al., 2019; Rashidov, 2020). Cognitive capacities are a sign of a successful increase in human resources within the education sector (Rini & Budijastuti, 2022; Utami et al., 2020). Movement School resulting in changes to raise the standard of education in Indonesia (Sakdiah et al., 2023; Satriawan et al., 2021). The level of education provided in schools must be balanced with good character and is not dependent on student intelligence or the IQ of the younger generation. Aspects of critical and creative reasoning are highlighted in the Pancasila student profile (Mariana, 2021). Previous research has discussed the thinking skill.

Previous research has discussed critical thinking skills and creative thinking skills, but there are still very limited studies that discuss the correlation between these two abilities and cognitive learning outcomes. Both skills are fundamental in facing the challenges of daily life problems, especially regarding living things consisting of trillions of cells (Kilag et al., 2023; Levin, 2021; Oktafiani et al., 2025). Cell and tissue material covers the basic concepts of how cells and tissues interact in organisms. Cells and tissues are basic material and have characteristics related to students' daily lives and are considered the right material to be implemented to stimulate critical thinking skills, so that they are able to understand and develop more complex concepts (Hikmawati & Ningsih, 2020; Ng et al., 2022). The need for understanding basic concepts is because in learning,

each concept is related to other concepts (Adhani & Rupa, 2020; Puspitasari et al., 2019; Supena et al., 2021). A thorough understanding of concepts can realize meaningful learning.

Meaningful learning can improve student learning achievement, especially thinking skills. Critical and creative thinking skills invite students to play an active and effective role in solving the problems faced (Maulina et al., 2022; Prihatin et al., 2022). In addition, the transferable skills that students acquire during the learning process can be used in the real world, providing them with the ability to address challenging environmental and social issues (Bahri et al., 2021; Mahanal et al., 2019; Pilu et al., 2025). Learning expects students to participate more actively so as to improve their ability to think critically and creatively. High-level thinking skills are part of the Higher Order Thinking Skills (HOTS) which are certainly needed by students to face the next era of education (Ramadhana et al., 2022). Students' creative thinking skills cannot be obtained instantly but require a process and need to be trained or optimally empowered (Listiana & Bahri, 2019; Siburian et al., 2019).

Based on this rationality, it is very necessary to conduct research that examines thinking skills, especially critical and creative thinking skills. The purpose of this study is to investigate the correlation between critical thinking skills and creative thinking skills simultaneously on cognitive learning outcomes in cell and tissue material at the Movement School in Biringkanaya District, Makassar. So that it is expected to optimize students' critical and creative thinking skills effectively.

## MATERIALS AND METHODS

The type of research that will be used in this study is research ex post facto which is correlational in nature. This means that this study only examines an event without any prior treatment of the object to be studied (Alhassan et al., 2021; Kusuma et al., 2021; Nomleni, 2023) to investigate the correlation between critical thinking skills and creative thinking skills (independent variable) with biological cognitive learning outcomes (variable dependent). The participants in this study were 162 students in grades XI and XII who have learned cell and tissue material at the Movement School in Biringkanaya District, Makassar City in the even school year 2022/2023. The sampling technique is using purposive random sampling, with representation of each high school based on the category of Movement School (applying a prototype of the new paradigm curriculum).

The instruments used in this study were 10 items of integrated essay test questions, critical thinking skills, creative thinking skills, and learning outcomes of the cell and tissue subject matter. The instruments that have been validated and rated for their validity and reliability. There are two types of validity tests, namely the expert validity test assessed by two expert lecturers on material and instruments with a value of 4.73 and empirical validity test with a value of 0.328-0.743, besides the coach reliability value of 0.853 (high).

Critical thinking skills indicators suggested by Ennis, (1993) namely providing elementary clarification, basic support, interference, advanced clarification, and managing strategies and tactics. While creative thinking skills suggest by Munandar, (2016) which includes fluency, flexibility, originality, and elaboration. Additionally, operational verbs of cognitive learning outcomes based on revised bloom's taxonomy (Anderson & Krathwohl, 2017) in the C4-C6 domain.

The rubric rates critical thinking skill adapted from Zubaidah et al., (2020) on a scale 0-5 while creative thinking skill scoring rubric employed a 0-4 point scale, which is modified from. To assess cognitive learning outcomes in cell and tissue material using score by a rubric that refers to Hart (1994) on a scale of 0-4.

Data analysis was carried out with two kinds of analysis techniques, namely descriptive analysis and inferential analysis. Analyzed descriptively using Microsoft Excel 2019. Before conducting inferential statistical tests, prerequisite analysis tests were first carried out which consisted of 4 tests, namely normality, linearity, heteroscedasticity, and multicollinearity tests. Hypothesis testing includes simple and multiple linear regression tests to find the magnitude of the correlation and contribution of two independent variables to the dependent variable using SPSS 25 for windows software. All results of inferential statistical analysis have a standard significance value (sig.) > 0.05.

## RESULTS AND DISCUSSION

The descriptive analysis result of critical thinking skills are presented in Tabel 1. Data on critical thinking skills is in the medium category with a percentage of 67.90% with frequency 110 students, while a lowest category is very low was 3.09% with frequency 5 students.

**Table 1.** Category, Frequency, and Percentage of Critical Thinking Skills of School Students Mobilizing on Cell and Tissue Material in Biringkanaya District, Makassar City

| Percentage Score Interval | Category  | Frequency | Percentage (%) |
|---------------------------|-----------|-----------|----------------|
| $81.25 < X \leq 100$      | Very High | 16        | 9,88           |
| $71.50 < X \leq 81.25$    | Tall      | 22        | 13,58          |
| $62.50 < X \leq 71.50$    | Keep      | 110       | 67,90          |
| $43.75 < X \leq 62.50$    | Low       | 9         | 5,56           |
| $0 < X \leq 43.75$        | Very Low  | 5         | 3,09           |

The average percentage of critical thinking skills indicators is 67.31% in [Tabel 2](#). The highest percentage of student answers was the indicator of managing strategies and tactics which was 71.91%, while the lowest analysis result was the aspect interference which was 63.21%.

**Table 2.** Percentage of Achievement of Critical Thinking Skills Indicators of Movement School Students on Cell and Tissue Material in Biringkanaya District, Makassar City

| Critical Thinking Skills Indicators | Percentage (%) |
|-------------------------------------|----------------|
| Elementary clarification            | 68,21          |
| Build basic support skills          | 65,74          |
| Interference                        | 63,21          |
| Provide advanced clarification      | 67,47          |
| Strategies & tactics                | 71,91          |
| <b>Average</b>                      | <b>67,31</b>   |

The indicator of organizing strategies and tactics is in 2 items, namely in number 4 and 9. Item 4 with the editorial question about nerve cells, this question directs students to provide answers about how to maintain nerve cells in everyday life. Meanwhile, item 9 is about how to increase the mass of hand muscle tissue. This is in accordance with the results of research conducted ([Hidayati & Indriana, 2022](#); [Pertiwi et al., 2021](#)), that the high indicator of organizing strategies and tactics is because students already know a lot about how to maintain healthy nerve cells and how to form strong skeletal muscle tissue through various sources such as the internet, textbooks, and their own experiences. While creative thinking skills are in the medium category with a percentage of 50.62% with a frequency of 82 students in [Table 3](#), then the lowest creative thinking skills data is in the very low category with a percentage of 0%.

**Table 3.** Category, Frequency, and Percentage of Creative Thinking Skills of Mobilizing School Students in Biringkanaya District, Makassar City

| Percentage Score Interval | Category  | Frequency | Percentage (%) |
|---------------------------|-----------|-----------|----------------|
| $80 < X \leq 100$         | Very High | 37        | 22,84          |
| $60 < X \leq 80$          | Tall      | 40        | 24,69          |
| $40 < X \leq 60$          | Keep      | 82        | 50,62          |
| $20 < X \leq 40$          | Low       | 3         | 1,85           |
| $0 < X \leq 20$           | Very Low  | 0         | 0              |

The average percentage indicator of creative thinking skills is 65.12% in [Table 4](#). The highest percentage of student answers is found in the first indicator, namely the fluency indicator with a value of 67.28%, while the lowest analysis results are found in the fourth indicator, namely the Elaboration indicator with a value of 62.73%.

**Table 4.** Percentage of Achievement of Creative Thinking Skills Indicators of School Students Mobilizing Cell and Tissue Materials in Biringkanaya District, Makassar City

| Creative Thinking Skills Indicators | Percentage (%) |
|-------------------------------------|----------------|
| Fluency                             | 67,28          |
| Flexibility                         | 65,17          |
| Originality                         | 65,28          |
| Elaboration                         | 62,73          |
| <b>Average</b>                      | <b>65,12</b>   |

Based on the analysis of aspects of indicators of students' creative thinking skills, it is known from 4 aspects of creative thinking skills that the aspect that has the highest percentage is the fluency aspect, which is 67.28%. This is according to the results of research that has been conducted ([Agustiana et al., 2020](#); [Yolanda, Mahardika,](#)

& Wicaksono, 2021; Cahyani, Martini, & Purnomo, 2022) which states that the fluency aspect shows the highest percentage of scores, this is because the learning process is fun and varied.

An example of the question used to measure the participants critical thinking skills on item 1 regarding the differences between animal cells and plant cells by presenting a discourse on the causes of differences in the structure of plant stems and ear leaves. The indicators that are expected to be achieved by students are to come up with many ideas, many answers, many problem solutions, many questions fluently (Aisyah et al., 2023; Handayani et al., 2021).

One of the principles in the Movement School is differentiated problem-based learning. So, students are given challenges or problems that they have to solve. This activity leads students to think critically and creatively to find effective solutions (Kardoyo et al., 2020; Mulyani et al., 2023). In addition, at the Movement School, there is always room for students to explore and express their ideas especially through projects at the end of the semester. This is important to support the development of students' critical and creative thinking. So that they have the freedom to try new things and dare to express their ideas, their thinking skills will definitely be more developed and honed (Azis & Mu'nisa, 2021; Setyani et al., 2023).

The normality test is a data test that aims to find out whether the residual value is normally distributed or not. Data normality testing of critical thinking skills variables ( $X_1$ ) and creative thinking skills ( $X_2$ ), and cognitive learning outcomes variables ( $Y$ ) were conducted using the Kolmogorov-smirnov test with the SPSS 25 for windows program. The results of the data normality test are described in Table 5.

**Table 5.** Normality Test Results with Kolmogrov-Smirnov

|                                  |                | Unstandardized Residual |
|----------------------------------|----------------|-------------------------|
| N                                |                | 162                     |
| Normal Parameters <sup>a,b</sup> | Mean           | .0000000                |
|                                  | Std. Deviation | 7.55469896              |
| Test Statistic                   |                | .079                    |
| Exact Sig. (2-tailed)            |                | .248                    |

The SPSS output results are known that the research data has a probability value of Sig. which is greater than the probability of 0.05 or (Sig = 0.05) which is 0.248  $0.05 \alpha \Rightarrow \alpha > .$  So it can be concluded that the research data comes from normally distributed data. The linearity test aims to determine whether two variables have a linear correlation or not significantly. The results of the linearity test with the help of the SPSS program version 25.0 for windows can be seen in Table 6.

**Table 6.** Linearity Test Results

| Model Korelasi | N   | Alpha ( $\alpha$ ) | Sig.(2-tailed) |
|----------------|-----|--------------------|----------------|
| $X_1$ with Y   | 162 | 0,05               | 0,415          |
| $X_2$ with Y   | 162 | 0,05               | 0,786          |

That the results of the linearity test through the SPSS program version 25.0 for windows obtained the value of Sig. between variables  $X_1$  and Y which is 0.415, for the correlation between variables  $X_2$  and Y which is 0.786. The correlation model of the two independent variables ( $X_1$  &  $X_2$ ) is greater than the probability level  $\alpha = 0.05$  or (Sig.  $> \alpha = 0.05$ ), so it can be concluded that critical thinking skills and creative thinking skills with learning outcomes are linear.

The heteroscedasticity test is used to determine the presence or absence of classical asumsi abnormalities, heteroscedasticity, namely the presence of variance inequality from residuals for all observations in the correlation model. To prove this can be done with the Glejser test. The glacier test values can be seen in Table 7.

**Table 7.** Heteroskedasticity Test Results

| Variable                 | Say.  | Information                  |
|--------------------------|-------|------------------------------|
| Critical Thinking Skills | 0,688 | No heteroscedasticity occurs |
| Creative Thinking Skills | 0,247 | No heteroscedasticity occurs |

That the significance value (Sig.) for the critical thinking skill variable ( $X_1$ ) is 0.688. Meanwhile, the significance value (Sig.) for the creative thinking skill variable ( $X_2$ ) is 0.247. Because the significance value of the two independent variables is greater than 0.05, it corresponds to the basis of decision making in the glejser heteroscedasticity test. So it can be concluded that the data do not occur symptoms of heteroscedasticity.

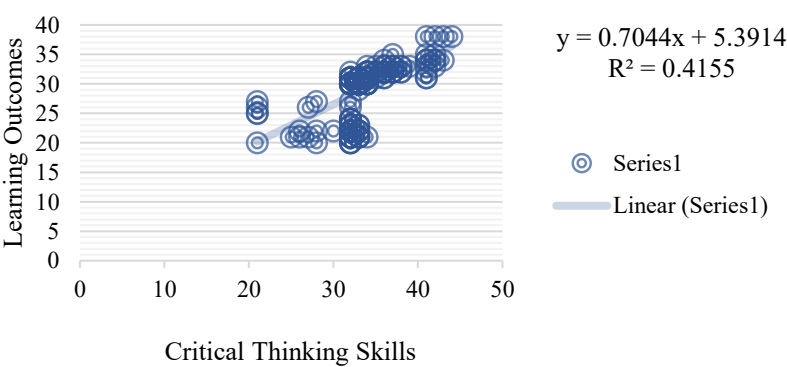
The multicollinearity test is used to determine whether or not there is a strong correlation between independent variables and correlation. The basis for decision making if there are no symptoms of multicollinearity, if the tolerance value > 0.100 and the VIF value < 10.00. The results of the multicollinaras test can be seen in [Table 8](#).

| Table 8. Test Results of Multicollinearity |                         |        |                             |
|--|-------------------------|--------|-----------------------------|
| Variable                                   | Collinearity Statistics |        | Information                 |
|  | Tolerance               | BRIGHT |                             |
| Critical Thinking Skills                   | 0,488                   | 2,049  | No multicollinearity occurs |
| Creative Thinking Skills                   | 0,488                   | 2,049  | No multicollinearity occurs |

That the Tolerance value> 0.100 and the VIF value < 10.00 for all variables. So it can be concluded that there is no storage of the correlation between the independent variable and the correlation model or there is no symptom of rhythmiculceration. Because the data has met the requirements, simple and multiple regression tests can be carried out.

| Table 9. Regression of the Correlation between Critical Thinking Skills and Cognitive Learning Outcomes of School Students Mobilizing Cell and Tissue Material in Biringkanaya District, Makassar City |                   |          |
|--|-------------------|----------|
| Model  | R                 | R Square |
| 1  | .645 <sup>a</sup> | .415     |

Based on [Table 9](#) above, it is known that critical thinking skills contribute 41.5% in explaining the achievement of student learning outcomes. Another meaning of the results of this analysis is that 58.5% is explained by other r-factos besides critical thinking skills. Based on the value of the correlation coefficient (R), also know the correlation between critical thinking skills and learning outcomes is in the medium category. The regression coefficient value b = 0.704 and the constant value a = 5.391. Thus the regression equation is obtained which is  $\hat{Y} = 5.391 + 0.704X_1$ . Therefore, the regression equation can explain and draw further conclusions about the correlation between critical thinking skills and cognitive learning outcomes of Movement School Students on Cell and Tissue Material in Biringkanaya District, Makassar City which is depicted with a simple linear regression line in [Figure 1](#).



**Figure 1.** Graph of the Correlation between Critical Thinking Skills and Cognitive Learning Outcomes of School Students Mobilizing Cell and Tissue Material in Biringkanaya District, Makassar City

Cell material, plant tissue structure and function, and animal tissue structure and function are able to stimulate critical thinking skills ([Fitroh et al., 2022](#); [Ng et al., 2020](#)). This is despite the fact that learning biology materials such as cells and evolution contain complex and abstract content ([Fajariningtyas & Hidayat, 2023](#); [Sari et al., 2023](#); [Sitohang et al., 2025](#)). This is relevant to some of the research results reported ([Annisa et al., 2020](#); [Cahyono & Dwikoranto, 2021](#); [Megati et al., 2021](#); [Nurhasnawati et al., 2023](#); [Supena et al., 2021](#); [Tuaputty et al., 2021](#)), which states that there is a positive correlation between critical thinking skills and student learning outcomes, which means that the higher the level of critical thinking skills of students, the greater the significant functional correlation to cognitive learning outcomes, and also the greater the contribution or contribution of critical thinking skills to the cognitive learning outcomes obtained by students. The results of the regression analysis were conducted to explain the correlation between creative thinking skills and cognitive learning outcomes of students at the Movement School of Biringkanaya District, Makassar City. The results of the regression analysis are described in [Table 10](#).



**Table 10.** Regression of the Correlation between Creative Thinking Skills and Cognitive Learning Outcomes of School Students Mobilizing Cell and Tissue Material in Biringkanaya District, Makassar City

| Model | R                 | R Square |
|-------|-------------------|----------|
| 1     | .700 <sup>a</sup> | .490     |

The results of data analysis with variance analysis tests are aimed at finding out whether predictors can predict criterium significantly. A summary of the results of the variance analysis test is shown in Table 11.

**Table 11.** Analysis of Variance in the Correlation between Creative Thinking Skills and Cognitive Learning Outcomes of School Students Mobilizing Cell and Tissue Material in Biringkanaya District, Makassar City

| Model     | Free degree | Average Sum of Squares | Sig.              |
|-----------|-------------|------------------------|-------------------|
| 1 Regresi | 1           | 1541.250               | .000 <sup>b</sup> |
| Remainder | 160         | 10.020                 |                   |
| Total     | 161         |                        |                   |

From Table 11 it is known that the probability value of  $\alpha = 0.05$  is greater than the probability value of Sig. which is 0.000, thus it can be concluded that creative thinking skills are able to predict the achievement of student learning outcomes. This means that creative thinking skills have a significant correlation with the achievement of student learning outcomes. The results of the analysis of the regression equation coefficient between creative thinking skills ( $X_2$ ) and cognitive learning outcomes ( $Y$ ) are shown.

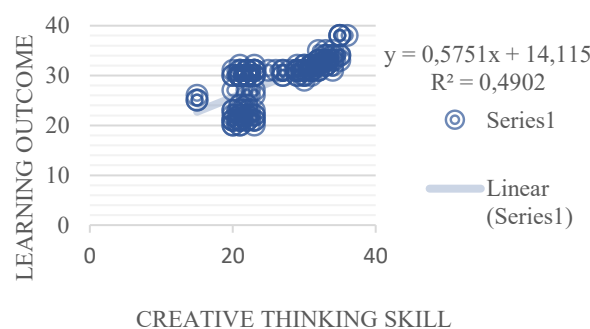
**Figure 2.** Graph of the Correlation between Creative Thinking and Cognitive Learning Outcomes of School Students Mobilizing Cell and Tissue Material in Biringkanaya District, Makassar City

Figure 2 shows that the graph of a simple linear regression equation is  $\hat{Y} = 14.115 + 0.575X_2$  which means: (1) if the thinking skills creative ( $X_2$ ) = 0 then the cognitive learning outcomes of students ( $Y$ ) can be estimated at 14.115 and (2) if there is a change in thinking skills creative ( $X_2$ ) by one unit, the learning outcome can be estimated at 0.575 at the constant unit 14.115. The results of a simple regression analysis are known that it shows that the higher the level of creative thinking skills of students, the higher the learning outcomes. The findings in this study also reject  $H_0$  and accept  $H_1$  which states "there is a correlation between thinking skills and cognitive learning outcomes of Movement School students on cell and tissue material in Biringkanaya District, Makassar City".

Cell and tissue material is challenging for students to optimize creative thinking. One example of a problem that measure students' creative thinking skills in the originality indicator found in item number 8 which directs students to associate the phenomenon of skin cancer with the structure of epithelial tissue. It is expected that students can provide their arguments based on assumptions and knowledge gained while studying cells and tissues. This is relevant to some of the research results reported (Rauf, Halim & Mahmud, 2020); (Samudera, 2020); (Febriyanti & Wulandari, 2021) Balance the thinking structure participants learn as meaningful learning outcomes obtained through cognitive processes (Haris, 2022).

**Table 12.** Regression of the Correlation between Creative Thinking Skills and Cognitive Learning Outcomes of School Students Mobilizing Cell and Tissue Material in Biringkanaya District, Makassar City

| Model | R                 | R Square |
|-------|-------------------|----------|
| 1     | .730 <sup>a</sup> | .532     |

Based on Table 12 above, it is explains that critical thinking skills and creative thinking skills contribute 53.20% in explaining the achievement of student learning outcomes. Another meaning of the results of this

analysis is that 46.80% is explained by other factors in addition to critical thinking skills and creative thinking skills. Based on the value of the correlation coefficient (R), also know the correlation between critical thinking skills and creative thinking skills with learning outcomes being in the medium category. The results of data analysis with variance analysis tests are aimed at finding out whether predictors can predict criterion significantly. A summary of the results of the variance analysis test is shown in Table 13.

**Table 13.** Analysis of Variance in the Correlation between Critical Thinking Skills and Creative Thinking Skills with Cognitive Learning Outcomes of School Students Mobilizing Cell and Tissue Material in Biringkanaya District, Makassar City

|   | Model     | Free Degrees | Average Sum of Squares | Sig.              |
|---|-----------|--------------|------------------------|-------------------|
| 1 | Regresi   | 2            | 837.104                | .000 <sup>b</sup> |
|   | Remainder | 159          | 9.247                  |                   |
|   | Total     | 161          |                        |                   |

From Table 13 it is known that the probability value of  $\alpha = 0.05$  is greater than the probability value of Sig. which is 0.000, thus it can be concluded that critical thinking skills and creative thinking skills are able to predict the achievement of student learning outcomes. This means that critical thinking skills and creative thinking skills have a significant correlation with the achievement of student learning outcomes. The results of the analysis of the coefficient of regression equation between critical thinking skills ( $X_1$ ) and creative thinking skills ( $X_2$ ) with cognitive learning outcomes (Y) are shown in Table 14.

**Table 14.** Coefficient of Regression Equation the Correlation between Critical Thinking Skills and Critical Thinking Skills with Cognitive Learning Outcomes of School Students Drive on Cell and Tissue Material in Biringkanaya District, Makassar City

| Model |                          | Unstandardized Coefficients |            | Standardized Coefficients | T     | Sig. |
|-------|--------------------------|-----------------------------|------------|---------------------------|-------|------|
|       |                          | B                           | Std. Error | Beta                      |       |      |
| 1     | (Konstanta)              | 7.796                       | 2.045      |                           | 3.813 | .000 |
|       | Critical Thinking Skills | .322                        | .085       | .294                      | 3.792 | .000 |
|       | Creative Thinking Skills | .402                        | .064       | .490                      | 6.307 | .000 |

Based on Table 14 above, the regression coefficient  $b_1 = 0.322$ ,  $b_2 = 0.402$  and the constant  $a = 7.796$ . Thus, the regression equation is  $\hat{Y} = 7.796 + 0.322X_1 + 0.402X_2$ . The results of a simple regression analysis are known that it shows that the higher the level of critical thinking skills and creative thinking skills of students, the higher the learning outcomes. The findings in this study also reject  $H_0$  and accept  $H_1$  which states "there is a correlation between critical thinking skills and creative thinking skills together with the cognitive learning outcomes of Movement School students on cell and tissue material in Biringkanaya District, Makassar City".

**Table 15.** Effective Contribution between Critical Thinking Skills and Critical Thinking Skills with Cognitive Learning Outcomes of Movement School Students on Cell and Tissue Material in Biringkanaya District Makassar City

| Variable                 | Regression Coefficient (Beta) | Correlation Coefficient (r) | Effective Contribution |
|--------------------------|-------------------------------|-----------------------------|------------------------|
| Critical Thinking Skills | 0,294                         | 0,645                       | 18,96                  |
| Creative Thinking Skills | 0,490                         | 0,700                       | 34,30                  |
| Sum                      |                               |                             | 53,26                  |

From Table 15. it is known that the largest effective contribution to the dependent variable (learning outcomes) is given by creative thinking skills, which is 34.30%, and critical thinking skills are 18.96%. The total effective contribution of the two independent variables amounted to 53.26%, which means critical thinking skills and creative thinking skills, together made an effective contribution of 53.26% to the Cognitive Learning Outcomes of Movement School Students on Cell and Tissue Material in Biringkanaya District, Makassar City, while 46.74% was influenced by factors that were not studied.

This positive correlation can be interpreted that the higher the critical thinking skills of students, the higher the creative thinking skills of students and will affect the improvement of cognitive learning outcomes of students. This is in line with the results of research that has been found by (Fatmawati et al., 2019; Siburian, Corebima, Ibrohim, et al., 2019) which states that there is a significant positive correlation between critical thinking skills, creative thinking skills that contribute greatly to improving students' cognitive learning outcomes. Thus, it is necessary to empower thinking skills in learning to further improve critical and creative

thinking skills, as well as learning outcomes by using innovative learning so as to improve the quality of learning for the better.

## CONCLUSION

Critical thinking skills and creative thinking skills of Movement School students on cell and tissue material in Biringkanaya District, Makassar City are in the medium category. The cognitive learning outcomes of Movement School students on cell and tissue material in Biringkanaya District, Makassar City are in the sufficient category. There is positive and significant correlation between critical thinking skills and the cognitive learning outcomes of students who are at the level of median correlation with a sig. value 0,000 less than  $\alpha = 0,05$ . There is positive and significant correlation between creative thinking skills and the cognitive learning outcomes of students who are at an average level of correlation with a sig. value 0,000 less than  $\alpha = 0,05$ . There are positive and meaningful correlation between critical thinking skills and creative thinking skills in conjunction with the cognitional learning outcomes of the learners who are on a medium level of relation with an sig. rating 0,000 less than  $\alpha = 0,05$ .

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