# The Relationship of Critical Thinking and Creativity of Early Childhood Education Students In Case Method-Based and Team Based Projects Courses

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**Abstract.** Critical thinking skills and creativity are part of the 21st century skills that students need to have in order to be successful and be able to answer the challenges of the 21st century. The general objective of this study is to analyze the relationship between critical thinking skills and creativity of early childhood education (ECE) students in case method-based courses and team-based projects. This research is a correlational quantitative research to measure the relationship between two variables, namely students' critical thinking skills and creativity. The population for this study were all ECE students of the UNIMED Faculty of Education, while the samples in this study were students in semester 2, 4, and 6, totaling 450 students. The data collection technique is through filling out 21st century skills questionnaires which are carried out by self-assessment and online peer assessment by students. The 21st Century Skills dimensions and indicators used in this research tool were developed under the Partnership for 21st Century Skills (P21). The results show that students' critical thinking skills are in the good category with an average percentage of 83.5%, and student creativity is included in the very good category with an average percentage of 86%. There is a significant relationship ( value (0.00) < sig (0.05) ) in the very strong category between critical thinking skills and creativity of PG PAUD FIP UNIMED students in case method-based courses and team-based projects with a value of $r_{xy}$= 0.914, so that the value of the contribution of critical thinking skills to student creativity is 83.54%.

**Keywords:** critical thinking, creativity, early childhood education.

## 1 Introduction

In today's 21st century, one of the most important criteria for success in life is problem solving ability which includes critical thinking and creativity skills. Knowledge of critical thinking skills enables students to not only describe their problems thoroughly and logically, but also helps them to reason and present their thoughts in an organized and persuasive manner. Critical thinking skills not only help a person solve problems, but also help him in making the right decisions [1,3].

Critical thinking means being skilled and able to overcome the problems it faces in the process of learning activities as a vehicle to practice dealing with more real problems in life, while creativity is a skill in finding, expressing new ideas in different or new ways [4]. Having creativity allows a person to be a quality individual in his life. Creativity is able to make a person see the problem from various points of view. In addition, with creativity, a person is

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also able to produce works that are different from those that have existed before. Creativity is a need in the present and in the future [5].

In today's rapidly changing world, students must be provided with education to think critically and creatively as these are important and essential skills that students need today for the future [3]. The 21st century which is marked by various changes in economic, transportation, technology, communication and information aspects as a result of globalization requires people who think critically, creatively, communicatively and collaboratively [6]. In the Law on the National Education System Number 20 of 2003 it is stated that in the learning process students are conditioned to actively develop their potential including critical thinking skills and creativity that are beneficial for themselves, society, nation and state.

Critical thinking skills and creativity are higher-order thinking skills that can be developed in learning with various methods, approaches, and strategies [7]–[9]. Both of these things can be trained starting from early childhood education to college. The use of appropriate models, methods, approaches, or strategies is important for developing students' critical thinking skills and creativity. Case methods and team-based projects that are student-centred and challenge students to find real problems that are close to students' lives so that they can find solutions with teamwork can encourage and help students develop their critical thinking skills and creativity [10,11].

## 2 Research Method

This research is a correlational quantitative study to measure the relationship between two variables, namely the ability to think critically and students' creativity in the case method and team based Early Childhood Education (ECE) Teacher Education Study Program courses. This research was carried out in the Early Childhood Education (ECE) Teacher Education Study Program with data collection carried out on several case method-based courses in semesters 2, 4, and 6.

The population in this study were all students of the Early Childhood Education Teacher Education Study Program. The samples in this study were 2nd, 4th, and 6th semester students who contracted case-method-based study programs and team-based projects totaling 450 students.

Data collection techniques in this study using literature study techniques, filling out questionnaires, and observation. Document study techniques will be used to analyze and identify critical thinking skills and creativity as part of 21st century skills in the case method-based learning process and team-based projects carried out at the Early Childhood Education (ECE) Teacher Education Study Program, Faculty of Education, Medan State University to be later developed into a self-assessment instrument and peer assessment in the learning process. The questionnaire for students' critical thinking skills and creativity was filled out with self-assessment and peer assessment to identify students' critical thinking and creativity skills. Observation techniques will be used by lecturers to observe critical thinking skills and creativity that appears in students during the learning process in case method-based courses and team-based projects.

The instrument for critical thinking and creativity in this study was developed based on aspects of 21st century skills based on The Partnership for 21st Century Skills (P21) (Partnership for 21st Century learning, 2015) and adapted to the steps in case-based and team-

based learning. projects. The grading scale used to measure both the Early Childhood Education (ECE) Teacher Education Study Program students uses a Likert scale.

After descriptive data is obtained to see whether each variable has a relationship and influence, an inferential test is carried out using Product Moment correlation and linear regression test. To perform the correlation test, the researchers used SPSS 22 for Windows. The first step is to calculate the correlation of two variables. To find out whether there is a relationship between the two variables (X and Y) and how closely the relationship is between the two variables can be known by calculating the correlation coefficient of the two variables.The correlation coefficient values are interpreted according to the following table:

**Table 1**. Categorization of Correlation Coefficient

| Value of r | Category |
|---|---|
| 0,0 – 0,29 | very weak |
| 0,30-0.49 | weak |
| 0,50-0,69 | adequate |
| 0,70-0.79 | strong |
| 0,80-1.00 | very strong |

Furthermore, to see the significance of the relationship between the two variables being tested, the T-test was carried out:

$$T_{test} = \frac{r\sqrt{n-2}}{\sqrt{1-r2}}$$

The determination test is used to see how much the contribution of variable X to variable Y, with the formula

$$CD = r^2 \text{ X } 100\%$$

Description

CD = Coefficient of Determination

r = Correlation coefficient

## 3 Result and Discussion

Critical thinking measured in this study refers to critical thinking aspects and indicators developed by The Partnership for 21st Century Skills (P21), a national organization that develops a framework for 21st century skills. Students conduct self-assessment and they also assessed by their friends (peer assessment). The following are the results of self-assessment and peer assessment on critical thinking skills of the Early Childhood Education (ECE) Teacher Education Study Program, Faculty of Education, Medan State University (PG-PAUD FIP UNIMED) students.

**Table 2**. Recapitulation of Self Assessment and Peer Assessment on Critical Thinking Ability of PG PAUD FIP UNIMED Students

| No | Aspects of Critical Thinking Ability | Average Self-Assessment Score | Average Peer-Assessment Score | Average |
|---|---|---|---|---|
| 1 | Perform reasoning effectively | 84.6 | 82.8 | 83.7 |
| 2 | Making Judgments and Decisions | 84.4 | 83.6 | 84 |
| 3 | Solve the problem | 83.4 | 83.6 | 83.5 |
| Average Critical Thinking Ability of PG PAUD FIP UNIMED Students | | | | 83.7 |

The critical thinking ability of PG PAUD FIP UNIMED students shows an average score of 83.7 which belongs to the good category. Aspects of critical thinking skills assessed are (1) reasoning effectively, (2) making judgments and decisions, and (3) solving problems. Based on the results of self-assessment and peer assessment, the aspect of problem solving is the aspect of critical thinking ability that has the lowest average, while the aspect of making judgments and decisions is the aspect of critical thinking ability that has the highest average among the others. The following is a graph that shows the average value of aspects of critical thinking skills for PG PAUD FIP UNIMED students.

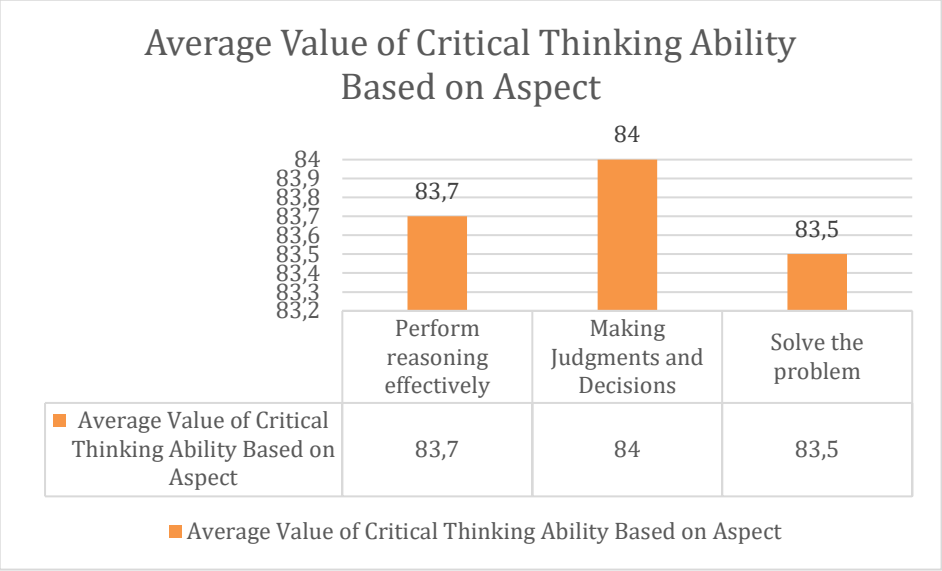


**Fig. 1**. Graph of the average value of critical thinking skills in each aspect

Creativity measured in this study refers to aspects and indicators of critical thinking developed by The Partnership for 21st Century Skills (P21). Students do a self-assessment (self-assessment) and they are also assessed by their friends (peer assessment). The following are the results of self-assessment and peer assessment on the creativity of the Early Childhood

Education (ECE) Teacher Education Study Program, Faculty of Education, Medan State University (PG PAUD FIP UNIMED) students.

**Tabel 3.** Recapitulation of Self Assessment and Peer Assessment on Student Creativity PG PAUD FIP UNIMED

| No | Aspect of Creativity | Average Self-Assessment Score | Average Peer-Assessment Score | Average |
|---|---|---|---|---|
| 1 | Creative Thinking | 84.5 | 83.9 | 84.2 |
| 2 | Work creatively with others | 88.3 | 84.8 | 86.6 |
| Average Student Creativity PG PAUD FIP UNIMED | | | | 85.4 |

The creativity of PG PAUD FIP UNIMED students shows an average score of 85.4 which belongs to the good category. Aspects of creative ability assessed based on The Partnership for 21st Century Skills (P21) are (1) creative thinking and (2) working creatively with others. Based on the results of the self-assessment and peer-assessment creativity assessment, the creative thinking aspect has the lowest average creativity aspect, while other aspects, namely working creatively with others, have the highest average creativity aspect. The following is a graph that shows the average value of the creativity aspect of PG PAUD FIP UNIMED students.

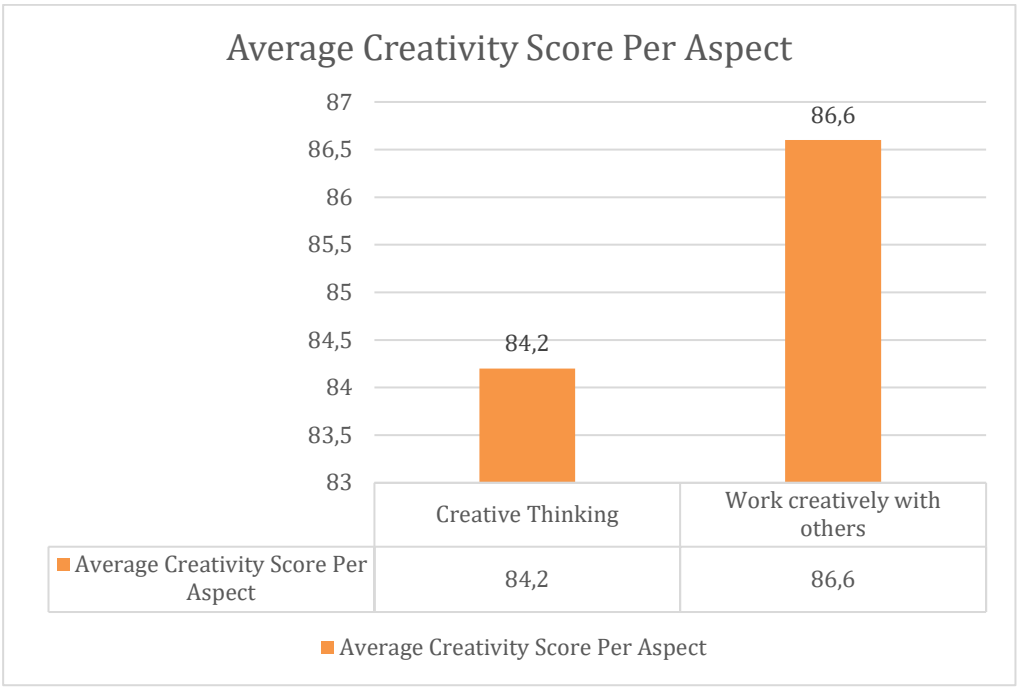


**Fig. 2**. Graph of the average value of student creativity in each aspect

Based on data analysis using SPSS 22 For Window in testing the relationship of each 21st century skill, data is obtained as shown in the following table:

**Table 4**. Recapitulation of Correlation Results of Critical Thinking Ability and Creativity of PG PAUD FIP UNIMED Students

| | | Creative |
|---|---|---|
| Critical_thinking_skill | Pearson Correlation | 0.914** |
| | Sig. (1-tailed) | 0.000 |
| | N | 450 |

**. Correlation is significant at the 0.01 level (1-tailed).

From the table above, it is known that there is a significant relationship ( value (0.05) < sig value (0.00) in a very strong category (rxy = 0.914) between critical thinking ability (x) and creative (y) with the contribution of the variable x to y by 83.54%.The students' critical thinking ability has a very strong relationship with students' creativity.

Lectures conducted at the Early Childhood Education (ECE) Teacher Education Study Program, Faculty of Education, Medan State University (PG PAUD FIP UNIMED) using case methods and team based projects help develop students' critical thinking skills and creativity. The case method is a discussion-based, participatory learning method for solving cases and problems. By applying this method, students can improve their critical thinking skills, communication skills, collaboration and creativity for problem solving. Team-based projects, on the other hand, are a method that builds on learning activities and project-based real-life tasks, providing students with real-world challenges to solve in groups. Learning with the case method helps students acquire meaningful knowledge and improve student learning outcomes [10].

To hone students' critical thinking skills and creativity, lecturers can carry out learning activities with the case method. There are two types of cases in this case method, namely Directed Case and Dilemma/Decision Case. In the directed case, the scenario presentation is followed by a discussion with directed/closed-ended questions that can be answered from the lecture material. In this process there is strengthening of understanding of concepts, principles and fundamental facts. Meanwhile, in Dilemma/Decision Case, it can bring individuals, institutions or communities who have cases to be resolved. Students can be shown the actual solution after working on the case. In this process there is a strengthening of skills. Learning strategies that can be done in the case method are (1) Debate/trial; two groups have different opinions, (2) Role play: play a specified role, (3) Jigsaw: teach case solutions to peers. Steps and procedures in learning based on the case method, namely: 1. Deepening the material/concept; 2. Presentation of the case; 3. Group formation (if needed); 4. Solving the case ((a) Search for data, information, theory, materials, tools, resources; (b) Submission of ideas; (c) Discussion and validation; (d) Formulation of solutions; (e) Writing results of work); 5. "Presentation" of work results (groups/individuals); 6. Class/group discussion; 7. Assessment and feedback

Lecturers can also do team based projects which are also called project based learning.

The principle is learning by doing. The project is the core "media" for CPL fulfillment. Student centered learning (SCL) approach with the application of constructivism learning theory and creative and innovative forms of learning. In the learning process students are facilitated (required) to work on real projects, carry out exploration, analysis, synthesis, assessment, investigation and collaboration, students produce real work (authentic and contextual), students work within a certain period of time (half - one semester). While the role of the lecturer is to help students understand concepts/theories, help students fulfill the competencies needed in working on projects, help students form teams/groups according to ability/competence. Steps and procedures in team-based project-based learning, namely: 1. Introduction to the material/concept; 2. Group formation; 3. Project assignment; 4. Project Implementation ((a) Project planning and time schedule; (b) Search for data, information, theory, materials, tools, resources; (c) Submission of concepts, designs, ideas, solutions; (d) Discussion and validation; (e) Formulation / writing of work results); 5. Reporting; 6. Presentation of results/products; 7. Assessment and feedback (Notes: Provide instructions/guidelines for project implementation).

The 21st century learning aims to train students' critical thinking through media, methods and student-centered learning strategies by conveying real cases from everyday life [7,12–14]. Learning activities with discussion and critical thinking will build students' creative activities, cooperation and collaboration [14]. Learning that provides a problem to solve will help develop students' critical and creative thinking skills because students are challenged to acquire knowledge and concepts related to these problems [9]. Providing real problems that occur in life or the surrounding environment can improve critical thinking skills and help students achieve life skills [15].

Basically every human being has the ability to think. Human nature in carrying out their daily activities certainly uses the mind. Thinking has levels ranging from the simple to the most complex. Critical thinking is a process that is carried out in a directed and clear and organized manner to carry out activities such as solving a problem, making decisions, analyzing, evaluating, and conducting research.

Critical thinking is very important for academic success, whether in college, life or work. Here are the key points where critical thinking is one of her goals in education. (1) Critical thinking can develop if the learning process often involves “learning to thinking” exercises (2) Thinking skills improve significantly in high school 3) Critical thinking is (4) Critical Thinking High thinking and one of the most important when making decisions [16].

Different from critical thinking, creative thinking is a mental activity undertaken to generate new ideas and understandings of problems. Creative thinking involves divergent stages in which different ideas are generated, and convergent stages involve synthesis and evaluation of ideas. In addition, creative thinking can be defined as a set of cognitive activities that humans employ in response to objects, problems, conditions, and specific efforts on events according to their abilities. They use their imagination, intelligence, insight, and ideas when faced with a problem. Creative thinking can also be defined as a person's cognitive process of generating ideas that are effective in solving problems given specific goals and conditions. Creative thinking skills include imagination, independence, and experimentation.

Creative and innovative abilities are very useful for creating a new work or for solving problems by finding solutions through new ideas. The ability to think creatively and innovatively also thinks about how the ideas you have can be implemented or can become

reality. One of success is owned by people who have the ability to think creatively and innovatively, people who have this ability are useful because they have new ideas and solutions.

Critical and creative thinking skills are interconnected and influence each other. Without critical thinking, people will find it difficult to think creatively [16]. Both are higher order thinking skills that need to be trained and possessed by students to help them follow and answer the challenges of the times [1], [2]. The ability to think critically provides the right direction in thinking and working and helps you make the right decisions based on a variety of considerations, while creativity generates ideas in thinking to solve problems or ideas to come up with a new idea. These two abilities are part of 21st century skills that need to be developed starting from early childhood education to higher education [4,6,17–26]. Some experts state that higher education is responsible for developing critical thinking skills that lead to higher order thinking skills [3].

Cultivating critical thinking skills takes time and effort [1, 8], as well as student creativity. The ability to think creatively is not born but formed [5]. According to Ng (2001) in [3] stated that critical and creative thinking skills for Asians are still low because Asian cultures tend to obey and follow group expectations and feel ashamed if they are different from others. However, learning in the 21st century has opened these boundaries and has begun to develop critical thinking skills and creativity of students from early childhood education to higher education with various methods, approaches and strategies.

## 4 Conclusion

Critical thinking skills and creativity are part of the 21st century skills that are very necessary and essential to be developed in learning both at the early childhood and college level. Case methods and team based projects can be used as methods to stimulate students' critical thinking skills and creativity. The critical thinking skills of at the Early Childhood Education (ECE) Teacher Education Study Program, Faculty of Education, Medan State University (PG PAUD FIP UNIMED) students are in the good category with a percentage of 83.5% and the creativity of PG PAUD students is in the very good category with a percentage of 86%. There is a very strong relationship between critical thinking skills and creativity in PG PAUD FIP Unimed students with a correlation coefficient (rxy) of 0.914 and the contribution value of critical thinking skills to creativity is 83.54%. This further strengthens that critical thinking skills and creativity can be simultaneously developed in a student-centered learning process and challenge students to find a problem until they find a solution from various points of view.

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## References


[1] Idris, T. (2018). Profil Berpikir Kritis Mahasiswa Program Studi Pendidikan Biologi Se- Kota Pekanbaru Critical Thinking Profile of Biology Education Departement Student in Pekanbaru City, *Bioedusiana*, vol. 3, no. 1, pp. 1–7, [Online]. Available: http://jurnal.unsil.ac.id/index.php/bioed/index.

[2] Handayani, P. H., Hidayati, I., Marbun, S. (2020). Medan, Profil habits of mind mahasiswa pg paud universitas negeri medan (unimed), Vol. 5, no. 1, pp. 1–13.

[3] Changwong, K., Sukkamart, A., and Sisan, B. (2018). Critical thinking skill development: Analysis of a new learning management model for Thai high schools, *J. Int. Stud.*, Vol. 11, no. 2, pp. 37–48, 2018, doi: 10.14254/2071-8330.2018/11-2/3.

[4] Junedi, B., Mahuda, I., and Kusuma, J. W. (2020). Optimalisasi keterampilan pembelajaran abad 21 dalam proses pembelajaran pada Guru MTs Massaratul Mut'allimin Banten, *Transform. J. Pengabdi. Masy.*, vol. 16, no. 1, pp. 63–72, doi: 10.20414/transformasi.v16i1.1963.

[5] Handayani, P. H. (2017). Pengembangan Kreativitas Anak Usia Dini Dalam Keluarga, *J. Kel. Sehat Sejah.*, vol. 15, no. 2, pp. 46–56, 2017, doi: 10.24114/jkss.v15i2.8774.

[6] Aslamiah, A., Abbas,E. W. and Mutiani, M. (2021). 21st-Century Skills and Social Studies Education, *Innov. Soc. Stud. J.*, Vol. 2, no. 2, p. 82, doi: 10.20527/iis.v2i2.3066.

[7] Zain, A. R. and Jumadi. (2018). Effectiveness of guided inquiry based on blended learning in physics instruction to improve critical thinking skills of the senior high school student, *J. Phys. Conf. Ser.*, Vol. 1097, no. 1, 2018, doi: 10.1088/1742-6596/1097/1/012015.

[8] Kusuma, E. D., Gunarhadi, G. and Riyadi, R. (2018). The Strategies to Improve Critical Thinking Skills through Problem-Based Quantum Learning Model at Primary School, *Int. J. Multicult. Multireligious Underst.*, Vol. 5, no. 4, p. 123, doi: 10.18415/ijmmu.v5i4.213.

[9] Qalbi, Z. and Putera, R. F. (2022). Penggunaan Model Problem Based Learning sebagai Upaya Peningkatan Creative Thinking pada Mata Kuliah Seminar Isu Terkini PAUD Berorie. ). *Journal on Teacher Education Research & Learning in Faculty of Education,* Vol. 3, pp. 317–327.

[10] Sari, N. (2022). "Penerapan Pembelajaran Berbasis Pemecahan Kasus ( Case Method ) untuk Menumbuhkan Generasi Sadar Pajak pada Mata Kuliah Perpajakan Program Studi Pendidikan Ekonomi FKIP Universitas Jambi Pembelajaran perpajakan pada Program Studi Pendidikan Ekonomi yang d," pp. 665–673.

[11] Nursulistyo, E. D., Siswandari, S., and Jaryanto, J. Model Team-Based Learning dan Model Problem-Based Learning Secara Daring Berpengaruh terhadap Kemampuan Berpikir Kritis Siswa, *Mimb. Ilmu*, vol. 26, no. 1, p. 128, 2021, doi: 10.23887/mi.v26i1.32321.

[12] Lestari, D., Mulyani, E. and Susanti, R. (2016). Pengembangan Perangkat Blended Learning Sistem Saraf Manusia Untuk Meningkatkan Keterampilan Berpikir Kritis, *J. Innov. Sci. Educ.*, Vol. 5, no. 1, pp. 83–93, [Online]. Available: http://journal.unnes.ac.id/sju/index.php/jise.

[13] Zhang, L., Zhang, H. and Wang, K. (2020). Media Literacy Education and Curriculum Integration: A Literature Review, *Int. J. Contemp. Educ.*, vol. 3, no. 1, p. 55, doi: 10.11114/ijce.v3i1.4769.

[14] Marchellina A. and . Qomariyah, N., (2022). BioEdu, Vol. 11, no. 2.

[15] Nurzaman. (2017). "The Use of Problem-Based Learning Model to Improve Quality Learning Students Morals," *J. Educ. Pract.*, vol. 8, no. 9, pp. 234–248 [Online]. Available: http://ezproxy.lib.uconn.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ1138846&site=ehost-live.

[16] Idris, T. (2022). Critical and Creative Thinking Skills of Pekanbaru High School Students in Biology Learning, Vol. 8, no. 5, pp. 2430–2436, doi: 10.29303/jppipa.v8i5.1737.

[17] Yulianisa, Rizal, F., Oktaviani, and Abdullah, R. (2018). "Tinjauan Keterampilan Abad 21 (21st Century Skills) di Kalangan Guru Kejuruan (Studi Kasus: SMK Negeri 2 Solok)," *J. Civ. Eng. Vocat. Educ.*, vol. 5, no. 3, pp. 1–8.