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Improving Critical Thinking Skill Through Team-based Projects, is it Effective?

Nevy Farista Aristin[1*], Agus Purnomo[2]

[1]Geography Education Study Program, Lambung Mangkurat University, Banjarmasin, Indonesia
[2]Social Studies Department, Universitas Negeri Malang, Malang, Indonesia

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ABSTRAK

Menghadapi era pembelajaran abad 21, kemampuan berpikir kritis sangat penting bagi mahasiswa dan menjadi salah satu tujuan pendidikan di perguruan tinggi. Untuk mencapai salah satu tujuan pendidikan tersebut diperlukan pembelajaran yang dapat membentuk peserta didik yang kritis, inovatif, kreatif, dan berdaya saing. Penelitian ini bertujuan untuk meningkatkan kemampuan berpikir kritis mahasiswa pada materi pengembangan wilayah perdesaan dan perkotaan secara berkelanjutan di lahan basah, melalui model pembelajaran team-based project. Penelitian ini menggunakan desain pre-experimental dengan tipe metode one group pretest-posttest. Sampel yang digunakan sebanyak 47 mahasiswa dengan dibentuk 11 kelompok. Tahapan model team-based project dilaksanakan enam langkah, yakni 1) orientasi awal, 2) identifikasi masalah (kasus), 3) merencanakan proyek, 4) implementasi proyek, 5) mempresentasikan hasil proyek, dan 6) evaluasi hasil proyek. Pengolahan data dilakukan dengan rerata pretest dan posttest, uji normalitas (Shapiro Wilk), dan uji homogenitas (Lavene test) serta dianalisis menggunakan uji paired sample t-test. Hasil penelitian menyatakan bahwa terdapat perbedaan hasil belajar setelah penggunaan model team-based project dalam meningkatkan keterampilan berpikir kritis mahasiswa pada wilayah perdesaan dan perkotaan secara berkelanjutan di lahan basah. Ini dikarenakan mahasiswa dapat mengintegrasikan teori dan praktikum dengan menghasilkan produk melalui proyek berupa artikel di jurnal nasional. Hasil penelitian ini dapat diimplikasikan pada pembelajaran setiap mata kuliah, baik berbasis teori maupun praktikum, guna meningkatkan kemampuan berpikir kritis mahasiswa.

ABSTRACT

Facing the 21st-century learning era, critical thinking skills are very important for students and become one of the goals of education in higher education. To achieve one of these educational goals, learning is needed that can form critical, innovative, creative, and competitive students. This study aims to improve students' critical thinking skills on materials for developing rural and urban areas in a sustainable manner in wetlands, through a team-based project learning model. This research uses a pre-experimental design with one group pretest-posttest. The sample used was 47 students, formed into 11 groups. The team-based project model is carried out in six steps, namely 1) initial orientation, 2) identification of problems (cases), 3) project planning, 4) project implementation, 5) presenting project results, and 6) evaluating project results. Data processing was carried out using pretest and posttest, normality test (Shapiro Wilk), and homogeneity test (Lavene test) and analyzed using a paired sample t-test. The results of the study stated that there are differences in learning outcomes after using the team-based project model in improving students' critical thinking skills in rural and urban areas in a sustainable manner in wetlands. This is because students can integrate theory and practicum by producing products through projects in the form of articles in national journals. So, it can be implied in the learning of each subject, both theory-based and practical, to improve students' critical thinking skills.

1. INTRODUCTION

21st-century learning presents very complex challenges in higher education, especially for lecturers and students. The role of lecturers is seen in how they must follow and develop innovative learning technologies to support learning objectives. In addition, the role of lecturers must be able to form student competencies, such as critical thinking skills. These critical thinking skills become fundamental for students to overcome various problems around them (Ikhsan & Rizal, 2014) and become capital in competing to achieve goals in the global world (All et al., 2021; Li et al., 2021; Liliasari, 2011). Critical thinking skills are provisions that must be possessed by students to take logical decisions in solving problems in difficult situations while still considering the impact that occurs on society (Arslan et al., 2014; Atabaki et al., 2015; Prabawani et al., 2020). Students who tend to think critically have the ability to

*Corresponding author.
E-mail addresses: Farista90@gmail.com (Nevy Farista Aristin)

assess and analyze arguments, and find logical reasoning so that they can take the right decisions and actions (Adi & Junining, 2013; Kong, 2015; Wahyudi, 2020). So, critical thinking is an intellectual process that is actively carried out to conceptualize, apply, analyze, synthesize, and evaluate information obtained from observation, experimentation, reflection, communication, as internalization within itself and taking action. Facing the 21st-century learning era, critical thinking skills are very important for students and become one of the goals of education in higher education. To achieve one of these educational goals, learning is needed that can form critical, innovative, creative, and competitive students (Setyawan, 2016; Sobri et al., 2020). Along with the advancement of learning in the era of 21st-century education, one of the sciences that is developing rapidly is geography. Geography has various branches and applied sciences that have developed and provided benefits to the community, one of which is Rural and Urban Geography. This rural and urban geography course is one of the compulsory subjects for students of the Geography Education Study Program at Universitas Lambung Mangkurat who are currently studying. This Rural and Urban Geography course includes materials for sustainable rural and urban development according to the characteristics of each region. The characteristics of the South Kalimantan region are wetlands so a development model design is needed that supports wetland management in rural and urban areas. The accuracy of the selection of the regional development model must also be adjusted to the potential of the wetland area in South Kalimantan to improve the social and economic conditions of the community. This is reinforced by the statement that regional development is based on the superior sector of each region so that it can improve the community's economy in a sustainable manner (Puspita, 2022).

In fact, based on the results of initial observations made during the learning process for the Rural and Urban Geography course, it was found that students tend to be passive. This can be seen the learning process in class when the lecturer deliver lecture material or the question and answer session is opened, only a few students are actively asking questions. The same thing was also seen when the lecturer asked the students questions back, only a few students were willing to respond to answer the lecturer's questions. In addition, the tendency of passive students was also seen when learning in class using presentation techniques, it was seen that only 2-4 students asked questions to the team that made the presentation. In addition to problems related to student activity, there were also problems related to the ability of students to express opinions and ideas which were still low. This is proven when in the learning process, lecturers invite students to provide opinions and ideas related to the case studies described as discussion material, but only a few students are willing to provide ideas and opinions.This condition causes the achievement of learning objectives is still low. Communication skills in expressing opinions in a good way need to be improved to achieve success in the learning process (Dipalaya et al., 2016; Susanti & Risnanosanti, 2019).

One of the roles of lecturers is to encourage students to be more active during discussions and question and answer sessions and to improve critical thinking skills during the learning process. However, the low critical thinking skills of these students are an important problem in the 21st century education era that must be resolved immediately. The phenomenon of the low number of students who have critical thinking skills does not only occur in the Geography Education Study Program, Universitas Lambung Mangkurat, but is experienced by many lecturers from various universities. The selection of the right learning model is one solution to the problem of low critical thinking skills experienced by students. One of the appropriate learning models to achieve this goal is a team-based project. Project-based learning is a learning model that focuses on developing student competencies by choosing topics, analyzing problems, solving problems, making decisions, providing opportunities to design projects independently and produce real projects that can be used for everyday life (Jumrodah et al., 2021). Project-based learning includes part of one of the models in the K-13 curriculum where in the learning this model includes activities and assessments based on contextual projects, the use of technology. In addition, this learning model must involve students actively and work together in teams during the learning process. Team-based learning is collaborative learning based on the results of the design of strategies or ways to solve problems faced by students in the surrounding environment, carried out by groups (Michaelsen & Sweet, 2008). So in this team-based learning learning can train and improve the ability of students to work together and collaborate so that they exchange ideas with each other in solving existing problems. Team-based project is one of the innovative learning models in improving students' critical thinking skills through projects given by lecturers in groups. This can make students learn to hone their foresight in finding solutions to problems based on the knowledge they have previously through group discussions. In addition, through this team-based project, students can train how to express opinions, ideas, suggestions and respect each other's opinions among group members. This learning model, a model with a focus on students, provides opportunities for students to build critical thinking skills, communicate, and collaborate so that they can improve the quality of learning through group discussions.

There are many previous studies that have been conducted on the effectiveness of the learning model (Almulla, 2020; Syahra et al., 2020), one of which is a team-based project that can be used as an alternative model to improve communication skills and collaboration skills (Tekad & Pebriana, 2021), helps students to improve interpersonal relationships and social skills (Aranzabal et al., 2022). This model has also been applied to practical courses oriented toward the use of modules that can improve cognitive abilities and innovation skills in Indonesian language courses (Idris et al., 2020; Wijaya, 2017; Wijaya et al., 2021). Team-based projects can increase the average learning outcomes and the percentage of student activity in learning so that they can complete their learning demands (Siyam, 2021). Based on previous research, this research can fill the gap in the effectiveness of team-based projects to improve critical thinking skills to support the 7th Key Performance Indicators (KPI) of Higher Education in the rural and urban geography course at the Geography Education Study Program, Banjarmasin. In addition, the team-based project model will have a final output in the form of articles submitted in national journals.Currently, the team-based project model is one of the learning models that refer to the 7th Key Performance Indicators (KPI) and is applied in all Indonesian universities. For this reason, it is very important to conduct this research to see if this team-based project model can improve the critical thinking skills of students in higher education, especially students of the Geography Education Study Program at Universitas Lambung Mangkurat.

2. METHODS

This research uses a quantitative approach with a pre-experimental design method of type one group pre-test and post-test. This type of research provides a pre-test before being given treatment and post-test is given after being given treatment. In this study, the treatment in question is the use of a team-based project model. So, it can be concluded that the results of the treatment can be known more accurately by comparing before and after treatment. The research population was 47 students who took the Rural and Urban Geography course, Geography Education Study Program, Universitas Lambung Mangkurat. The sampling technique used was a saturated sample. This means that the sample used in this study was 47 students, divided into 11 groups. The instruments used are 1) test sheets, namely pretest and posttest, 2) observation sheets, and 3) critical thinking skills observation sheets. The types of pretest and posttest questions used in the form of case study descriptions related to sustainable rural and urban development materials to measure students' critical thinking skills. Indicators of critical thinking skills for geography education students consist of 1) analyzing problems, 2) identifying problems, 3) integrating with the latest literature or knowledge, 4) designing actions, 5) presenting results, and 6) producing quality reports. Meanwhile, the framework of the team-based project learning process in the rural and urban geography course is carried out through six stages as presented in Figure 1.

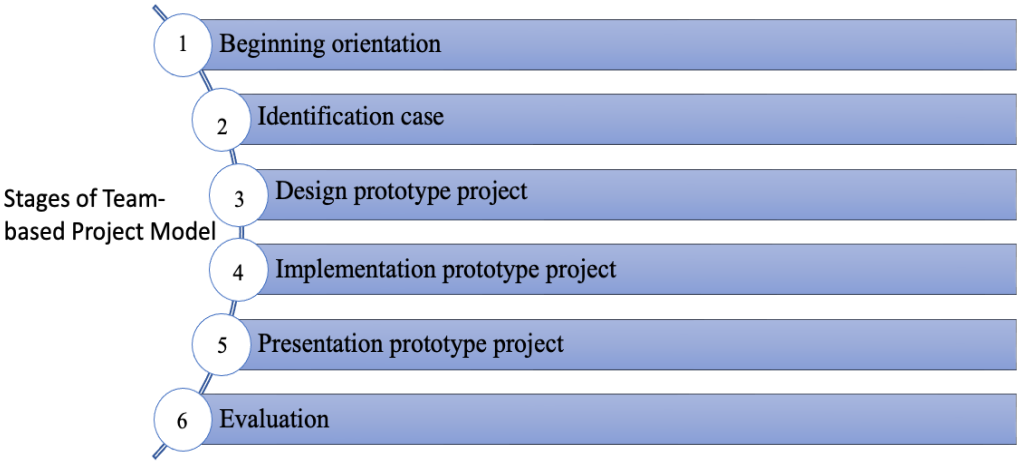

Figure 1. Research Flowchart

Data processing was carried out using pretest and posttest, then normality test (Shapiro Wilk) and homogeneity test (lavender test) were carried out. The analysis used is a paired sample t-test using IBM SPSS version 26 software.

3. RESULT AND DISCUSSION

Results

The results of students' critical thinking skills who take rural and urban geography courses related to the sustainable development of rural and urban areas can be seen from the pretest and posttest mean scores on each critical thinking skill indicator as presented in Figure 2.

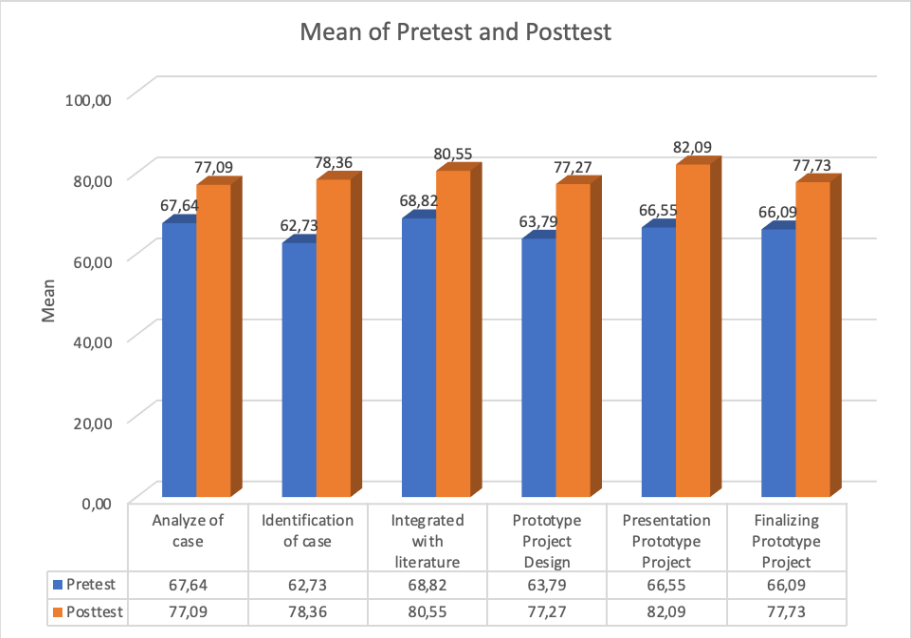

Figure 2. The Average Results of the Pretest and Posttest of Critical Thinking Skills

The lowest pretest value is seen in the critical thinking skills indicator in the form of problem identification as project material with a mean value of 62.73 and the highest pretest score of 68.82 on the indicator of designing actions in critical thinking skills. The lowest posttest score is on the indicator of integration with the latest literature or knowledge with an average value of 77.09, while the highest posttest score on the indicator presents project results with an average value of 82.09 and designing actions with an average value of 80.55. To find out the difference in the improvement of critical thinking skills before and after the treatment of the team-based project model, the first normality test and homogeneity test were carried out and presented in Table 1 and Table 2.

Table 1. Normality Test Results

Unit of Analysis	Shapiro Wilk		
	Statistic	df	Sig.
Pretest	0.936	11	0.478
Post-test	0.933	11	0.438

Based on the normality test in Table 1, it was found that the pretest data had a significance value. (0.478) and posttest data with Sig. (0.438) is greater than the probability value (0.05) then it is stated that the pretest and posttest data are normally distributed.

Table 2. Homogeneity Test Results

Learning outcomes	Levene Statistic	df1	df2	Sig.
	0.156	1	20	0.697

Based on the results of the homogeneity test in Table 2, it was found that the learning outcomes (pretest and posttest) were Sig. 0.697 > probability value (0.05) which means the data is homogeneous. So, it can be concluded that the data is normally distributed and homogeneous. The statistical test used was the paired sample t-test to determine the improvement in critical thinking skills after the treatment of

the team-based project model in the Rural and Urban Geography course, Geography Education Study Program, Universitas Lambung Mangkurat. The results of the paired sample t-test are presented in Table 3 and Table 4.

Table 3. Paired Samples Correlations

Variable		N	Correlation	Sig.
Learning outcomes	Pretest & Posttest	11	0.880	0.000

Based on the results of the paired correlation test in Table 3, it was found that the value of Sig. 0.000 <0.05, which means that the pretest data has a relationship with the posttest of 0.880.

Table 4. Paired Samples Test

Pretest – Post-test	Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
	-12.83	0.449	0.135	-13.126	-12.522	-94.659	10	0.000

Based on the results of the paired sample t-test in Table 4, the value of Sig. (0.000) < 0.005 which means that there is an average difference between the pretest and post-test learning outcomes. This shows that there are differences in learning outcomes after using the team-based project model in improving the critical thinking skills of students of geography education at Universitas Lambung Mangkurat.

Discussion

The low level of critical thinking ability of the pretest score is seen in the problem identification activity because students in each group still had difficulty identifying the core problems of the case of sustainable rural and urban development given by the lecturer. In addition, students cannot define the problem precisely because they do not understand the real problem. All the things that underlie this low case identification activity are due to low sensitivity in recognizing problems, lack of critical thinking skills, resilience, and willingness not to rush in solving problems (Mahanal et al., 2018). The highest pretest score can be seen from the student's ability to design actions even though the score is still in the category less than the minimum completeness criteria of 70. However, students with an initial theoretical understanding related to sustainable rural and urban development, students can plan project designs to solve existing cases. Students in each group have started to learn to express their ideas and opinions regarding the stages of sustainable rural and urban development. However, students are still confused about the right method to use in their projects. Planning actions by planning this project also requires adjustments to the time allocation that needs to be determined in advance. This lack of knowledge is because students still do not get experience related to group project learning, so intensive lecturer guidance is still needed. The learning model needs to require the role of active and skilled lecturers, adequate facilities, and the active involvement of students to find relevant resources (Abidin, 2014; Yusoff, 2006).

Indicators of critical thinking skills through designing actions and presenting the results after the implementation of the team-based project learning model got the highest posttest score. The student activities of each group in planning actions include the appropriate use of development methods, formulating project flow diagrams that have been adapted to the characteristics of rural or urban areas, and using appropriate, creative, and innovative ideas and ideas to analyze rural or urban development based on their potential. Giving ideas and ideas in designing projects can stimulate critical thinking skills in someone's (Jumrodah et al., 2021). The indicators for presenting project results by students have also increased. This can be seen from students' ability to report project results in the form of case study papers related to strategies developed for sustainable rural and urban development in South Kalimantan. In their report, they must synthesize relevant information and use the right theory as well as share the results from their observations and provide logical reasons for a suitable design project for the development of this sustainable rural and urban area with peatland characteristics in South Kalimantan. The project reporting stage must go through stages that are supported by the ability to identify, analyze, synthesize, and evaluate information so that it can be taken into consideration in making the right decisions (Kong, 2015; Shim & Walczak, 2012). Critical thinking skills cannot be obtained directly by students. Students must be trained to be sensitive in being aware of the problems that exist around them, especially problems related to the development of sustainable rural and urban areas with the characteristics of

wetlands (peatlands). So, lecturers must instill and develop critical thinking skills continuously through appropriate learning planning (Sastrika et al., 2013; Ghanizadeh et al., 2020; Wahyudi, 2020) contains conclusions and suggestions. The team-based project learning model is effective in improving students' critical thinking skills in the Geography Education Study Program. It means student activities in team-based project learning can shape their critical thinking skills. So, it supports the results of previous studies which state that the team-based project model is effective in improving critical thinking skills, social skills, and activating skills that activate practical learning materials according to their learning. The team-based project model can improve students' critical thinking skills in solving problems logically and precisely, and it is used to improve students' metacognitive abilities, one of which is critical thinking (Flavell, 1979; Grant, 2002). With the increase in students' metacognitive abilities, it means that students are also increasing their ability to solve problems around them logically and effectively (Gotoh, 2016). Student activities start from identifying, exploring, and analyzing the cases in each group. This activity can stimulate students to be more active in solving existing problems involving students in each group so that they can work together and collaborate in discussion activities. Learning carried out in groups can make it easier to analyze difficulties and solve problems appropriately (Nuswowati et al., 2017; Purvis et al., 2020; Shishigu et al., 2017). Thus, the project-based model requires students to identify problems by combining critical and creative thinking skills in solving problems (Isabekov & Sadyrova, 2018; Ridlo et al., 2020). This activity makes students learn to express opinions, ideas, and ideas and respect each other to find the right solution to the problem together. The learning process through groups is expected that students are more active in discussing understanding the material and analyzing existing problems and this discussion activity can also help other students who do not understand the material gradually (Triyanti et al., 2021). This is supported by its model requires students to be active in expressing ideas, ideas, and opinions as well as being active in asking questions (Susanti, 2013) so that they can practice critical thinking skills.

Role lecturers are also needed in team-based project learning activities, especially in directing, guiding, and improving project designs to produce final products. In directing students, lecturers provide field manuals to identify problems that exist in the field directly as student guidelines. This is because this learning model is a collaborative model between lecturers and students in determining the project theme, working on the project, and determining the time allocation for the process (Fitirani et al., 2020). It is also supported that project-based models can improve collaboration skills including critical thinking skills, creativity, collaboration, and problem-solving (Hesti Safitri et al., 2015; Nurmayani et al., 2018; Rahmawati et al., 2019). Each group presented the final result of their project after going through the integration stage with the relevant and up-to-date literature. This is reinforced by previous research which states that students can improve critical thinking skills by understanding the relevance of concepts and cases empirically, analyzing, evaluating, to conclude by processing data in the field (Saroinsong, 2018). Furthermore, the final result of the project will be evaluated by the lecturer. By way of lecturers asking questions related to products in the form of models for developing sustainable rural and urban areas. In addition, students from other groups can provide suggestions to improve product quality for the better.

Team-based project learning syntax can improve critical thinking skills. This is because in learning syntax there are student activities to practice critical and logical thinking (Hari Utomo et al., 2018). This is evidenced by the existence of groups of students taking rural and urban geography courses and publishing articles in national journals and other learning material. The team-based project produces products in the form of modules as learning materials in learning to improve student learning outcomes (Rusmanto & Rukun, 2020). It can be concluded that team-based projects can facilitate students in developing their potential, both academic and non-academic potential. So, the novelty of this research can be seen that the team-based project model uses a series of questions to direct students regarding the cases to be discussed and the final output is in the form of modules, but the design of this model lecturer provides guidance and direction in case finding in the field. For example, the case is related to rural and urban geography around Banjarmasin before students go to the field directly and the output of the team-based project model is in the form of articles submitted to accredited national journals as a student's academic potential, while the non-academic potential of students is the level of sensitivity of students in understanding and identifying environmental and social problems in the Banjarmasin City area with characteristics wetland environment. Given the importance of critical thinking skills that must be possessed by students, students' critical thinking processes must continue to be trained and honoured to increase. With the high critical thinking skills possessed by students, they can survive in the 21st-century education era to face challenges in real life. Team-based projects are one of the models that can improve the critical thinking skills of geography students in the era of generation Z.

4. CONCLUSION

There is an increase in critical thinking skills possessed by students after the application of team-based project learning in rural and urban geography courses, Geography Education Study Program, Universitas Lambung Mangkurat. The improvement of critical thinking skills is based on the six indicators, namely analyzing problems, identifying problems, integrating with the latest literature or knowledge, designing actions, presenting results, and producing quality reports through the activities of designing sustainable rural and urban development projects in South Kalimantan. The limitation of this research is the team-based project model is still implemented in rural and urban geography courses with case finding still around Banjarmasin City so that the cases found are still limited. The implication is that it is necessary to apply to the learning of each subject, both theoretically and practically based so that students' critical thinking skills towards surrounding problems are increasing and students' academic abilities are also increasing with the final output in the form of articles submitted to accredited national journals.

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