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The influence of E-PjBL and student learning interest on critical thinking skills

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ABSTRAK

Penelitian ini bertujuan untuk menguji pengaruh model pembelajaran electronic project-based learning (E-PjBL) dan minat belajar terhadap kemampuan berpikir kritis pada materi pola pemotongan busana tanpa perca. Penelitian dilakukan di lembaga kursus dan pelatihan di Surabaya dengan jumlah responden sebanyak 120 peserta didik dan terbagi menjadi 2 kelompok yaitu 60 peserta didik pada kelompok kontrol dan 60 peserta didik pada kelompok eksperimen. Hasil analisis menunjukkan sebagai berikut: terdapat pengaruh model pembelajaran electronic project-based learning (E-PjBL) dan metode konvensional serta minat belajar terhadap kemampuan berpikir kritis pada materi pola pemotongan busana tanpa perca dan terdapat interaksi antara model pembelajaran electronic project-based learning (E-PjBL) dan minat belajar terhadap kemampuan berpikir kritis pada materi pola pemotongan busana tanpa perca. Maka dapat disimpulkan dari hasil penelitian bahwa model pembelajaran electronic project-based learning (E-PjBL) dan minat belajar dapat meningkatkan kemampuan berpikir kritis peserta didik.

ABSTRACT

This study attempted to see the impact of the electronic project-based learning (E-PjBL) learning model and learning interest on students' critical thinking skills using Lean pattern fashion design materials. The research was carried out at a course and training institute in Surabaya, with 120 students divided into two groups and surveyed: 60 in the control group and 60 in the experimental group. According to the findings, the electronic project-based learning (E-PjBL) learning model and the traditional learning method and interest increase student's critical thinking skills in fashion design through lean patterns. It also unveiled the relationship between modeling and a desire to learn with critical thinking skills in lean pattern fashion design. As a result of the research findings, the current study concluded that the electronic project-based learning (E-PjBL) learning model and students' interest in learning can improve students' critical thinking abilities.

INTRODUCTION

Learning in the digital age necessitates students actively and independently developing their potential and knowledge (Bestari et al., 2023; Hasyim & Hayati, 2023). Although learning models influence differences in each student's critical thinking skills, the main question is how to encourage students to improve their critical thinking skills through learning (Majuarsa & Kasna, 2023; Mulyanti et al., 2023; Suradika et al., 2023). Students must be highly interested in learning to maximize their critical thinking skills (Altun & Yildirim, 2023). In addition to supporting factors, learning methods, initial skills, and student learning skills must be considered. Intelligence also influences critical thinking abilities (Aston, 2023; Berg et al., 2023; Park et al., 2023).

Pattern-making is one of the subjects covered in fashion design classes that require students to practice and display their maximum capacity for critical thought (López et al., 2023; Setiawati & Shofwan, 2023). Observations conducted at the Course and Training Institute in Surabaya during the first semester of the 2023 academic year support this view, showing that the sewing practice score is higher than the average periodic test score for pattern-making materials, specifically, zero waste pattern fashion design. Pattern-making materials, especially zero-waste patterns fashion design regular test, score average for sewing practice. A student's difficulty in creating clothing patterns for zero-waste fashion design materials is greatly influenced by the student's learning method and learning interest in finding references and other supporting knowledge (Fitri & Ernawati, 2023; Rofiqodduri & Wahyuningsh, 2023).

Research studies discussing the electronic project-based learning (e-PjBL) learning model are innumerable, with the location, material, and target students having different problems. A study (Rati et al., 2023) entitled "HOTS-Oriented e-Project-Based Learning: Improving 4C Skills and Science Learning Outcomes of Elementary School Students" concluded that HOTS-oriented E-PjBL tools can improve learning outcomes for Critical Thinking, Communication, Creative Thinking, and Collaboration (4C) and science are simultaneous and partial, but the E-PjBL implemented must be HOTS oriented to get appropriate learning outcomes. Therefore, in this research, HOTS-oriented E-PjBL was used to improve Critical Thinking, Communication, Creative Thinking, and Collaboration (4C) skills and science learning outcomes of students in elementary schools. Based on these differences in characteristics, it is likely that different applications will result in dissimilar outcomes.

Researchers are in a quest to adjust learning methods by using the electronic project-based learning (e-PjBL) learning method, which can accommodate changes in students' learning styles in the current era of digital technology. One of the learning methods commonly used in courses and training institutions in Surabaya is the project-based learning (PjBL) method. However, because students' learning styles have transformed along with changes in technological developments, conventional face-to-face learning methods are increasingly ineffective. This is due to the many obstacles, ranging from a lack of references to students' limitations in exploring ideas. These obstacles further reduce students' interest in learning about zero-waste pattern fashion design material. Based on what has been discussed so far, the results of this study are simple, easy to apply, and already familiar learning treasures, but with some modifications and a touch of technology to the learning. Therefore, this study is necessary; it is more compelling and effective and also stimulates participants' interest in learning.

Furthermore, the benefit of this research for teachers is that it provides learning input that is engaging and easy for students to understand so that students' interest in learning and enthusiasm for the zero-waste pattern fashion design material increases. Then, for students, this research improves critical thinking skills in the zero-waste pattern fashion design material.The electronic project-based learning (E-PjBL) learning model and the individual learning interests of students can be monitored remotely by educators (Afdal & Febliza, 2023; Rati et al., 2023). So, each student's critical thinking ability depends on their activeness and interest in learning, which can trigger their active involvement in the learning process (Wulan et al., 2023; Nurdiana et al., 2023; Radiansyah & Hakim, 2023; Ruslan et al., 2023). In addition, in e-learning, practical materials require students to complete the tasks from the educators (Thaseen et al., 2023).

Therefore, this research focuses on students' critical thinking abilities in zero-waste pattern fashion design materials through the electronic project-based learning (E-PjBL) learning model in each student's learning interests.

METHOD

This research employed a quantitative approach with a quasi-experimental type of research with a 2x2 factorial design with the following variable details: (1) independent variable, namely the electronic project-based learning (E-PjBL) learning model (see Figure 1); (2) moderator variable, namely interest in learning; and (3) the dependent variable, namely the ability to think critically, zero waste pattern fashion design. The research took place at a course and training institution in Surabaya with a research population of 120 students currently undergoing fashion design training at final level II. The research sample consisted of four classes divided into two experimental classes and two control classes taken using the cluster random sampling technique.

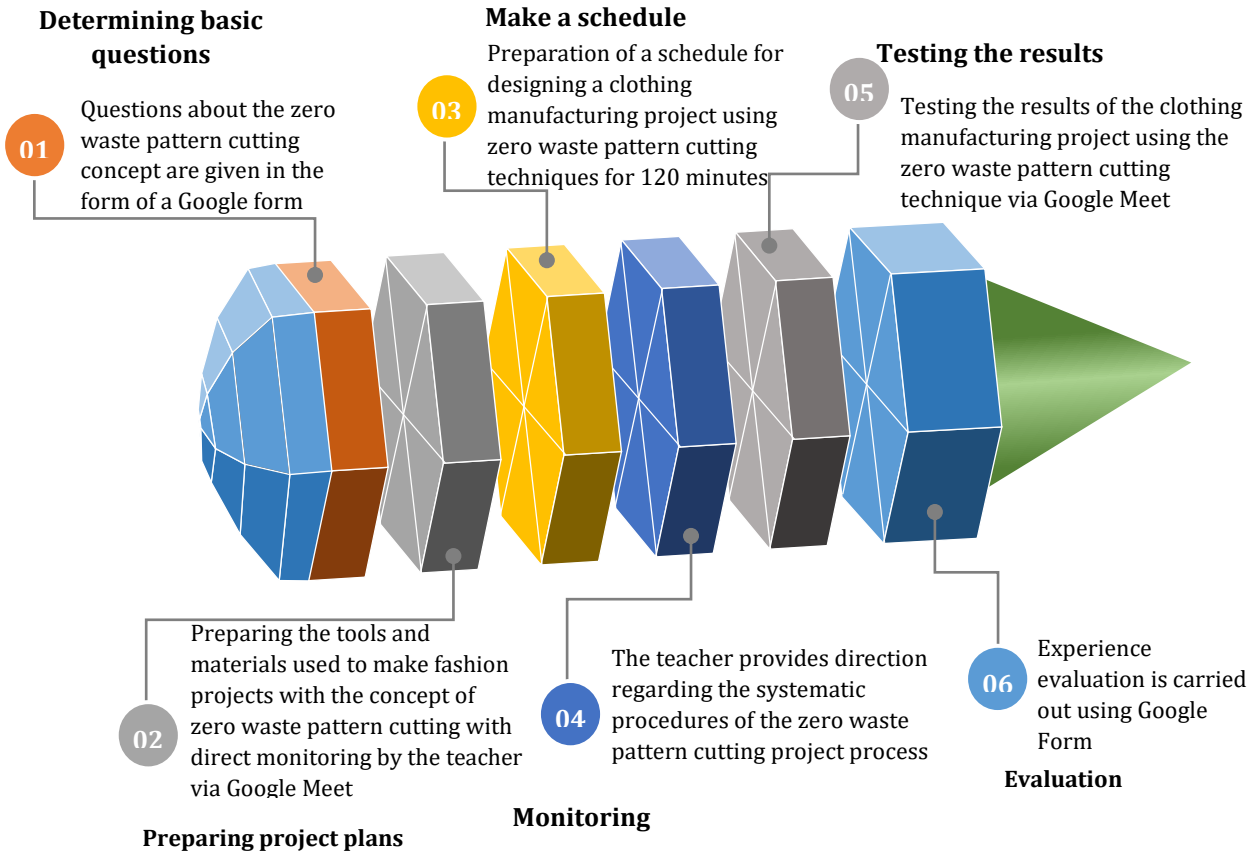

Figure 1. Sintax E-PjBL

Two tests were employed in the research: (1) a test of learning interest and (2) a test of critical thinking skills. For teachers to assess each student's level of success following the implementation of the electronic project-based learning (E-PjBL) learning model, a multiple-choice test measuring twenty questions was used to assess students' critical thinking abilities (Anggraeni et al., 2023; Campo et al., 2023; Triawang & Kurniawan, 2021).

The data obtained in this research are students' critical thinking ability scores through formative tests. The steps of this research are (1) class observation to determine the group of research subjects in the experimental class, which will be given action using the electronic project-based learning (E-PjBL) learning model; (2) a pretest to find out the learning interests of each student; (3) application of electronic project-based learning (E-PjBL) learning models in the experimental class; (4) post-tests in two class groups, namely the experimental class and the control class; (5) assessment of the test results obtained from each group, namely the class group

that received the electronic project-based learning (E-PjBL) learning model and the class group with the conventional learning model; and (6) collection and analysis of data using SPSS 23 statistical analysis with a two-way variance analysis technique (two-way ANOVA).

RESULT

The electronic project-based learning (E-PjBL) learning model test included 60 respondents grouped based on their learning interests: 12 with low learning interests and 48 with high learning interests. The trial produced critical thinking ability scores between 70 and 95, with an average score of 78.00 and a standard deviation of 6.19. For respondents with high interest in learning, the average value (mean) produced was 77.91, and the standard deviation (standard deviation) was 6.67, while for respondents with low interest in learning, the average value (mean) produced was 78.33, and the standard deviation was 3.89. Detailed test results are in Figure 2.

The conventional learning model involved 60 respondents grouped based on their learning interests: 8 with low and 52 with high learning interests. The trial of critical thinking ability scored between 50 and 70, with an average score of 60.03 and a standard deviation of 3.95. Respondents with high interest in learning got an average score (mean) of 61.27 and a standard deviation of 2.30, while those with low interest in learning obtained an average score (mean) of 52.00 and a standard deviation of 2.77. Detailed test results are in Figure 3.

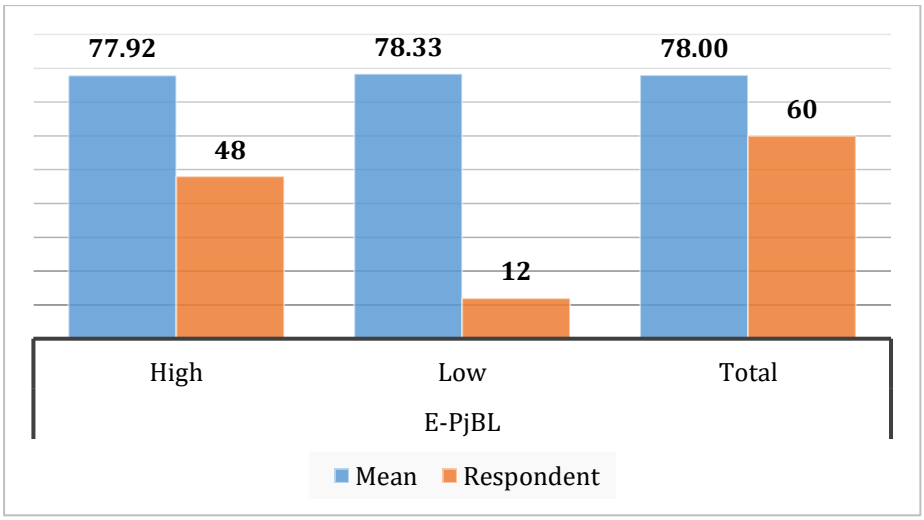

Figure 2. Descriptive statistic of E-PjBL

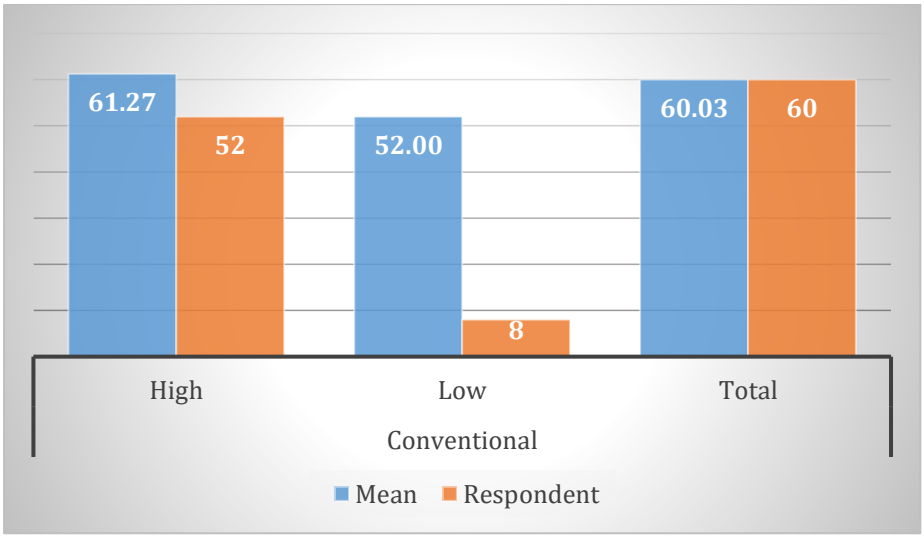

Figure 3. Descriptive statistic of conventional method

The following statistical test determined the significance value of the learning model and interest in learning on students' critical thinking abilities. In this test, the sig value was 0.000 with a significance level of α=5% in the electronic project-based learning (E-PjBL) learning model, so it concluded that the electronic project-based learning (E-PjBL) learning model has a significant influence on the critical thinking ability of zero waste pattern fashion design. In testing students' learning interests, the sig value was 0.000 with a significance level of α=5%, which means that interest in learning influences the critical thinking ability of zero-waste pattern fashion design. In the test of the interaction between the electronic project-based learning (E-PjBL) learning model and interest in learning, the sig was 0.000 with a significance level of α=5%, so it concluded that the interaction between the electronic project-based learning (E-PjBL) learning model and interest in learning has a significant influence on the critical thinking ability of zero-waste pattern fashion design. Table 1 displays the full findings.

Table 1. Multivariate analysis of variant

Tests of Between-Subjects Effects

Dependent Variable: Critical thinking skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	10281.403[a]	3	3427.134	153.935	.000
Intercept	292437.060	1	292437.060	13135.279	.000
Model	7437.060	1	7437.060	334.047	.000
Interest	315.494	1	315.494	14.171	.000
Model * interest	377.688	1	377.688	16.964	.000
Error	2582.564	116	22.263		
Total	584460.000	120			
Corrected Total	12863.967	119			

a. R Squared = .799 (Adjusted R Squared = .794)

DISCUSSION

The learning process in this research consisted of two groups with different learning model treatments. The first group consisted of 60 respondents, with 48 respondents having a high interest in learning and 12 having a low interest in learning, receiving treatment with the electronic project-based learning (E-PjBL) learning model by utilizing various digital platforms and the sophistication of artificial intelligence (AI) (Yustiasari, 2023; Zahara et al., 2023). The second group consisted of 60 respondents, with 52 respondents having a high interest in learning and 8 having a low interest in learning, receiving treatment with the project-based learning (PjBL) learning model without utilizing existing technology.

The systematic steps taken in the learning approach using the electronic project-based learning (E-PjBL) learning model are by the following applicable syntax: (1) Educators provided trigger questions to students to stimulate and determine the level of students' interest in learning about zero waste pattern fashion design materials owned by each student via Google form media; (2) Educators provided a basic understanding of the concept of zero waste pattern fashion design materials and showed several examples of clothing models designed using zero waste pattern fashion design techniques via the Google Meet platform with virtual presentation techniques for provide a real experience to students; (3) The students and educators agreed that the time for working on a clothing making project using the zero waste pattern fashion design technique was 120 minutes; (4) Educators checked workmanship standards and provided several suggestions for inappropriate concepts through direct monitoring with Google Meet; (5) The final results of the zero waste pattern fashion design were presented via Google Meet so that the teacher could provide an evaluation of products that were not suitable; and (6) Evaluation of the entire process was carried out using interviews to explore the critical thinking skills that students acquired while carrying out the project.

The electronic project-based learning (E-PjBL) learning model (Sari et al., 2023; Siregar et al., 2023) does not merely apply project-based learning where the source of information and

knowledge is centered on the educator's instructions but is more inclined towards the creativity of the participants. Students are in the process of enriching information through digital media (Setyowati et al., 2022). This learning model emphasizes students who actively search, compare, practice, and evaluate learning progress independently with the support of various digital platforms and sophisticated artificial intelligence (AI) (Herowati, 2023; Susilowati et al., 2022). This will encourage students to be more active in constructing various kinds of problems found during the assignment process, so indirectly, they get used to challenges and try to solve them, which has an impact on increasing their critical thinking skills (Ananda et al., 2023; Ekaputra & Sanova, 2023; Pramasdyahsari et al., 2023; Yusro & Ardania, 2023).

Based on the first hypothesis' findings, a two-way ANOVA study using statistical testing and the SPSS program reveals that the electronic project-based learning (E-PjBL) learning model affects students' critical thinking skills in zero-waste pattern fashion creation. The 78.00 average value (mean) and the 6.19 standard deviation point prove this claim. The electronic project-based learning (E-PjBL) learning model is a significant advancement in digitalized education, particularly for curricula prioritizing practice over theory. Students adopting this learning strategy must be able to think critically and finish assignments before the deadline. This model may accommodate activeness, innovation, teamwork, and learning to overcome challenges faced during the learning process, allowing students to master the topic better (Mulyanti et al., 2023; Nurmasyitah et al., 2023; Sukackė et al., 2022).

Based on the results of the second hypothesis, statistical testing using the SPSS program in a two-way ANOVA analysis shows that the conventional learning model or the one compared in this research, namely project-based learning (PjBL), influences the critical thinking skills of zero-waste pattern fashion design students at course institutions and training. This is evident in the test results, which show an average value (mean) of 60.03 and a standard deviation of 3.95. As a result of testing students' interest in learning, the average score of students with high interest was 69.26, and the standard deviation of students with low interest was 9.68, which significantly impacted their critical thinking ability. The obtained values have a mean value of 67.80 and a standard deviation value of 13.67(Allanta & Puspita, 2021; Elvianasti et al., 2022; Syakur et al., 2020).

The interaction between learning models and learning interests is essential to master critical thinking skills. Besides, educators also play a vital role in effective learning as they can encourage students' interest and creativity. Learning that is interactive, fun, and has extensive teaching resources can enrich understanding and improve critical thinking skills. This is the goal of the learning process expected by all parties. So, from all the hypotheses, it can be concluded that there is an interaction between the learning model and interest in learning and critical thinking skills in zero-waste pattern fashion design. In other words, using the E-PjBL model and interest in learning can improve students' critical thinking skills in designing zero-waste clothing patterns (Aston, 2023; Lun et al., 2023; Rofiqodduri & Wahyuningsih, 2023).

CONCLUSION

Based on the research results and discussion, the current research concluded that the electronic project-based learning (E-PjBL) learning model and conventional methods and interests influenced critical thinking skills in zero-waste pattern learning. Also, there was an interaction between the electronic project-based learning model (E-PjBL) and interest and critical-thinking skills in zero-waste pattern fashion design materials. So, it concluded that the electronic project-based learning (E-PjBL) learning model and interest in learning can improve students' critical thinking abilities. The current study still has many shortcomings and limitations, including the following: in this research, the data produced is only from questionnaires, so the conclusions drawn are only based on the data collected. This research suggests the importance of collecting all triangulation data in investigating similar studies in the future.

Author contributions

The authors made significant contributions to the study's conception and design. The authors were in charge of data analysis, interpretation, and discussion of results. The final manuscript was read and approved by the authors.

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Conflict of interest

The authors declare that there is no potential conflict of interest.

Data availability statement

All data are available from the authors.

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