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The Effect Of Portfolio Assessment-Based Pjbl Model On Students' Critical Thinking And Creativity In Nail Art Learning

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ABSTRACT

The objectives of this study are: 1. to evaluate the influence of project-based learning (PJBL) based on portfolio assessments on critical thinking skills in nail art learning and 2. Evaluate the influence of the project-based learning model (PJBL) based on portfolio analysis on the creative of students in the study of nail art. The procedure is complete. The sample of this study was 61 students at SMKN 1 Lingsar who were divided into experimental groups and control groups using cluster random sampling techniques. The data was collected through a multi-choice test for Critical Thinking skills and a rubric of analysis for creativity. The results showed that the PjBL model, based on portfolio evaluation, has a significant impact on students' critical thinking skills, with significance score of 0.024 and an N gain of 0.81 (high category). Moreover, this model also has a significant impact on student creativity, with a value score of 0.000 and an N gain of 0.85 (high category). Therefore, applying PjBL based portfolio analysis has been shown to be effective in improving students' critical thinking and creativity skills in learning nail art.

Introduction

Webinaire SEAQIL "*From 4Cs to 6Cs emphasized the importance of applying the capabilities of 6Cs, namely character* (character), *Citizenship* (nationality), *The Critical Thinking*, *Creativity*, *Collaboration* and *Communication*, in the 21st century during the *Hyper*-Globalization. These skills aim to train learners to be ready for the challenges of the world of work and social life, and be able to adapt and make positive contributions to an ever-changing society. (Almarzooq et al., 2020). Creativity (*Creativity*and critical thinking (*The critical thinking*) is one of the practices of 6C in high

demand in the 21st century. The program encourages students to develop innovative solutions. (Akpur, 2023). While critical thinking ability allows them to analyze information in-depth and make decisions with logical and objective thinking (Mga Tao et al., 2024).

Creativity and critical thinking are skills that students must possess to survive in the 21st century. As a result, a teacher must have the ability to design and implement an effective learning model Suttrisno, (2020). Based on Permendikbud No. 65 of 2013 regarding process standards, one of the priority learning models in the implementation of independent programs is the Project Based Learning Model (PJBL) (Kemendikbud Ristek, 2021). The PjBL learning model has proven effective in improving students' creativity and critical thinking, as this approach encourages active engagement of learners through hand-held experiences (Almulla, 2020). In line with the implementation of an independent curriculum, the project-based learning model shifts learning from teacher-centered to student-centered. (Kemendikbudristek, 2021).

The PjBL model is a learning approach that enables teachers manage teaching through projects with complex assignments, where learners integrate knowledge from real-world experiences such as design, implementation, investigation, problem solving, and and decision making. Teachers play a role in presenting problems, asking questions, and facilitating project design (Halim et al., 2023). The steps in the PjBL model include: (1) inquiry, (2) plan creation, (3) schedule drafting, (4) development monitoring, (5) test results, and (6) evaluation of experiments (Redhana, 2019). PjBL was found to be more effective than traditional methods for improving students' economic understanding, with the experimental group's score after the exam (82.5) higher than the control group (70.4), $t(121) = 5.48$, $p < 0.001$. In addition, 95% of students feel more motivated and interested in this method (Maros et al., 2023),

SMK is a secondary school dedicated to education and professional practice. SMKN 1 Lingsar offers NTB a variety of professional topics, such as gastronomy, fashion design, skin and hair beauty, and so on, designed to provide practical skills that meet the needs of the industry through the use of the Merdeka program. The school is equipped with comprehensive facilities, including internet, lounges, hotels, and workshops which supports the teaching and learning process. The Department of Skin and Hair Beauty (TKKR) has 106 students and 4 lecturers, as well as adequate facilities such as classrooms, salons, and standard clinical practice tools. This department also works with 15 beauty salons in the NTB. One of the key components of the program is hand, foot, and nail art care, which teaches skin care skills and nail art to Phase F students of Grade 11. With the complete equipment and implementation of the Merdeka program, SMKN 1 Lingsar is ready to conduct the

training with the PjBL model.

SMKN 1 Lingsar's Beauty Skills program includes elements of hand, foot and nail care art that teaches skincare techniques as well as nail art decoration. Students in Phase F of Grade 11 learn nail art care, massage, and art techniques such as nail rubbing, stickers, and other decorations. Nail art has become an important material in Lombok due to the increasing demand, as evidenced by the development of nail art salons and popular trends on social media. In addition, BPS NTB 2020 data show a high number of female populations and an increasing attention to nail care. Lombok is also a popular tourist destination, increasing the demand for beauty services, including nail art. This creates a great opportunity for vocational learners to master these skills and meet the needs of the beauty industry.

Based on data from the Ministry of Education and Culture, elements of hand, foot and nail art care at SMKN 1 Lingsar have learning outcomes (CP) which include understanding the basic concepts of nail art, job preparation, counseling and nail analysis. and the working process of nail art. To achieve these learning goals, learners need creativity and critical thinking to master the material and live up to established standards.

The implementation of the SMKN 1 Lingsar training faces obstacles due to high participation of students, as 3 out of 10 students are registered as absent at the end of the 2nd semester. In addition, a direct teacher-centered model is always used in the learning process, which hinders students' creative thinking skills. Student interviews show that teachers rarely attend the event in person and are more likely to provide materials without assistance. Ideally, teachers act as mentors with students as they practice, but this lack of help affects the decline in creativity and critical thinking of learners.

The results of nail art training at SMKN 1 Lingsar did not show the level of creativity expected according to the indicators of Torrance (1974), namely fluidity, flexibility, originality and elaboration. Based on observations and pictures of the students' work, the resulting drawings tend to be monotonous and less original, with students following more general patterns without developing new variations or methods. The rubric-based analysis shows a score of 50 for aspects of creativity and innovation, which is below the established standard. The uniform design and lack of experimentation in terms of colors, shapes, and methods indicate that more efforts are needed to develop the creative thinking skills of learners.

Fig 1: Documentation Of *Nail Art Results* For Students In 2023
(*Source: SMKN 1 Lingsar Nail Art Teacher*)

Based on critical thinking assessment indicators according to Facione (2013) which include interpretation, analysis, evaluation, analysis, conclusions, explanations and self-regulation, students at SMKN 1 Lingsar still lack aspects of evaluating design, choosing the right method and solving challenges while working. This is reflected in the difficulty of students explaining the reasons for choosing a particular drawing or technique, as well as their ability to identify and correct errors in the work. The resulting design often seems unplanned or out of topic, reflecting the lack of consideration in the selection of methods and designs. In addition, the monotonous nature of the lessons means that learners find the study of nail art difficult and uninteresting, so they simply follow the material without creating new designs, which makes it difficult for them to develop their critical thinking. Based on the summary of student scores, the average score for nail art material over the past three years was 75, indicating a standard pass and only one pass. Therefore, to improve the quality of learning, especially when it comes to creativity and critical thinking, the application of a project-based learning model (PBL) can be an effective solution.

Project based learning is considered effective in increasing the creativity of learners. Strong Lesman et al (2023)The results of the study show that applying the project based learning model (PJBL) effective in boosting students creativity, with data analysis results showing that 75% of students fall into the category of very good creativity, and hypothesis testing with *Won a score* yielded an N gain of 0.53, indicating a modest increase from learner outcomes prior to the introduction of PjBL. Pan et al (2023)concluded that this study shows that the application of the PT-PBL framework, which *Think about the possibilities* and *Projector Based on the study* In history of learning, he has succeeded in combining creativity (efficiency, flexibility, authenticity and attention to detail) and motivation to learn (*Self-efficacy*) in the experimental group (N = 75) compared to the control group (N = 65), although no significant difference in the level of mastery of historical knowledge could be observed between the two groups. Other research has also found that PjBL

(PjBL) has the potential to improve students' critical thinking skills. Ashidiq et al (2024), this study shows that the application of the STEM PjBL model to optical device learning results in a sharp increase in students' critical thinking skills with an N gain of 0.718**.** Furthermore, based on qualitative analysis using the Miles and Huberman methods, PjBL has proven to be effective in optimizing the critical and creative thinking of learners by planning structured projects from fundamental questions to project completion timelines. (Zulyusri et al., 2023)**.** Therefore, PjBL (PjBL) is learning model ideal for developing creativity and critical thinking of learners. This approach not only encourages creative and innovative exploration, but also strengthens learners problem..solving and self-reflection skills, which is essential for developing effective and high-quality learning projects.

The PjBL learning model is a project-based learning model. In the implementation of learning according to the PjBL model, Students need to do something or a product to showcase their learning outcomes. Products from the learning stages can be collected and converted into a portfolio. Strong Furnace Mail (2020) A portfolio is an ongoing analysis based on a set of reflective integrative information that shows the development of learners' skills over a period of time, with this assessment activity conducted using evidence of learning outcomes related to the items being evaluated. The PjBL model, equipped with a portfolio analysis, significantly improved the students' scientific knowledge, with an average value of the experimental group of 41.52, higher than the control group's score of 29.62 and the t score of 12.27 exceeding the t table of 2.021, with the experimental group scoring higher than the control group (Anggreni et al., 2020). By combining the right learning model and appropriate assessments, teachers can create a learning environment that encourages students' creativity and critical thinking of the elements of the hand, foot and foot. *Nail Art*.

This means that SMKN 1 Lingsar needs to have new learning experiences by introducing an innovative learning model, namely the PjBL model, which is based on portfolio analysis. Based on the above-mentioned presentation, the researcher wanted to further investigate the influence of portfolio assessment models on students' critical thinking and creativity, so a study was conducted entitled "The influence of the PJBL model based on portfolio analysis to increase *critical thinking and creativity* in *nail art learning*".

Method

The research design used is nonequivalent control group design which is included in the quasi-experimental category. Sugiyono (2017) stated that this experimental design consists of an experimental group and a control group that are not selected randomly. This is in accordance with the research conditions in schools, where students are already divided into several classes so that researchers cannot randomly divide groups (Arikunto, 2017). In this study, there is an experimental group that uses a learning model *Project-based learning* (PJBL) with portfolio valuation. The control group → used a direct method of learning without the application of PJBL with portfolio analysis.

This study uses cluster sampling, a sampling method based on existing groups (Measure, 2019). This method is chosen because in the school environment, students are already divided into several classes, so the selection of samples is based on groups (clusters) and not on individuals. Strong Arikunto (2017)This method is more effective in educational research, as it allows for easier and more convenient data collection without having to randomly select each person.

This research was conducted at SMKN 1 LINGSAR JL. GORA II NR. 4, Batu Kumbung, Lingsar District, West Lombok Regency, West Nusa Tenggara Province. Population is a general development area of objects or subjects that have special characteristics and traits that must be studied, to then draw conclusions (Sugiyoni 2010). While the population of Jannah (2016) is a group of subjects with characteristics to be studied. The population of this study consists of Phase F TKKR students consisting of grades XI and XII in the unique semester of the 2024/2025 school year at SMKN 1 Lingsar who have the same or equivalent skills and are studying nail art.

The samples were collected by random cluster grab sampling in Phase F of TKKR. This means that the sampling is done entirely by researchers to achieve specific goals. The research sample was taken from Phase F students of Class XI TKKR 1 with a total of 31 students as a control class and Phase XI TKKR 2 students with a total of 30 students as an experimental class.

To ensure group equivalence, a pretest was conducted for both the control and experimental groups. The results showed no statistically significant differences in the initial scores of critical thinking ($p = 0.281$) and creativity ($p = 0.651$), indicating that both groups had comparable starting abilities. The control group had a mean pretest score of 9.55 for critical thinking, which increased to 24.94 in the posttest. Meanwhile, the experimental group increased from 9.27 to 26.33. For creativity, the control group's average score increased from 13.45 to 26.48, while the experimental group improved from 12.97 to 29.33.

Creativity assessment was based on Torrance's indicators—fluency, flexibility, originality, and

elaboration. Each student's work was evaluated by two raters using a standardized rubric. Inter-rater consistency was ensured through calibration and training sessions, resulting in consistent application of the assessment criteria.

The tools used in this study are critical questions of thought and rubrics in the analysis of creativity. Critical thinking questions use 6 indicators for interpretation, analysis, analysis, analysis, conclusions, explanation, and self-regulation. For the "Creativity assessment" section, 4 creativity indicators are used, namely *fluency*, *flexibility*, *originality* and *elaboration*. Before it can be used in research, the validity of content needs to be evaluated on learning devices and instruments (gay Santyasa, 2014).

Learning tools consisting of learning modules, including the portfolio section, are relatively valued based on the considerations of content experts and design experts. The creativity assessment component is tested by materials experts and design experts to ensure that each prepared standard and indicator is consistent with the concept of creativity to be measured and relevant in the context of the assessment. For multiple choice questions, content validity is assessed based on expert opinion on content. To find out if this Findbuch can be used in research, this Findbuch was first tested for validity, reliability, difficulty and diversity. The device is then used in sessions before and after the testing of the contraolian group and the experiment group.

Search aids in the form of multiple-choice questions and rubrics for creativity analysis have been validated by experts in design and material. The validation results showed that critical thinking questions had an average score of 4.6 out of 5, with 3 questions modified (2 removed and 1 modified). The "Creativity Rating" category also received a score of 4.6 and scored very well. Based on the SPSS review, the multi-choice question tool is declared viable after evaluation and improvement. Of the 36 questions examined, 4 questions were omitted because they were invalid, and the instrument showed high reliability (Cronbach's alpha 0.961), which showed a very good parity both. A total of 30 questions were selected that met the criteria of validity, diversity and difficulty to ensure the validity and effectiveness of measuring research variables.

This study uses quantitative data, so quantitative data analysis methods are also used in the design of applied data analysis (Sugiyono, 2013, p. 207). After collecting data on the learning outcomes of control classes and experiments, a statistical Analysis was conducted to determine the differences between the two classes. Statistical analysis techniques used are the T test and the N gain test. Before performing the T test, the data must first go through a normality and reliability test to ensure the validity and consistency of the data used.

Results and Discussion

Testing normality

The normality Test Results can be show on table 1:

Table 1. Normality Test Results

	Group	Variable na	Uji	Sig. (P)	Implication
Critical thinking	Control	Vortesten	Shapiro-Wilk	**0.845**	Normal Distributed Data
		After the exam	Shapiro-Wilk	**0.487**	Normal Distributed Data
	Eksperimen	Vortesten	Shapiro-Wilk	**0.140**	Normal Distributed Data
		After the exam	Shapiro-Wilk	**0.198**	Normal Distributed Data
Creativity	**Control**	Vortesten	Shapiro-Wilk	**0.209**	Normal Distributed Data
		After the exam	Shapiro-Wilk	**0.130**	Normal Distributed Data
	Eksperimen	Vortesten	Shapiro-Wilk	**0.240**	Normal Distributed Data
		After the exam	Shapiro-Wilk	**0.103**	Normal Distributed Data

All data from the before and after test results in the experiment and control groups had a Sig. (p) value > 0.05. Therefore, the data is normally distributed. The results of the homogeneity test are presented in the following table 2:

Table 2. Homogeneity Test Results

Group	Variable na	Tst Sig de Levene (P)	Implication
Experience vs. Control	Pre-test *for critical thinking*	0,600	Mga Homogeneous Variation
	Critical thinking *after the exam.*	0,837	Mga Homogeneous Variation
	Try to create in advance.	0,745	Mga Homogeneous Variation
	Creativity after the exam	0,637	Mga Homogeneous Variation

The results of the homogeneity analysis in the Levene test show that all variables, both critical thinking and creativity, have a significance value (p) > 0.05 at pre and posttest between the experimental group and the control group. This shows that the differences in data are homogeneous in each group. Thus, the data satisfied the homogeneity hypothesis, which supports the use of parametric statistical tests to evaluate differences between groups.

T-Test

To determine the effect of the pjBL portfolio learning model on students' critical thinking skills. Data analysis was carried out using the t-test. The results of the independent sample t-test obtained on SPSS 25 showed a t value of 2.32, Sig (two-tailed) of 0.024 <0.05, meaning that H is accepted while H is rejected. The basic decision value of 0.024 <0.05 means that H_a is accepted while H is rejected, so it can be concluded that there is an influence of the Project Based Learning (PjBL) model

on the critical thinking skills of class XI TKKR 2 students of SMKN 1 Lingsar. Meanwhile, the influence of the model PjBL learning based on portfolio analysis on student creativity, showed that the t test scores of the independent sample obtained in SPSS 25 showed a t score of 7.26, Sig (bilateral) of 0.000 < 0.05, which means H_a is accepted while H_a is rejected. The decision basis of 0.000 < 0.05 means H_a is accepted while H_a is rejected, so it can be concluded that the project-based learning (PjBL) model based on portfolio analysis has an influence on student creativity XI TKKR 2 SMKN 1 lingsar.

Uji N-Gain

The N Gain test was conducted to determine the increase in students' cognitive learning outcomes after treatment. The test results are listed in the following table 3:

Table 3. Ngain Test Results

Variable na	Group	Nacht, Nacht, Na-Gain	Category
Critical thinking	Control	0,74	Keep
	Eksperimen	0,82	Malaki ang
Creativity	Control	0,69	Keep
	Eksperimen	0,85	Malaki ang

N Gain is calculated to. determine the effectiveness of increasing Critical Thinking and creativity outcomes. The results of calculating mean N gain for both variables showed that the experimental group showed a significantly more significant improvement compared to the control group. For critical thinking, the control group had an average N gain of 0.74, is in the middle category, while the experimental group has an average gain of N 0.82, which was placed in the high category. This shows that the learning approach applied to the experimental group is effective in improving students Critical Thinking skills. Meanwhile, the control group for creativity had an average N gain of 0.69, which is also included in the medium category, while the experimental group has an average N gain of 0.85, which is included in the high category. This shows that the experimental group's learning intervention is more successful in improving students' creativity than the control group. Overall, the average N gain of the experimental group is higher than that of the control group, indicating that this study produces better results for the experimental group.

Discussion

The impact of the PJBL based portfolio assessment model on the critical *thinking of students* in *the study of nail art*

In this study, the effect of Project-Based Learning (PBL) model with portfolio assessment on

students' critical thinking skills in hand, foot, and nail care was studied. The results of data analysis showed that students' critical thinking skills in the experimental group showed a significant increase compared to the control group, with a significance level of 0.024 and an N gain of 0.81 (high category). The normality test showed normal distributed data (Sig. 0.487), while the homogeneity test confirmed the difference between homogeneous groups (Sig. 0.837). The portfolio-based PjBL model has proven to be effective in improving six critical indicators of thinking, namely interpretation, evaluation, evaluation, conclusion, explanation, and self-regulation, according to Facione.

Through portfolio evaluation, students are actively engaged in all phases of the nail art project, from the first sketch to the final presentation. They identify appropriate designs (interpretations), evaluate the suitability of the colors and procedures (evaluation) and evaluate the quality of the final result (evaluation). In addition, students draw conclusions about maintaining the design (inference), explain the methods used (explaining) and reflect on the results and the feedback received (self-regulation). This process not only sharpens critical thinking, but also promotes creativity and thoughtful, analytical decision-making. Portfolio assessments, which include documenting learners' development, such as sketches, implementation timelines, and final reports, provide a deeper insight into their thought processes.

The impact of the PJBL model based on portfolio assessment on *the creativity* of students in *the study of nail art*

The purpose of this study was to investigate the effect of project-based learning (PjBL) on students' creativity through portfolio assessment in the fields of care of hands, feet and *Nail Art*. In the result of the data analysis, the portfolio evaluation-based PjBL model has a significant impact on the creativity of the students. This is demonstrated by the normality test value of 0.103, the homogeneity test of 0.637, the value of 0.000 and the N gain of 0.85, which are included in the high category. These findings are in line with Lesena's research that demonstrated the effectiveness of PjBL in boosting learners' creativity as well as supporting Zulyusri et al. (2023) and Sudarmad (2023), which shows that the PjBL approach not only promotes critical thinking, but also increases learners' active participation in learning.

Compared to the traditional teacher-centered learning model used in the control group—which primarily involved demonstrations and passive observation—the portfolio-based PjBL model provided structured and active participation. This approach resulted in significantly higher N-Gain scores for both critical thinking and creativity in the experimental group.

For critical thinking, the control group achieved a mean N-Gain of 0.74 (moderate category), while the experimental group reached 0.82 (high category). This indicates that the learning approach applied in the experimental group was more effective in enhancing students' critical thinking skills. For creativity, the control group reached an N-Gain of 0.69 (moderate), whereas the experimental group achieved 0.85 (high), reinforcing the success of the intervention in enhancing student creativity.

Although this study focused on nail art instruction, the portfolio-based PjBL model can be effectively adapted to other vocational subjects such as culinary arts, fashion design, or automotive repair, where project-based tasks and tangible products are central.

However, teachers may face challenges such as time constraints, lack of training, or difficulties in designing meaningful projects. Thus, institutional support and professional development are essential for successful implementation. Although student motivation and engagement were not directly measured in this study, observational data indicated higher levels of participation and enthusiasm in the experimental group during implementation.

Moreover, while effective in this context, the model's scalability may be limited in schools with fewer resources or higher student-teacher ratios. Further research is needed to explore feasible strategies for broader implementation.

Applying the Model Project Based Learning (PjBL) based on portfolio analysis significantly improves learners' skills in critical thinking and creativity, especially in nail art design. Through portfolio assessments that include sketches, plans, deliverables, and presentations, students can demonstrate their skills in analysis and evaluation. In addition, according to Torrance, the model generates four indicators of creativity: fluidity, flexibility, originality and elaboration. Students demonstrate a great ability to design effectively, adapt to techniques and feedback, create unique and innovative designs, and pay attention to detail to create clean and structured work.

Conclusion

Based on the results of the research that has been conducted on the influence of the Project Based Learning (PjBL) model based on portfolio assessment on students' critical thinking skills and creativity in the elements of hand, foot and nail art at SMKN 1 Lingsar, it can be concluded that:

1) **The PjBL model based on portfolio assessment has a significant influence on students' critical thinking skills.**

   The results of the analysis showed that students' critical thinking scores were normally distributed (p = 0.487) and had homogeneous variance (p = 0.837). The t-test showed a

significant increase in critical thinking in students in the experimental group compared to the control group (p = 0.024). Furthermore, the N Gain score of 0.81 which is included in the high category indicates that this learning model is effective in improving students' critical thinking skills.

2) **The PjBL model, which is based on portfolio evaluation, has a huge impact on learner creativity.**

Results of the normality test (p = 0.103) and homogeneity test (p = 0.637) showed that the students' creativity data corresponded with the assumptions of normality and homogeneity. The t test showed that the PjBL model, based on portfolio analysis, had a significant impact on student creativity with a value score of p = 0.000. Furthermore, the N Gain value of 0.85 which is included in the high category shows that this model is able to significantly increase student creativity.

From here it can be concluded that the implementation of Project-Based Learning (PjBL) based on portfolio assessment is an effective learning strategy to improve students' critical thinking and creativity when *learning nail art*. It is recommended that vocational schools integrate the portfolio-based PjBL model into their curriculum planning, especially in skill-based subjects. Curriculum developers should consider aligning project outcomes with industry standards and incorporating reflective portfolio tasks to foster deeper learning.

Further studies are recommended to explore long-term retention of critical thinking and creativity skills, as well as the transferability of these skills to real-world work contexts. Broader implementation trials across various vocational disciplines could strengthen the model's validity and sustainability

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