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Effect of Project-Based Learning Implementation on XI-Grade Culinary Students' Performance in Cucur Cake Production at SMKN 6 Surabaya

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ABSTRACT

This research investigates the influence exerted by the application of the Project-Based Learning (PjBL) strategy on students' academic performance in practical culinary education, specifically in the preparation of kue cucur among Grade XI students in the culinary arts program at SMKN 6 Surabaya. Initial observations indicated low performance due to weaknesses in technical skills, raw material management, and innovation in presentation. Traditional instructional methods were found inadequate for developing the practical competencies and creativity demanded by the culinary industry. This research adopts a quantitative method within a quasi-experimental framework. Two classes were purposively selected: an experimental group taught through the Project-Based Learning (PjBL) model and a control group instructed using conventional methods. Data were obtained through pre-tests and post-tests, then analyzed to assess normality and homogeneity of variance. An Independent Samples T-test was subsequently conducted using SPSS version 27. The analysis revealed a statistically significant difference between the two groups, with a p-value of 0.001 ($p < 0.05$) .Students in the experimental group exhibited greater improvements in theoretical understanding, practical execution, and creativity in product presentation. These findings suggest that the PjBL model effectively enhances both cognitive and practical competencies in vocational culinary education and provides a more engaging and industry-relevant learning experience.

Keywords: *Cucur Cake, Culinary Learning, Learning Outcomes, Project-Based Learning, SMKN 6 Surabaya*

INTRODUCTION

The advancement of human resources is strongly influenced by the role of education. High-quality educational systems are essential for developing individuals with the skills and competencies needed in a competitive environment. To elevate the standard of education in Indonesia, the government has introduced a range of reforms, encompassing both curriculum development and the implementation of innovative instructional approaches. Although the curriculum is often viewed as the overall educational experience of a student, there is actually more to it than that in the curriculum. The curriculum is so rich and diverse that it cannot be considered as the beginning or the end of a student's learning process. The curriculum serves as the core component of the educational process, strategically designed to facilitate students' holistic skill development and to equip them with the competencies required for their academic and professional growth (Lutfiana, 2022).

The instructional process within schools is intended to equip students with the knowledge and skills necessary to secure improved future prospects, to develop noble personalities, smart individuals, and those with broad knowledge. All these learning goals can be reflected in the students' achievements in the form of learning outcomes. This aligns with the mandate of Law Number 20 of 2003 on the National Education System, particularly Article 3, which articulates that national education serves to cultivate learners' potential and develop character and a dignified national civilization, ultimately aiming to build an enlightened society. It underscores the comprehensive growth of students into individuals who uphold moral values, possess integrity, and demonstrate commitment to spiritual and ethical principles, uphold ethical integrity, maintain physical and mental well-being, possess intellectual competence and practical skills, exhibit creativity and independence, and are prepared to engage as responsible and democratic members of society. The future of Indonesia is a sovereign, advanced, just, and prosperous Indonesia, as articulated in the Golden Indonesia Vision 2045. Vocational schools aim to equip students with skills (Alam, 2019). Vocational education is a comprehensive experiential concept that prepares individuals for success in the workforce. Learning in vocational education includes theoretical learning and practical learning. Vocational schools also cover the culinary industry, which operates in the field of services and products (Sriwiarti et al., 2024).

Based on the initial observations conducted by the researchers at SMKN 6 Surabaya, the students' learning outcomes in making cucumber cakes have not been optimal. Some students show difficulties in mastering the techniques of making, managing materials, and innovating in presentation. Hence, an interactive instructional approach is essential to enhance student learning outcomes. The selection of an appropriate learning model plays a pivotal role in determining the effectiveness of the educational process. It is therefore critical to adopt a model that

aligns with the instructional content and actively engages students in the learning experience. Some of the learning models used must be student-centered. One of these learning models is PjBL (Sari, 2023), which structures the learning process around the completion of meaningful projects as a central component of instruction (Febiwanti et al., 2023).

Numerous prior studies have highlighted the positive impact of PjBL on student achievement across various subject areas. Nevertheless, empirical investigations focusing on its implementation within the domain of culinary education remain relatively scarce. Meanwhile, the culinary industry has unique characteristics that require a learning approach tailored to the practical demands in the field. Given the critical need to prepare graduates for the demands of the culinary industry, additional inquiry is necessary to explore the extent to which the application of the PjBL model enhances learning outcomes among students in the culinary field.

This research investigates the impact of implementing the Project-Based Learning (PjBL) model on students' learning outcomes in the preparation of *cucur* cake. Through the use of PjBL, students are expected to develop a deeper conceptual understanding, enhance their practical skills, and foster greater creativity in producing high-quality culinary products.

LITERATURE REVIEW

Project-Based Learning is a pedagogical approach that engages students in creating a project as a means to address real-world problems, enabling them to develop and apply relevant concepts throughout the problem-solving process. This PjBL learning model makes educators act as facilitators for students by providing them with ample opportunities to create ideas or concepts (Widana & Septiari, 2021). The PjBL model is refers to an instructional approach centered on the development of projects that engage students in exploring real-world issues collaboratively. This method is often employed by educators as an effective strategy to present course content in a manner that fosters student enjoyment and active participation (Sudrajat & Hermawati, 2020).

In the PjBL model, educators assume the roles of facilitators and mentors, guiding students through the process of addressing and resolving their learning challenges. This is very different from conventional learning, where teachers must master the material and the material is delivered directly to students. Natty et al. (2019) stated that the Project-Based Learning (PjBL) model consists of the following steps:

1. The learning process begins with questions that guide students through activities that prepare them to learn. Extensive research discussing real-world situations can serve as a useful starting point for providing information.

2. Planning the project. Project planning is carried out collaboratively between teachers and students to instill a sense of responsibility for the project's completion.
3. Designing an activity schedule after completing tasks, teachers and students create an activity schedule. Instructions must be provided to help students manage their time effectively, and a clear timeline for project completion should be provided. With the assistance and guidance from the teacher, students learn new material.
4. Supervising the project work process, the teacher oversees the activities carried out by the students. By providing students access to facilities during the project creation process, supervision is needed so that the teacher acts as a mentor for the project being worked on by the students. Guidance is carried out so that students participate in groups and allow them to play their roles without conflicting with the interests of the group.
5. Providing an evaluation of the produced products. This assessment is carried out to help teachers reflect on whether the standards have been met, assess the progress of each student, provide feedback to students to improve understanding, and assist educators in developing teaching strategies that will be implemented.
6. Each group will individually present their product in front of the class as part of the product evaluation process. In this final stage, the teacher and students demonstrate their work. Each group presents their results, engages in a question and answer session with other groups, and participates in a discussion process where the teacher supports the students' outcomes. Reinforcement can be provided through praise and guidance if the students are unable to present or answer questions.

RESEARCH METHODOLOGY

This research adopts a quantitative framework through a quasi-experimental approach to explore the influence of applying the PjBL model on students' learning performance in preparing cucur cakes. The study employs a Nonequivalent Control Group Design, involving two groups selected through non-random procedures: one serving as the experimental group and the other as the control group.

The investigation took place at SMKN 6 Surabaya and targeted Grade XI students enrolled in the Culinary Arts program during the 2024/2025 academic year. The participants comprised two purposively selected classes, each consisting of 19 students. The experimental group was instructed using the PjBL strategy, whereas the control group received teaching through traditional methods commonly practiced by educators, including lectures and demonstrations.

A written test (pre-test and post-test) was utilized as the research instrument to assess cognitive learning outcomes. Data obtained from the tests were analyzed

using an Independent Samples t-test with the assistance of SPSS software to determine whether there was a statistically significant difference in learning outcomes between the two groups. The decision-making criteria are that if the significance value (Sig. 2-tailed) < 0.05, there is a significant difference between the two classes.

RESULT AND DISCUSSION

Research Results

Normality Test

Table 1. Normality Test Results

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Kelas	Statistic	df	Sig.	Statistic	df	Sig.
Hasil Belajar	Pretest Eksperimen	.170	19	.150	.954	19	.455
	Posttest Eksperimen	.149	19	.200*	.974	19	.859
	Pretest Kontrol	.124	19	.200*	.962	19	.617
	Posttest Kontrol	.150	19	.200*	.947	19	.349

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Source: Processed Data by Researchers (2025)

Referring to the Kolmogorov-Smirnov normality test results, the obtained significance values for both the pre-test and post-test scores in the experimental group are above 0.05. Likewise, the control group's pre-test and post-test significance values also exceed 0.05. These results confirm that the data in both groups meet the criteria for normal distribution.

Homogeneity Test

Table 2. Homogeneity Test Results

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Hasil Belajar	Based on Mean	.792	3	72	.502
	Based on Median	.624	3	72	.602
	Based on Median and with adjusted df	.624	3	69.567	.602
	Based on trimmed mean	.768	3	72	.516

Source: Processed Data by Researchers (2025)

Based on the results presented in the combined homogeneity test table, the significance value between the experimental and control classes is 0.502. Since this value exceeds 0.05, it indicates that the data variances between the two groups are homogeneous. This satisfies the assumptions of homogeneity of variance, thereby allowing the research to proceed to the next stage of analysis.

Hypothesis Test

Table 3. Hypothesis Test Results

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Hasil Belajar	Equal variances assumed	.275	.603	-3.507	38	.001	-18.500	5.275	-29.179	-7.821
	Equal variances not assumed			-3.507	37.567	.001	-18.500	5.275	-29.183	-7.817

Source: Processed Data by Researchers (2025)

The results of the Independent Samples Test reveal a significant statistical difference between the experimental and control groups, as demonstrated by a p-value (2-tailed) of 0.001, which is below the threshold of 0.05. This finding indicates that learners who received instruction through the PjBL model achieved higher performance compared to those who underwent conventional teaching methods. As a result, the null hypothesis (H_o) is rejected, supporting the conclusion that the PjBL approach has a positive effect on students' learning outcomes in producing *cucur* cakes within the Grade XI Culinary Program at SMKN 6 Surabaya.

Research Discussion

This research involves two groups of participants: students with attendance numbers 1–19 are assigned to the experimental class, while those numbered 20–38 comprise the control class. The experimental group is instructed using the PjBL model, whereas the control group receives instruction through traditional teaching methods. To measure students' cognitive development, both groups undergo a pre-test before the intervention and a post-test after completing the instructional sessions. These assessments are designed to evaluate the effectiveness of the applied teaching strategies in enhancing student learning outcomes.

The implementation of the cake cucur making practice in this study was conducted in one meeting during the Indonesian Cake and Pastry Products subject in class XI Culinary at SMKN 6 SurabayaInstruction was delivered in two classes: the experimental class, which applied the PjBL model, and the control class, which utilized conventional instructional methods. In the experimental class, the application of the PjBL model was strategically adapted to ensure its effectiveness despite the constraints of a limited instructional timeframe. The strategy used was

to condense the stages of PjBL into one integrated cycle in a single meeting. The learning activities include:

1. Introduction and Brief Planning of the Project

   The teacher begins the activity by explaining the learning objectives and introducing the basic concept of making cucur cakes. The students are then divided into several small groups and asked to create a simple work plan, such as determining materials, tools, steps, and division of tasks among members.
2. Project Implementation

   After the brief planning, the students immediately practice making cucur cakes. They prepare the ingredients, mix the dough, and fry the cakes according to the procedure. The teacher facilitates the practice, supervises the process, and provides direct feedback to the groups.
3. Product Evaluation and Reflection

   After practice is complete, the products from each group are evaluated based on aspects of appearance, taste, texture, and cleanliness of the workspace. Students also engage in simple reflection through group discussions about the challenges faced and the solutions implemented during the practice process.

In this study, the Project-Based Learning (PjBL) model is a learning model where students are directly involved in solving problems and creating projects. This PjBL learning model allows educators to act as facilitators for students by providing ample opportunities to create ideas or concepts (Widana & Septiari, 2021). The Project-Based Learning model offers teachers the opportunity to facilitate classroom instruction through project-based activities, enabling students to engage actively in meaningful learning experiences. Additionally, students are required to design, solve problems, perform skills, make decisions, and be given the opportunity to work independently.

Applying the Project-Based Learning (PjBL) approach substantially enhances students' collaboration abilities, as it promotes teamwork, shared responsibility, and joint problem-solving throughout the learning process. Key success factors include the relevance of the project to students' lives, intensive teacher guidance, and structured collaborative activities (Fazhari et al., 2024). In contrast, in the control class, learning is conducted conventionally, where the teacher first provides explanations, followed by demonstrations and individual practice without group planning or project collaboration. Conventional or traditional learning is a teacher-centered model where the main methods are lectures, memorization, and exercises (Amirova, 2025). Students tend to follow instructions passively and focus on the product outcomes without involvement in planning or problem-solving.

Based on the analysis of students' learning outcomes in both the experimental and control classes, the data were processed using SPSS version 27 with parametric

statistical methods involving several tests. Prior to conducting the t-test, normality and homogeneity tests were performed to determine whether the data met the required assumptions. The results of the normality test showed significance values of 0.150 for the experimental class pre-test and 0.200 for the control class post-test, both exceeding the 0.05 threshold. These values indicate that the data from both groups follow a normal distribution. Additionally, the homogeneity test revealed a significance value of 0.502, which also exceeds 0.05, suggesting that the variance in learning outcomes between the experimental and control classes is homogeneous.

Subsequent hypothesis testing was conducted using an Independent Sample T-test. The analysis produced a two-tailed significance value of 0.001, which is below the 0.05 significance threshold. Consequently, the null hypothesis (H_o) is rejected and the alternative hypothesis (H_a) is accepted. This indicates that the implementation of the Project-Based Learning model exerts a statistically significant influence on the learning outcomes of eleventh-grade culinary students at SMKN 6 Surabaya in the context of cucur cake preparation. This finding is further reinforced by the marked differences observed in the pre-test and post-test scores between the experimental and control classes.

The findings of this research align with the perspective of Ibrahim et al. (2023), who assert that learning outcomes reflect the results students achieve after undergoing the learning process, encompassing evaluations of their knowledge, attitudes, and skills. An individual's success in mastering subject matter can be measured through these outcomes. Employing an appropriate learning model contributes to the creation of a conducive learning environment, enabling the process to align with intended objectives while fostering greater student engagement and participation (Cahyani et al., 2024).

This research is also in line with the study entitled "The Effect of Project-Based Learning (PjBL) Model on Mathematics Learning Outcomes" which shows that the analysis of the implementation of learning achieved an average of 93.75% in the very good category. The hypothesis test calculation yielded a t-count of 2.353 and a t-table value of 1.671. Since the t-count exceeded the t-table, the alternative hypothesis (H_a) was accepted and the null hypothesis (H_o) rejected, indicating that the PjBL model positively influences mathematics learning outcomes among fifth-grade students at SDN 19 Cakranegara, Mataram City (Butar Butar et al., 2022).

Consistent with prior findings, the current research also demonstrates a significant effect of applying the PjBL model on the learning outcomes of Grade XI culinary students at SMKN 6 Surabaya in the practice of making cucur cakes. This is supported by a statistical significance value of $0.001 < 0.05$, confirming the rejection of the null hypothesis (H_o) and the acceptance of the alternative hypothesis (H_a), thereby indicating a meaningful impact within this context.

CONCLUSION

The project-based learning model emphasizes student engagement through the creation of projects that address real-world problems collaboratively in group settings. This approach is often selected by educators as it encourages enjoyment in learning while delivering content meaningfully. Research findings indicate a notable impact of this model's application, as evidenced by the Independent Sample T-test, which yielded a significance value of 0.001 < 0.05. This confirms that H_o is rejected and H_a is accepted, signifying a statistically significant influence. The implementation of the PjBL model demonstrably improves the learning outcomes of Grade XI culinary students at SMKN 6 Surabaya in the practical task of making cucur cakes. Beyond academic achievement, this model also fosters the development of essential technical skills and professional work ethics, aligning well with the competencies required in the culinary industry.

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