ISSN 2656-8039 (online)
International Journal of Environment, Engineering & Education
Volume 7, Issue 2, August 2025
www.ijeedu.com

OPEN ACCESS

Research Article

The Effectiveness of a Vlog-Integrated Project-Based Learning Model on Culinary Arts Learning Achievement

Lise Asnur[1*], Jusmita Weriza[2], Meddiati Fajri Putri[3]

[1] Department of Tourism, Faculty of Tourism and Hospitality, Universitas Negeri Padang, Padang, West Sumatra 25131, Indonesia
[2] Department of Informatics Management, Faculty of Economics, Universitas Ekasakti, Padang, West Sumatra 25115, Indonesia
[3] Department of Family Welfare Education, Faculty of Engineering, Universitas Negeri Semarang, Semarang, Central Java 50229, Indonesia

Abstract

Project-Based Learning (PjBL) is a constructivist learning model that emphasizes active student engagement through real-world projects. Implementation in vocational education often faces challenges such as limited time, high material costs, and procedural errors. This study aims to evaluate the effectiveness of integrating vlogs into Project-Based Learning, or Project-Based Learning with Vlog (PjBLV), in improving learning readiness, reducing procedural errors, and enhancing students' culinary practicum outcomes. Employing a quasi-experimental design with a nonequivalent control group, the research involved 26 third-semester students of the Hospitality Management Program at Universitas Negeri Padang, divided equally into an experimental group (PjBLV) and a control group (PjBL). The instruments consisted of a pre-test, essay-based post-test, and practicum assessment, all validated and tested for reliability. At the same time, data were analyzed using N-Gain and independent t-tests at a 0.05 significance level. Findings revealed that the experimental group achieved a higher post-test mean score (88.67) than the control group (84.42), with an N-Gain of 80.46% categorized as high, indicating significant improvement in learning outcomes. The consistent distribution of scores demonstrated that PjBLV benefitted students across different ability levels, thereby reducing performance gaps. PjBLV proved more effective than conventional PjBL by promoting time efficiency, minimizing errors, and optimizing resources. The implications suggest that PjBLV is a promising pedagogical model for broader application in vocational education. Future studies are recommended to examine its impact on long-term skill retention and to explore the integration of interactive, technology-enhanced vlog-based learning for more personalized instruction.

Keywords: Blended Learning Approach; Digital Learning Media; Instructional Innovation; Self-Regulated Learning; Video-Based Pedagogy.

Received: May 10, 2025
Accepted: August 18, 2025
Published: August 20, 2025

Article Citation: L. Asnur, J. Weriza, M.F. Putri, "The Effectiveness of a Vlog-Integrated Project-Based Learning Model on Culinary Arts Learning Achievement," International Journal of Environment, Engineering & Education, Vol. 7, No. 2, pp. 109-118, 2025.
https://doi.org/10.55151/ijeedu.v7i2.276

***Corresponding Author:** L. Asnur
✉ lise.asnur@fpp.unp.ac.id

1. INTRODUCTION

Learning models are the backbone of instructional design, providing educators with systematic procedures for guiding learners toward predetermined learning objectives [1]–[3]. They function as teaching techniques and conceptual frameworks that connect learning theories, pedagogical strategies, and instructional goals [4], [5]. The choice of an appropriate learning model influences the quality of teacher–student interactions, the organization of learning activities, and ultimately, student achievement [6].

Each learning model is characterized by a sequence of phases, tailored to the implemented instructional method. For example, project-based approaches generally involve formulating a problem, designing and planning the project, implementing the solution, monitoring progress, evaluating outcomes, and reflecting on the process [7]. Understanding these phases is crucial, particularly in domains where hands-on learning requires integrating knowledge with practical skills.

Within practicum-based education, the Project-Based Learning (PjBL) model has gained significant traction across

various disciplines, particularly in vocational and technical education [8], [9]. PjBL situates the project as the central vehicle for learning, requiring students to engage deeply with authentic, real-world problems and to produce tangible outputs that address these problems [10], [11].

PjBL, as popularized by the George Lucas Educational Foundation, is recognized for its alignment with 21st-century skills development critical thinking, collaboration, communication, and creativity [12]–[14]. Multiple studies have shown that PjBL enhances learner engagement, fosters self-directed learning, and supports the development of higher-order cognitive skills [15], [16].

Despite its proven strengths, implementing PjBL in practice-intensive fields such as culinary arts pose unique challenges. Culinary education is inherently project-oriented but requires high levels of procedural accuracy, substantial use of materials, and close adherence to time constraints factors that magnify the impact of inefficiencies in the learning process.

While PjBL offers clear pedagogical advantages, empirical evidence points to several persistent limitations that can reduce its effectiveness in vocational training contexts. First, long implementation periods are often incompatible with rigid course schedules, particularly in vocational programs where multiple competencies must be addressed within a limited time frame [17]. Second, high resource demands such as purchasing consumable materials and accessing specialized equipment can create financial barriers for institutions and learners [18]. Third, variation in students' prior knowledge can lead to uneven participation and inconsistent project outcomes, with some students struggling to keep pace while others move ahead rapidly [15], [19].

In practicum-heavy courses, these limitations translate into tangible consequences: higher rates of procedural errors, material wastage, and reduced instructional time for skill refinement. In culinary training, ingredient preparation mistakes or cooking techniques produce substandard dishes and waste expensive resources. Addressing these challenges requires innovations that streamline preparation, standardize baseline knowledge, and reduce reliance on repetitive in-class demonstrations.

One promising solution is strategically integrating digital learning media into the PjBL framework. Digital media can deliver consistent, reusable instructional content that students can access anytime and anywhere, allowing them to prepare before class, reinforce their understanding during practice, and review after the session.

Video blogs, in particular, have emerged as an engaging and pedagogically versatile medium. Vlogs combine visual demonstrations, auditory explanations, and narrative context in a format that supports both declarative and procedural knowledge acquisition [20], [21]. By aligning with Mayer's [22] principles of multimedia learning, vlogs can enhance retention, improve comprehension, and cater to diverse learning styles visual, auditory, and kinesthetic.

In vocational education, instructional videos have been shown to improve skill acquisition, reduce the number of practice errors, and build learner confidence before hands-on activities [23]–[25]. These qualities make vlogs an especially suitable medium for procedural training in culinary arts, where students benefit from observing detailed demonstrations before attempting a task themselves.

Integrating vlog-based instruction into the Project-Based Learning (PjBL) framework has led to the development of an enhanced pedagogical approach known as Project-Based Learning with Vlog (PjBLV). This model synthesizes the constructivist, inquiry-driven nature of PjBL with the flexibility, accessibility, and scalability of video-based learning. By embedding vlogs into each stage of the project cycle, PjBLV seeks to address several persistent challenges in traditional project-based instruction, particularly in skill-intensive and resource-dependent fields such as vocational education.

At its core, PjBLV is grounded in the premise that learners can achieve greater procedural mastery when engaging with instructional materials before direct practice. Access to high-quality vlog content before classroom or laboratory activities allows students to familiarize themselves with the task's steps, tools, and conceptual underpinnings, thereby streamlining the in-class implementation phase [26]. This preparatory exposure improves time efficiency and mitigates the risk of procedural errors that might otherwise result in wasted materials, increased costs, or compromised learning outcomes. Moreover, because all learners receive the same instructional resource, disparities in prior knowledge can be reduced, creating a more level playing field and enabling collaborative work to progress more smoothly.

The structure of PjBLV reflects a modification of the established PjBL stages, as articulated by Asmarani and Mariati [27] and further operationalized by Asnur et al. [28]. The process begins with identifying a driving question that stimulates curiosity and frames the project's scope. Learners then move to the design phase, where they collaboratively plan the project's objectives, methods, and deliverables. At the learning stage, students engage with curated vlog materials that demonstrate key techniques, conceptual explanations, and procedural sequences relevant to the project. These resources are not passive content; they serve as cognitive scaffolds, enabling learners to visualize complex processes and internalize critical steps before attempting them.

Culinary Arts is an ideal context for implementing the PjBLV model due to its procedural and project-based nature. Mastery in this field requires sequential skills such as mise en place, cooking techniques, plating, and sensory evaluation, which are best acquired through demonstration and repeated practice [29], [30]. Vlogs enhance this process by enabling students to prepare before class, reducing briefing time and maximizing hands-on work. They also provide detailed visualizations of complex actions, such as precise knife handling or sauce preparation, that may be missed in live demonstrations. They allow learners to review specific segments at their own pace to strengthen mastery. Research by Wang et al. [31] confirms that video-based instruction

improves learner readiness, shortens practice time, and enhances product quality, underscoring PjBLV's potential to meet the specific demands of culinary training.

Although PjBL and vlog-based instruction have been individually studied across various disciplines, empirical research on their combined application in vocational culinary education remains limited. Most prior studies have either focused on theoretical benefits or have been conducted in language learning and general education. Few have systematically evaluated the impact of PjBLV on time efficiency, cost-effectiveness, error reduction, and learning outcomes in a hands-on, resource-intensive context like catering. This gap in the literature is significant because culinary training, with its high material costs and procedural demands, stands to benefit significantly from a model that addresses these challenges without compromising instructional quality.

The present study investigates the PjBLV model's effectiveness in catering to education to address this gap. Specifically, it examines whether integrating vlogs into the PjBL framework can improve student readiness, reduce procedural errors, optimize time and resource usage, and enhance learning outcomes. The findings are expected to contribute to the theoretical advancement of blended pedagogical models in vocational education and provide practical guidance for educators seeking to implement cost-effective, time-efficient, and high-quality instructional strategies.

2. LITERATURE REVIEW

2.1. Learning Models in Education

A learning model serves as a conceptual framework that systematically outlines procedures in the teaching and learning process to achieve specific objectives. Joyce and Calhoun [4] emphasize that every learning model consists of four essential components: syntax (instructional phases), social system, reaction principles, and support system. Arends [6] further highlights that selecting an appropriate model should be based on learners' characteristics, subject matter, and instructional objectives to optimize learning outcomes.

In contemporary education, the choice of a learning model is influenced by classroom conditions and the broader demand for twenty-first-century competencies. Learning models must foster critical thinking, creativity, collaboration, and communication [32]. Similarly, Trilling and Fadel [33] identify these competencies as the core of the 21st Century Skills framework. Slavin [34] reinforces this perspective by underscoring the importance of evidence-based instruction, which advocates the implementation of models proven through empirical research to enhance learning outcomes.

This theoretical orientation has led to the growing adoption of constructivist-based learning models, which position students as active participants in constructing knowledge. Project-based learning (PjBL) has gained significant attention due to its capacity to integrate cognitive, affective, and psychomotor domains within a single learning experience.

2.2. Project-Based Learning (PjBL)

Project-Based Learning is a constructivist-oriented model that emphasizes projects as the central element of instruction. Thomas [35] defines PjBL as an in-depth investigation into complex questions or problems, culminating in a tangible product or solution that reflects student understanding. PjBL is a model particularly relevant to twenty-first-century learning, as it nurtures collaboration, communication, creativity, and problem-solving skills [36].

Extensive research supports the effectiveness of PjBL. Bell [10] demonstrates that PjBL enhances student motivation and engagement, while Kokotsaki, Menzies, and Wiggins [15] report that it strengthens conceptual understanding, higher-order thinking, and teamwork. Nonetheless, Markham [37] identifies several challenges in its implementation, including extended time requirements, high resource demands, and disparities in students' prior knowledge, all of which may hinder equitable comprehension.

Recent studies have proposed innovations to address these limitations. Guo et al. [38] found that integrating digital technologies into PjBL improves efficiency and reduces gaps in student abilities. Similarly, Lee, Blackwell, Drake, and Moran [39] note that digital PjBL fosters the production of more creative and multimedia-based learning outputs. Habók and Nagy [40] further reveal that PjBL enhances students' self-regulated learning by training them to plan, manage, and evaluate their projects.

In vocational education, the application of PjBL has proven particularly valuable. PjBL strengthens technical competencies and cultivates essential soft skills such as collaboration, communication, and time management [41], [42]. This makes PjBL highly suitable for fields such as Culinary Arts, where instruction requires an effective integration of theory and practice.

2.3. Vlogs as Learning Media in Education

Instructional media play a pivotal role in facilitating the delivery of content and enhancing student comprehension. Kay [21] argues that video-based materials are especially effective in visualizing abstract concepts, thereby aiding the understanding of procedural and conceptual knowledge. Building on this, Mayer [22], through the Cognitive Theory of Multimedia Learning, asserts that multimodal media integrating visual, auditory, and textual elements significantly improve information processing and accommodate diverse learning styles, such as visual, auditory, and kinesthetic.

Vlogs represent an innovative form of multimedia learning that integrates these elements. Hung, Hwang, and Huang [20] observe that vlogs promote self-directed learning and allow learners to review material before, during, and after classroom instruction. This flexibility makes vlogs especially compatible with the flipped classroom model.

Using vlogs in vocational education, particularly in Culinary Arts, has proven effective in enhancing procedural

knowledge. Vlogs allow students to observe practical steps visually and repeatedly, thereby reducing errors during practice and saving instructional time that would otherwise be spent on repeated demonstrations [43]. Consequently, costs associated with repeated mistakes can be minimized, while instructors can focus more on providing individualized feedback and facilitating more meaningful discussions [44].

Beyond efficiency, vlogs strengthen long-term retention by combining visual and verbal channels that deepen cognitive processing [45]. The material becomes easier to remember while increasing student motivation and engagement, as learners prefer interactive and flexible media [46]. Thus, vlogs are not merely supplementary tools but instructional strategies that enhance pedagogical effectiveness and better prepare vocational students to face real-world challenges in the workplace.

More recent evidence also supports these findings. vlogs enhance students' practical performance and their reflective skills through the documentation process [47], [48]. Likewise, Alwehaibi [49] highlights the collaborative nature of vlogs, demonstrating their effectiveness in increasing active participation and peer interaction. Thus, vlogs can serve as a powerful complement to PjBL by overcoming its practical limitations, providing accessible and repeatable resources, and accommodating multiple learning styles.

3. MATERIAL AND METHODS

3.1. Research Design

This research employed a quasi-experimental design with a nonequivalent control group, conducted in the culinary practicum classes during the July–December 2024 semester at the Hospitality Management Department, Universitas Negeri Padang. The learning environment consisted of standard teaching kitchens equipped uniformly across classes, including gas ranges, ovens, refrigerated worktables, chilled prep stations, calibrated digital thermometers, and standardized cooking utensils. All instructional materials and activities are aligned with the departmental practicum syllabus, covering five major culinary domains: salad preparation, sauce production, soup making, entrée creation, and main course execution. These domains were chosen to ensure that the instructional interventions Project-Based Learning (PjBL) and its variant (PjBLV) could be meaningfully compared regarding their effect on student learning outcomes.

3.2. Participants and Sampling

The target population included all active Culinary Practicum classes offered to third-semester students in the Hospitality Management program at Universitas Negeri Padang. Sampling was conducted using a purposive sequential sampling approach, in which classes were selected based on schedule availability and instructor assignment until two classes that met the inclusion criteria were identified.

The class-level inclusion criteria were as follows: (1) the class was taught by an instructor with a minimum of two years of teaching experience, (2) the number of students in the class ranged from 20 to 32, and (3) the class followed the department's standard practicum syllabus and utilized the same laboratory facilities. At the individual level, the student inclusion criteria included: (a) official enrollment in one of the selected classes, (b) participation in both the pre-test and post-test without accommodations requiring alternative assessment, and (c) a minimum attendance rate of 70% throughout the semester.

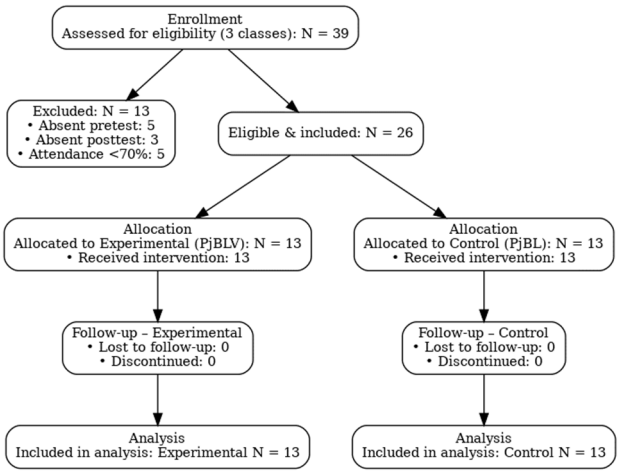

Figure 1. Participants flowchart

Exclusion criteria were applied to students who withdrew from the course, failed to attend either the pre-test or post-test, or had attendance records below the required threshold. Initially, three classes were screened for eligibility, and all students within those classes completed the pre-test. Based on the pre-test results, two classes with the closest average scores were selected as the study sample. Group 1 (G1), which had the lower average pre-test score, was assigned as the experimental group (PjBLV), while Group 2 (G2) served as the control group (PjBL). The final sample consisted of 13 students in each group, after excluding participants who did not meet the criteria (e.g., absences, incomplete data).

3.3. Instruments and Scoring

This study employed two main assessment instruments: a pre-test and a post-test to evaluate student learning outcomes in the Culinary Practicum course. The pre-test comprised 20 multiple-choice and true/false items covering competencies such as food safety, mise en place, knife skills, mother sauces, stocks, emulsions, and sensory evaluation, scored dichotomously (1 = correct, 0 = incorrect) and converted from a 0–20 raw score to a 0–100 scale. The post-test included an essay section with three prompts assessing procedural rationale, error diagnosis, and quality standards, scored with an analytic rubric (0–4 per criterion) and rescaled to 0–100, as well as a practical performance test on two culinary tasks (e.g., vinaigrette, consommé) evaluated across five weighted criteria preparation (20%), technique (20%), timing (20%), sanitation (15%), and sensory quality (25%) using a 0–4 scale; two independent assessors rated performances, and the mean score was used for analysis.

Instrument development followed rigorous quality assurance procedures. Content validity was established through evaluation by three culinary education experts, targeting a Content Validity Index (CVI) of ≥ 0.80. The pre-test underwent item analysis, examining item difficulty (p) and discrimination indices (r_pb), while rubric exemplars were provided to students before assessment to ensure scoring transparency.

Table 1. Research Instruments and Psychometrics

Instrument	Format	Items	Content Domains	Scoring & Range	Validity	Reliability
Pre-test (Baseline)	Objective (MCQ/TF)	20	Safety & sanitation; knife skills; stocks/sauces; emulsions; sensory basics	0–20 (rescaled 0–100)	Item-total (Pearson/point-biserial), expert CVI	KR-20 ≥0.70
Post-test – Essay	Analytic essay (3 prompts)	3	Procedural rationale; error diagnosis; quality criteria	Rubric 0–4/criterion; rescaled 0–100	Content mapping; item-total	α ≥0.70
Post-test – Practical	Performance tasks (2 dishes)	2	Mise en place; technique; timing; sanitation; sensory	Weighted rubric (20/20/20/15/25); 0–100	Inter-rater ICC (2, k)	α ≥0.70; ICC ≥0.75

Validity and reliability evidence were systematically gathered. For the pre-test, item-total correlations (Pearson or point-biserial) were calculated, with only items meeting the threshold of r ≥0.30 retained. For the post-test rubrics, confirmatory content mapping was performed, and inter-rater agreement was evaluated through double-rating at least 10% of responses, targeting an intraclass correlation coefficient [ICC (2, k)] of ≥ 0.75. Reliability was determined using the Kuder–Richardson 20 (KR-20) coefficient for the pre-test (acceptable ≥ 0.70) and Cronbach's α for the post-test's essay and practical scores (acceptable ≥ 0.70). Where dichotomous rubric facets were present, Phi coefficients or point-biserial correlations were applied as appropriate.

3.4. Statistical Analysis

The data were analyzed using SPSS and Microsoft Excel, with the N-Gain score as the primary dependent variable. The analysis followed a structured process to ensure validity and reliability. First, assumption checks were conducted to determine the suitability of parametric testing. Normality of N-Gain distribution for each group (experimental and control) was examined using the Shapiro–Wilk test (α = 0.05), where p > 0.05 indicated a normal distribution. Homogeneity of variance was then assessed using Levene's test (α = 0.05), with p > 0.05 signifying equal variances between groups.

Table 2. Assumption Checks Before N-Gain Comparison

Prerequisite	Objective	Test	Decision rule
Normality	Assess the distribution of N-Gain in each group	Shapiro–Wilk	p > .05 indicates normal
Homogeneity of variance	Evaluate the equality of group variances	Levene's test	p > .05 indicates equal variances
Between-group difference	Test whether groups differ on N-Gain	Independent-samples t-test	Two-tailed p < .05 significant

Based on these checks, the appropriate statistical test was selected. When both assumptions were met, an independent-samples t-test (two-tailed, α = 0.05) was used to compare mean N-Gain scores. If homogeneity was violated but normality was maintained, a Welch's t-test was applied. For non-normal data, the Mann–Whitney U test was conducted. Statistical significance was determined at p < 0.05, and all results were reported with the exact p-value and the 95% confidence interval.

4. RESULTS

4.1. Characteristics of Respondents

Table 3 presents respondents' demographic characteristics in the experimental group (n = 13) and the control group (n = 13). The data include gender, age, and previous educational background, which are essential for understanding the composition of participants and ensuring comparability between groups. These characteristics provide a clearer picture of the respondents' profiles and support the validity of the experimental design.

Table 3. Characteristics of Respondents (N=26)

Category	Experiment (n=13)		Control (n=13)	
	Freq.	Percentage	Freq.	Percentage
Gender				
Male	2	15.38%	3	23.08%
Female	11	84.62%	10	76.92%
Age				
18 years	4	30.77%	3	23.08%
19 years	7	53.85%	6	46.15%
20 years	2	15.38%	4	30.77%
Previous Education				
Vocational School	8	61.54%	9	69.23%
Senior High School	5	38.46%	4	30.77%

The distribution of respondents indicates that the majority in both groups were female, with 84.62% in the experimental group and 76.92% in the control group, suggesting that female participants were more dominant in this study. Regarding age, most respondents were 19, comprising 53.85% of the experimental group and 46.15% of the control group, while smaller proportions were 18 or 20 years old. Regarding prior education, the majority came from vocational schools (61.54% in the experimental group and 69.23% in the control group), while the rest were graduates of senior high schools. These findings show that both groups had relatively similar demographic compositions, which supports the fairness of group comparisons in subsequent analyses.

4.2. Validity and Reliability

The analysis commenced with evaluating the research instruments to ensure they were valid and reliable for measuring the intended constructs. Table 3 presents the pre-test and post-test instruments' validity and reliability test results.

Table 4. Instrument's Validity and Reliability Tests

Instruments	Validity (r-count)	Reliability (r-table)
Pre-test	0.824	0.444
Post-test	0.788	0.634

The validity test results indicate that the r-count values for both instruments exceeded the corresponding r-table values (pre-test: 0.824 > 0.444; post-test: 0.788 > 0.634), confirming that both were valid for assessing learning outcomes. The reliability coefficients further demonstrated consistency, with the pre-test yielding a high reliability value of 0.714 and the post-test a high value of 0.692. Therefore, both instruments met the required standards of validity and reliability.

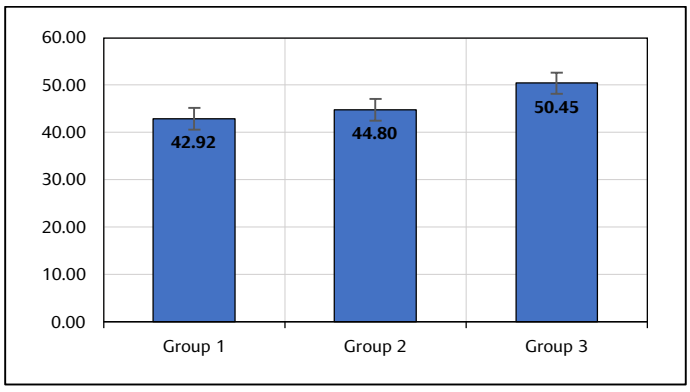

Figure 2. Pre-Test Results

The pre-test was administered to three groups of second-year students in the Hospitality Management Department after the validation process. The distribution of pre-test scores is presented in Figure 2. The pre-test results served as the basis for determining the experimental design. Group 2 (G2) was assigned as the control group, employing the Project-Based Learning (PjBL) approach. At the same time, Group 1 (G1) was designated as the experimental group, utilizing the Project-Based Learning with Video (PjBLV) approach. The intervention's impact was assessed through a post-test conducted at the end of the semester. The post-test outcomes are displayed in Figure 3.

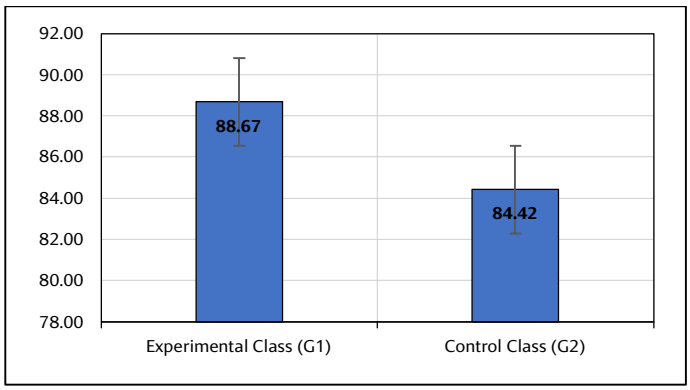

Figure 3. Post-Test Results

The post-test results revealed that the control group (PjBL) obtained an average score of 84.42, whereas the experimental group (PjBLV) achieved a higher average score of 88.67. This initial comparison indicates that the PjBLV learning approach was more effective in enhancing student performance than the conventional PjBL method. Nevertheless, a direct comparison of mean scores alone is insufficient to confirm the research hypothesis comprehensively. An N-Gain analysis was conducted to obtain a more accurate measure of learning improvement relative to initial competence. The N-Gain method allows for evaluating normalized learning gains by considering both pre-test and post-test scores. The detailed results of the N-Gain calculations are presented in the following section.

4.3. N-Gain Test

This study employed the normalized gain (N-Gain) analysis to more precisely evaluate the PjBLV learning model's effectiveness. This analysis measures the relative improvement in learning outcomes by considering both pre-test and post-test scores. This approach provides a standardized metric for comparison across learners with varying baseline competencies.

Table 5. N-Gain Test Result (Experimental Group)

Respondents (students)	Pre-test	Post-test	N-Gain (%)
S-01	36.00	85.00	0.77
S-02	38.00	85.00	0.76
S-03	40.00	85.70	0.76
S-04	41.00	86.00	0.76
S-05	41.50	86.50	0.77
S-06	41.70	86.70	0.77
S-07	40.00	88.10	0.80

Respondents (students)	Pre-test	Post-test	N-Gain (%)
S-08	43.25	88.25	0.79
S-09	45.00	90.00	0.82
S-10	45.05	90.05	0.82
S-11	46.40	91.40	0.84
S-12	50.00	95.00	0.90
S-13	50.00	95.00	0.90
Average	42.92	88.67	80.46
Minimum			75.81
Maximum			90.00

The N-Gain test was applied to the experimental group to determine how much the PjBLV intervention enhanced student achievement in the Culinary Education Practicum. Table 5 presents the detailed N-Gain results for each student. The analysis revealed an average N-Gain of 80.46%, with individual scores ranging from 75.81% (minimum) to 90.00% (maximum).

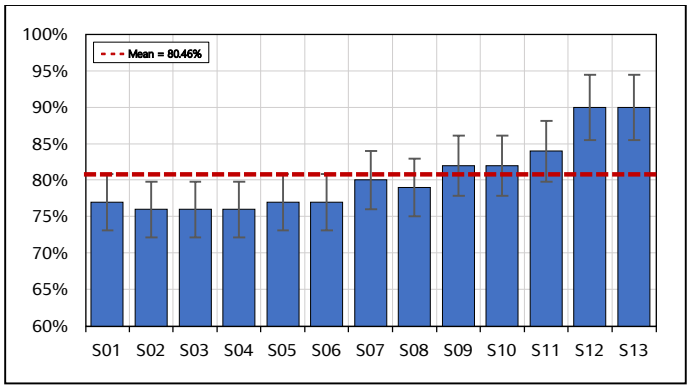

Figure 4. N-Gain Scores per Student (Experimental Group)

The visualization of N-Gain scores for the experimental group shows that all 13 students experienced substantial learning gains after implementing the PjBLV approach. The N-Gain values ranged from 75.81% (S02) to 90.00% (S12 and S13), placing all students firmly within the high improvement category according to Hake's [50] classification (>70%).

The mean N-Gain of 80.46%—indicated by the red dashed line—illustrates that most students performed above the average improvement threshold. Variability, as depicted by the error bars (standard deviation ≈ 4.9%), was relatively low, suggesting a consistent positive effect of the PjBLV intervention across individuals. The N-Gain distribution in the experimental group reveals two distinct performance clusters.

Upper cluster: Students 09–13, with N-Gain ≥ 82%, demonstrated exceptional improvement. This gain may be attributed to greater baseline motivation [51], [52], enabling these students to sustain engagement and effort throughout the learning process. Additionally, these learners may have exhibited better adaptation to video-based learning materials, as supported by Kay [21], who found that self-regulated learners benefit more from educational videos, and Guo, Kim, & Rubin [21], who demonstrated that effective video design enhances comprehension and retention. Furthermore, stronger project engagement, as highlighted by Thomas [11] and Bell [10], likely amplified their active learning experiences, leading to deeper understanding and higher post-test scores.

Lower cluster: Students 01–08, with N-Gain between 75–80%, still improved significantly according to Hake's [50] classification, but slightly below the top-performing group. Possible contributing factors include relatively lower initial motivation or slower adaptation to the video-based approach. Research suggests that students with lower prior self-regulation skills may require more time or additional scaffolding to leverage multimedia resources fully [21]. While their project engagement remained sufficient to yield substantial learning gains, these students may benefit from targeted motivational strategies and adaptive learning supports in future implementations [10].

This relatively narrow gap between the lowest and highest scores suggests that PjBLV benefits high achievers and effectively supports students with moderate initial competence, reducing the achievement gap within the group. The graphical evidence supports the statistical findings (Independent t-test and average N-Gain) that the PjBLV model fosters significant and consistent enhancement in student learning outcomes, making it a robust instructional approach for the Culinary Education Practicum.

5. DISCUSSIONS

The Project-Based Learning assisted by the Vlog (PjBLV) model positively influences students' practicum learning outcomes. This conclusion stems from the study's results, which revealed a post-test score of 88.67 in the experimental group, surpassing the control group's score of 84.42. Furthermore, this positive result reflects a high effectiveness level, demonstrated by an N-Gain of 80.46%. These findings support the hypothesis indicating a significant effect of applying the PjBLV on practicum outcomes in the Culinary Practicum course.

The PjBLV learning model is not strictly linked to any specific course field. It is designed to enhance practicum use and positively influence learning outcomes. The improvement in these outcomes results from the benefits of the PjBLV, which addresses the limitations of the traditional PjBL. Its key advantage is the incorporation of vlogs in the learning process within the PjBLV framework model.

The PjBLV learning begins with the Orientation Phase, specifically the 'Start with the Essential Question' stage. This phase aims to jog learners' memories about earlier material. By recalling previous content, instructors preserve valuable connections to the new materials in learning being presented [53], [54]. This will help educators in carrying out the next steps of PjBLV.

The second phase of the PjBLV involves designing a plan to analyze and determine students' projects. With instructor guidance, learners choose their groups and tasks [55]. Work tasks and groups are established, followed by project designs created by learners [56], [57]. The instructor subsequently examined the developed design. This discussion focuses on recognizing the indicators of project success, where the

availability of resources influences each indicator [57], [58].

In the third phase, valuable learning tools like video blogs met resource needs. This stage of the PjBLV focuses on learning through video blogs. Each learner group is provided with video blogs that offer vital information and examples for successfully finishing their projects. Furthermore, these video blogs include diverse discussions explaining the reasoning behind each student's assigned projects [2]. Video blogs act as educational tools with low abstraction. This reduced level of abstraction comes from their capacity to deliver learning material in real-time. Smartphone video blogs provide great flexibility for learning [59], [60]. Learning from the video blog, each group can refine the previously created project design, which is now finished. The instructor is excited to conduct a formative evaluation to see if students are ready to develop their projects in the fourth phase [61].

The fourth phase of the PjBLV approach focuses on monitoring the project's progress. During this phase, students actively engage in the project. Meanwhile, educators oversee the project's implementation, ensuring proper monitoring and control. They can offer support to encourage students and help develop their interpersonal and intrapersonal skills [62], [63]. In addition, the educator is a facilitator who assists students in addressing challenges during project implementation [58].

In phase five, we evaluated outcomes through presentations and demonstrations. Instructors emphasize prioritizing value for enhanced transparency and fairness [2], [58], [64]. The value assigned is assessed based on the learning experience offered. This assessment occurs in the sixth phase, titled Evaluate the Experience. This evaluation aims to add significance to every stage in the project [65]. By assigning learning implications, instructors can strengthen groups that have not fully engaged in project implementation while recognizing those who have excelled [2].

Instructors should engage students in discussions about their projects for future growth, including entrepreneurial opportunities that benefit the environment and stakeholders. [66]. The PjBLV model offers several advantages that enhance students' learning achievements. As such, the PjBLV learning model is anticipated to advance practicum learning, building on the PjBL model significantly.

6. CONCLUSION

This study demonstrates that integrating vlogs into Project-Based Learning, known as Project-Based Learning with Vlog (PjBLV), is more effective than conventional PjBL in improving students' learning outcomes in culinary practicum courses. This effectiveness is evidenced by the average post-test score of the experimental group, which reached 88.67, higher than the control group's 84.42. Furthermore, the N-Gain analysis of 80.46%, categorized as high, confirms that PjBLV significantly enhances student achievement.

Students with higher initial abilities and those with moderate skills experienced the improvement, resulting in relatively consistent learning gains and a reduced performance gap among individuals. In other words, PjBLV provides equitable benefits across different student groups.

Another advantage of PjBLV is its efficiency in learning time, reduction of procedural errors commonly encountered in culinary practice, and optimization of resource utilization. Integrating vlogs enables students to prepare beforehand by accessing detailed visual materials, making the learning process more effective, structured, and cost-efficient.

These findings imply that PjBLV holds significant potential for broader application in other vocational education fields emphasizing practical skills. This model not only strengthens cognitive and psychomotor outcomes but also supports the development of 21st-century competencies such as collaboration, communication, creativity, and self-directed learning. Future studies are recommended to investigate long-term retention of learning outcomes further and explore the development of interactive vlog-based learning supported by digital technology or artificial intelligence to enhance personalized learning experiences.

Acknowledgments

The authors sincerely thank Universitas Negeri Padang, particularly the Faculty of Tourism and Hospitality, for providing the facilities and support necessary to conduct this research. Special appreciation is extended to the participating students of the Hospitality Management Program who contributed their time and effort during the study.

References

[1] L. J. Briggs, *Instructional design: Principles and applications*. Educational Technology, 1991.

[2] H. Hamidah, T. A. S. Rabbani, S. Fauziah, izma A. Puspita, R. A. Gasalba, and Nirwansyah, *HOTS-Oriented Module: Project Based Learning*. Jakarta Selatan: SEAMEO QITEP in Language, 2020.

[3] A. S. Gibbons, E. Boling, and K. M. Smith, "Instructional design models," in *Handbook of research on educational communications and technology*, Springer, 2013, pp. 607–615.

[4] B. Joyce and E. Calhoun, *Models of Teaching*. Routledge, 2024.

[5] R. J. Menges and W. C. Rando, "What are Your Assumptions?," *Coll. Teach.*, vol. 37, no. 2, pp. 54–60, 1989, doi: 10.1080/87567555.1989.9925478.

[6] R. Arends, *Learning to teach*. McGraw-Hill Higher Education, 2014.

[7] J. Krajcik and P. Blumenfeld, "Project-Based Learning," *Cambridge Handb. Learn. Sci.*, pp. 317–333, 2006.

[8] A. Suradika, H. I. Dewi, and M. I. Nasution, "Project-Based Learning and Problem-Based Learning Models in Critical and Creative Students," *J. Pendidik. IPA Indones.*, vol. 12, no. 1, pp. 153–167, Mar. 2023, doi: 10.15294/jpii.v12i1.39713.

[9] R. Marta, A. R. Riyanda, A. D. Samala, I. P. Dewi, and N. H. Adi, "Innovative Learning Strategies: Project-Based Learning Model for Excelling in Visual Programming," *TEM J.*, vol. 13, no. 1, pp. 581–589, 2024, doi: 10.18421/TEM131-61.

[10] S. Bell, "Project-Based Learning for the 21st Century: Skills for the Future," *Clear. House A J. Educ. Strateg. Issues Ideas*, vol. 83, no. 2, pp. 39–43, 2010, doi: 10.1080/00098650903505415.

[11] L. Zhang, S. Li, and Q. Zhao, "A review of research on adakites," *International Geology Review*, vol. 63, no. 1. San Rafael, CA, USA,

pp. 47–64, 2021, doi: 10.1080/00206814.2019.1702592.
[12] J. Larmer, J. Mergendoller, and S. Boss, *Setting the standard for project based learning*. Ascd, 2015.
[13] C. Nurmaliah, T. N. Azmi, Safrida, Khairil, and W. Artika, "The impact of implementation of STEM integrating project-based learning on students' problem-solving abilities," *J. Phys. Conf. Ser.*, vol. 1882, no. 1, 2021, doi: 10.1088/1742-6596/1882/1/012162.
[14] A. Baines and A. DeBarger, "Key Principles for Project-Based Learning. Rigorous Project-Based Learning: An Inquiry-Based Educational Approach.," *Lucas Educ. Res. Georg. Lucas Educ. Found.*, 2021.
[15] D. Kokotsaki, V. Menzies, and A. Wiggins, "Project-based learning: A review of the literature," *Improv. Sch.*, vol. 19, no. 3, pp. 267–277, 2016.
[16] C. H. Chen and Y. C. Yang, "Revisiting the effects of project-based learning on students' academic achievement: A meta-analysis investigating moderators," *Educ. Res. Rev.*, vol. 26, pp. 71–81, 2019, doi: 10.1016/j.edurev.2018.11.001.
[17] J. P. K. Wardhani and A. L. Riani, "the Effectiveness of Learning Models To Increase Students' Interest in Enterpreneurship," *Int. J. Educ. Soc. Sci. Res.*, vol. 03, no. 06, pp. 245–253, 2020, doi: 10.37500/ijessr.2020.3622.
[18] C. F. Chien and C. J. Liao, "From Learning Literature to Online Holistic Education: An Investigation of an Online Holistic Environment for College Students," *Int. J. Web-Based Learn. Teach. Technol.*, vol. 16, no. 6, pp. 1–17, 2021, doi: 10.4018/IJWLTT.20211101.oa4.
[19] R. Maor *et al.*, "Relationships between metacognition, creativity, and critical thinking in self-reported teaching performances in project-based learning settings," *Think. Ski. Creat.*, vol. 50, p. 101425, 2023, doi: 10.1016/j.tsc.2023.101425.
[20] C.-M. Hung, I. Huang, and G.-J. Hwang, "Effects of digital game-based learning on students' self-efficacy, motivation, anxiety, and achievements in learning mathematics," *J. Comput. Educ.*, vol. 1, no. 2–3, pp. 151–166, 2014, doi: 10.1007/s40692-014-0008-8.
[21] R. H. Kay, "Exploring the use of video podcasts in education: A comprehensive review of the literature," *Comput. Human Behav.*, vol. 28, no. 3, pp. 820–831, 2012, doi: 10.1016/j.chb.2012.01.011.
[22] R. E. Mayer, "Multimedia learning," in *Psychology of Learning and Motivation - Advances in Research and Theory*, vol. 41, Elsevier, 2002, pp. 85–139.
[23] D. Cooper and S. Higgins, "The effectiveness of online instructional videos in the acquisition and demonstration of cognitive, affective and psychomotor rehabilitation skills," *Br. J. Educ. Technol.*, vol. 46, no. 4, pp. 768–779, 2015, doi: 10.1111/bjet.12166.
[24] R. Donkin, E. Askew, and H. Stevenson, "Video feedback and e-Learning enhances laboratory skills and engagement in medical laboratory science students," *BMC Med. Educ.*, vol. 19, no. 1, p. 310, 2019, doi: 10.1186/s12909-019-1745-1.
[25] W. S. Wang, Y. P. Cheng, H. Y. Lee, C. J. Lin, and Y. M. Huang, "Impact of anxiety and confidence in virtual reality-mediated learning transferred to hands-on tasks," *J. Comput. Assist. Learn.*, vol. 39, no. 4, pp. 1368–1381, 2023, doi: 10.1111/jcal.12805.
[26] D. F. Brilianti and A. Z. Fauzi, "The Effectiveness of Making Video Blog (Vlog) To Minimize Students' Anxiety in Public Speaking on Descriptive Text Material," *J. Basis*, vol. 7, no. 2, pp. 233–244, 2020, doi: 10.33884/basisupb.v7i2.2424.
[27] R. Asmarani and P. Mariati, "Application of Project-Based Models in Fine Arts Learning Through Class Exhibitions as a Place For Creative Processes and Art Appreciation at University," *Educ. Hum. Dev. J.*, vol. 6, no. 2, pp. 21–29, Oct. 2021, doi: 10.33086/ehdj.v6i2.2192.
[28] L. Asnur, N. Jalinus, A. Faridah, D. Irfan, A. Mubai, and F. Utami, "Empowering Project-Based Learning Model With Video Blog," *TEM J.*, vol. 14, no. 1, pp. 707–715, 2025, doi: 10.18421/TEM141-63.
[29] U. U. Amin, N. Nordin, and S. A. Hasbullah, "Assessment of Culinary Class Demonstration Methods on Students' Performance: Video Versus Live Streaming," *J. Event, Tour. Hosp. Stud.*, vol. 1, no. Number 1, pp. 71–94, 2021, doi: 10.32890/jeth2021.1.4.
[30] D. Surgenor *et al.*, "The impact of video technology on learning: A cooking skills experiment," *Appetite*, vol. 114, pp. 306–312, 2017, doi: 10.1016/j.appet.2017.03.037.
[31] Y. S. Wang, H. Y. Wang, and D. Y. Shee, "Measuring e-learning systems success in an organizational context: Scale development and validation," *Comput. Human Behav.*, vol. 23, no. 4, pp. 1792–1808, 2007, doi: 10.1016/j.chb.2005.10.006.
[32] D. C. L. Fung and T. W. Liang, "Fostering critical thinking through collaborative group work: Insights from Hong Kong," *Fostering Critical Thinking through Collaborative Group Work: Insights from Hong Kong*. Springer, pp. 1–172, 2018, doi: 10.1007/978-981-13-2411-6.
[33] B. Trilling and C. Fadel, *21St Century Skills: Learning for Life in Our Times*, vol. 47, no. 10. John Wiley & Sons, 2010.
[34] R. E. Slavin, "Instruction Based on Cooperative Learning," *Handb. Res. Learn. Instr. Second Ed.*, vol. 4, no. 2, pp. 388–404, 2016, doi: 10.4324/9781315736419-27.
[35] J. W. Thomas, "A review of research on project-based learning." San Rafael, CA, USA, 2000.
[36] N. Rehman, X. Huang, A. Mahmood, M. A. M. AlGerafi, and S. Javed, "Project-based learning as a catalyst for 21st-Century skills and student engagement in the math classroom," *Heliyon*, vol. 10, no. 23, 2024, doi: 10.1016/j.heliyon.2024.e39988.
[37] T. Markham, "Project based learning: a bridge just far enough," *Teach. Libr.*, vol. 39, no. 2, p. 38, 2011.
[38] P. Guo, N. Saab, L. S. Post, and W. Admiraal, "A review of project-based learning in higher education: Student outcomes and measures," *Int. J. Educ. Res.*, vol. 102, p. 101586, 2020, doi: 10.1016/j.ijer.2020.101586.
[39] J. S. Lee, S. Blackwell, J. Drake, and K. A. Moran, "Taking a Leap of Faith: Redefining Teaching and Learning in Higher Education Through Project-Based Learning," *Interdiscip. J. Probl. Learn.*, vol. 8, no. 2, p. 2, 2014, doi: 10.7771/1541-5015.1426.
[40] A. Habók and J. Nagy, "In-service teachers' perceptions of project-based learning," *Springerplus*, vol. 5, no. 1, p. 83, 2016.
[41] Y. Lee and B. Lee, "Developing career-related skills through project-based learning," *Stud. Educ. Eval.*, vol. 83, p. 101378, 2024.
[42] M. E. Beier, M. H. Kim, A. Saterbak, V. Leautaud, S. Bishnoi, and J. M. Gilberto, "The effect of authentic project-based learning on attitudes and career aspirations in STEM," *J. Res. Sci. Teach.*, vol. 56, no. 1, pp. 3–23, 2019, doi: 10.1002/tea.21465.
[43] A. Hansch, L. Hillers, K. McConachie, C. Newman, T. Schildhauer, and P. Schmidt, "Video and Online Learning: Critical Reflections and Findings from the Field," *SSRN Electron. J.*, 2015, doi: 10.2139/ssrn.2577882.
[44] W. Hsin and J. Cigas, "Short Videos Improve Student Learning in Online education," *J. Comput. Sci. Coll.*, vol. 28, no. 5, pp. 253–259, 2013.
[45] M. Ibrahim, P. D. Antonenko, C. M. Greenwood, and D. Wheeler, "Effects of segmenting, signalling, and weeding on learning from educational video," *Learn. Media Technol.*, vol. 37, no. 3, pp. 220–235, 2012, doi: 10.1080/17439884.2011.585993.
[46] M. N. Giannakos, "Exploring the video-based learning research: A review of the literature," *Br. J. Educ. Technol.*, vol. 44, no. 6, pp.

E191–E195, 2013, doi: 10.1111/bjet.12070.
[47] Q. Xie, X. Liu, N. Zhang, Q. Zhang, X. Jiang, and L. Wen, "Vlog-based multimodal composing: Enhancing EFL learners' writing performance," *Appl. Sci.*, vol. 11, no. 20, p. 9655, 2021, doi: 10.3390/app11209655.
[48] S. T. Hung, "Pedagogical applications of Vlogs: An investigation into ESP learners perceptions," *Br. J. Educ. Technol.*, vol. 42, no. 5, pp. 736–746, 2011, doi: 10.1111/j.1467-8535.2010.01086.x.
[49] H. O. Alwehaibi, "The Impact Of Using YouTube In EFL Classroom On Enhancing EFL Students' Content Learning," *J. Coll. Teach. Learn.*, vol. 12, no. 2, pp. 121–126, 2015, doi: 10.19030/tlc.v12i2.9182.
[50] R. R. Hake, "Analyzing Change/Gain Score." USA: Macmillan Publishing, 1999.
[51] D. H. Schunk, J. L. Meece, and P. R. Pintrich, *Motivation in education: Theory, research, and applications*, 4th ed. Boston: Pearson, 2014.
[52] E. L. Deci and R. M. Ryan, "The" what" and" why" of goal pursuits: Human needs and the self-determination of behavior," *Psychol. Inq.*, vol. 11, no. 4, pp. 227–268, 2000.
[53] M. M. da S. T. L. P. da Cruz, "Using Project Based Learning to build memorable and meaningful learning experiences," Instituto Politécnico do Porto, Escola Superior de Educação, 2022.
[54] A. Mubai, A. Ambiyar, D. Irfan, and M. S. Rasul, "Flipped Direct Instruction (FDI): A New Practicum Learning Model in Vocational Education," *Int. J. Learn. Teach. Educ. Res.*, vol. 22, no. 7, pp. 547–565, Jul. 2023, doi: 10.26803/ijlter.22.7.29.
[55] H. Suswanto, A. M. Nidhom, A. Dardiri, A. B. N. R. Pratama, A. A. Smaragdina, and K. Asfani, "Integrated reality-entrepreneurship project-based learning model to increase the skills of students," *World Trans. Eng. Technol. Educ.*, vol. 17, no. 2, pp. 187–191, 2019.
[56] E. Risdianto, R. Medriati, Parwito, and I. Setiawan, "Requirements Analysis of the Development of Project Based Learning (PJBL)-based Blended Learning Model Assisted by MOOC," *Al-Ishlah J. Pendidik.*, vol. 15, pp. 1529–1537, 2023, doi: 10.35445/alishlah.v15i2.2839.
[57] G. Lucas, "How Does Project-Based Learning Work?," *George Lucas Educational Foundation*, 2007. .
[58] D. . Flemming, *A Teacher's Guide to Project-Based Learning*. 2000.
[59] S. Hartanto, A. Huda, R. E. Wulansari, A. Mubai, Firdaus, and Shalehoddin, "The Design of Android-Based Interactive Lean Manufacturing Application to Increase Students' Work Skill in Vocational High School: The Development and Validity," *Int. J. Interact. Mob. Technol.*, vol. 16, no. 13, pp. 130–139, Jul. 2022, doi: 10.3991/ijim.v16i13.30595.
[60] E. S. Belt and P. R. Lowenthal, *Video use in online and blended courses: a qualitative synthesis*, vol. 42, no. 3. 2021.
[61] C. Doi, S. Lucky, and J. E. Rubin, "Open Educational Resources in the Time of COVID-19 Two Case Studies of Open Video Design in the Remote Learning Environment," *Knowl. Creat. Dissemination, Preserv. Stud.*, vol. 6, no. 1, 2024.
[62] S. Menggo, P. D. M. Y. Pramesti, and N. W. Krismayani, "Integrating Project-Based Learning in Preparing Students' Interpersonal Communication Skills on Speaking Courses in Indonesia," *Int. J. Learn. Teach. Educ. Res.*, vol. 22, no. 9, pp. 219–240, 2023, doi: 10.26803/ijlter.22.9.12.
[63] P. Crespí, J. M. García-Ramos, and M. Queiruga-Dios, "Project-Based Learning (PBL) and Its Impact on the Development of Interpersonal Competences in Higher Education," *J. New Approaches Educ. Res.*, vol. 11, no. 2, p. 259, Jul. 2022, doi: 10.7821/naer.2022.7.993.
[64] T. Tanti, B. Purwanto, B. Habibi, and B. Basukiyatno, "Developing Project-Based Learning for Social & Sciences Teaching Modules to Increase Learning Motivation at Smk Center of Excellence," 2022, doi: 10.4108/eai.28-5-2022.2320490.
[65] E. Tasrif, H. K. Saputra, D. Kurniadi, H. Hidayat, and A. Mubai, "Designing Website-Based Scholarship Management Application for Teaching of Analytical Hierarchy Process (AHP) in Decision Support Systems (DSS) Subjects," *Int. J. Interact. Mob. Technol.*, vol. 15, no. 9, pp. 179–191, 2021, doi: 10.3991/ijim.v15i09.23513.
[66] D. A. Sudjimat, "Implementation of project based learning model in mechanical machining skills package of vocational high school," in *Proceedings of the International Mechanical Engineering and Engineering Education Conferences (IMEEEC 2016)*, 2016, pp. 030024–1–030024–7, doi: 10.1063/1.4965758.