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Implementation of Project-Based Learning in Producing Custom-Made Uniforms Combined with Hand-Drawn Batik in Entrepreneurial Education

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ABSTRACT

This study aimed to examine the implementation of Project-Based Learning (PjBL) in producing custom-made daily uniforms combined with hand-drawn batik and to evaluate learners' learning outcomes in the 2025 Entrepreneurial Skills Education Program at LKP Kriya Busana Majapahit. The background of this study is based on the increasing demand for vocational education approaches that are capable of integrating practical skills, creativity, and entrepreneurial competence in line with industry needs, particularly in the fashion and creative industries. This research focuses on the application of PjBL as an instructional model that emphasizes authentic learning experiences through real product creation. The scope of the study covers the implementation of learning activities, learner engagement, and competency achievement in custom-made garment production integrated with batik craftsmanship. The study employed a quantitative pre-experimental design with a one-shot case study approach. Data were collected from 28 learners through structured observations and product assessments during the training program. The results show that Project-Based Learning was implemented very effectively, indicated by instructor activity scores of 3.95 and learner activity scores of 3.87, both categorized as excellent. In addition, learners achieved an average product score of 91, which exceeded the minimum mastery criterion of 82. These findings indicate that PjBL effectively supports the development of vocational competencies, improves learner engagement, and enhances product quality in custom-made batik uniform production within entrepreneurial education settings.

Key Word
Project-Based Learning, Entrepreneurial Skills Education, Custom-Made Uniforms, Hand-Drawn Batik, Learning Outcomes.

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INTRODUCTION

Vocational education plays a strategic role in preparing human resources who possess practical competencies and entrepreneurial capabilities that are aligned with labor market demands. In many countries, vocational training institutions are expected to produce graduates who are not only technically skilled but also capable of adapting

to industrial changes and technological developments. The rapid transformation of the creative industry has increased the demand for innovative learning approaches that emphasize hands-on experience and authentic problem-solving activities. Project-Based Learning (PjBL) has emerged as one of the most widely adopted instructional models for fostering creativity, collaboration, and practical competence in vocational settings (Rehman et al., 2025). Furthermore, PjBL supports learner engagement by connecting classroom activities with real-world tasks and industry-oriented outcomes (Hidayat & Widiyanti, 2025).

The implementation of PjBL has become increasingly relevant in fashion and garment education because the industry requires graduates who can integrate technical skills, creativity, and production management into a single learning experience. In the context of entrepreneurial education, learners are expected to develop competencies that enable them to design, produce, and market products that meet consumer expectations. Custom-made apparel production represents a learning activity that demands precision, aesthetic sensitivity, and problem-solving abilities throughout the production process. The incorporation of hand-drawn batik into garment products further enhances cultural value while simultaneously promoting local creative industries (Fiqih et al., 2025). As a result, vocational learning activities that combine custom-made production and batik craftsmanship provide meaningful opportunities for developing both technical and entrepreneurial competencies.

Previous studies have reported positive outcomes of PjBL implementation in vocational education. Research conducted by Pawar et al. (2026) demonstrated that PjBL significantly improved students' creativity and practical performance in skill-based learning environments. Similarly, Khoudri et al. (2023) found that project-oriented learning activities enhanced learner autonomy and collaborative problem-solving abilities. Another study by Khoudri et al. (2023) revealed that PjBL positively influenced students' engagement and learning achievement in vocational training programs. Despite these findings, most previous studies have focused on general vocational competencies, science education, or technology-based learning contexts. Limited attention has been given to the application of PjBL in custom-made fashion production that integrates traditional batik craftsmanship within entrepreneurial skills education programs.

A further research gap can be identified in the assessment of learning outcomes within non-formal vocational institutions. Existing studies generally evaluate cognitive achievement and classroom participation as indicators of learning success (Yang et al., 2023). However, vocational competence requires a more comprehensive assessment that includes technical performance, product quality, time management, and professional work attitudes. In custom-made garment production, learners must demonstrate the ability to transform design concepts into marketable products while maintaining quality

standards and aesthetic considerations. The complexity of integrating hand-drawn batik into daily uniforms creates additional challenges that have not been sufficiently explored in previous PjBL studies. Consequently, empirical evidence regarding the effectiveness of PjBL in supporting such competencies remains limited.

The need for this study is also supported by practical conditions observed in the Entrepreneurial Skills Education Program at LKP Kriya Busana Majapahit. Preliminary observations indicated that learners experienced difficulties in managing production schedules, applying batik motifs proportionally, and achieving the quality standards expected in custom-made garment production. These challenges were reflected in previous learning outcomes that remained below institutional expectations. Such conditions suggest that the implementation of PjBL requires further examination to determine its effectiveness in facilitating vocational competency development. Understanding how learners respond to project-based activities in authentic production settings is essential for improving instructional practices in non-formal vocational education.

Based on the aforementioned issues, this study aims to examine the implementation of Project-Based Learning in producing custom-made daily uniforms combined with hand-drawn batik and to evaluate learners' learning outcomes in the 2025 Entrepreneurial Skills Education Program at LKP Kriya Busana Majapahit. This study contributes to the literature by extending the application of PjBL to a fashion education context that integrates cultural heritage elements and entrepreneurial learning objectives. The findings are expected to provide empirical evidence regarding the effectiveness of PjBL in supporting vocational competency achievement within non-formal education settings. In addition, the results may serve as a reference for educators, training institutions, and policymakers seeking to strengthen project-based instructional practices in vocational and entrepreneurial education.

RESEARCH METHODE

Research Design

This study employed a quantitative approach using a pre-experimental method with a One-Shot Case Study design. Quantitative research is appropriate for examining learning outcomes and evaluating the implementation of instructional interventions through objective measurement procedures (Mohan, 2023). The pre-experimental design was selected because the study aimed to observe the implementation of Project-Based Learning (PjBL) and assess learners' outcomes following the instructional treatment without the use of a control group. This design is widely applied in educational settings where researchers seek to evaluate instructional practices under natural learning conditions. The research was conducted at LKP Kriya Busana

Majapahit, Mojokerto, Indonesia, from October to November 2025 during the implementation of the Entrepreneurial Skills Education Program.

Hypothesis

Based on the research objectives and theoretical framework, the following hypotheses were formulated:

- H1: Project-Based Learning can be effectively implemented in the production of custom-made uniforms combined with hand-drawn batik within an entrepreneurial skills education program.
- H2: Project-Based Learning supports the achievement of high learning outcomes in the production of custom-made uniforms combined with hand-drawn batik.

Population and Sample

The population consisted of 98 learners enrolled in the 2025 Entrepreneurial Skills Education Program (PKW) in the Fashion Design specialization at Level III of the Indonesian National Qualifications Framework. The sample comprised 28 learners selected using a non-probability sampling technique, specifically purposive sampling. This technique was employed because the study required participants who met specific academic and technical criteria relevant to the production of custom-made uniforms combined with hand-drawn batik. The inclusion criteria included prior knowledge of garment construction, satisfactory prerequisite competency achievement, and readiness to participate in project-based activities as recommended by instructors. Purposive sampling is considered appropriate when participants are selected based on their relevance to the research objectives and the characteristics of the phenomenon being investigated (Obilor, 2023).

Data Collection Instruments

Data were collected through structured observation and product assessment. Observation was conducted to evaluate both instructor activities and learner participation throughout the implementation of the six phases of Project-Based Learning. The observation instruments were developed based on the standard PjBL syntax, including essential questioning, project planning, scheduling, project monitoring, product testing, and reflection activities. Product assessment was used to measure learners' competencies in producing custom-made daily uniforms combined with hand-drawn batik. The assessment rubric covered preparation, production process, product quality, technical accuracy, fitting suitability, aesthetic appearance, and project completion. To enhance content validity, all instruments were reviewed by vocational fashion education experts and senior instructors prior to implementation. Instrument validation through expert judgment is recommended for ensuring the relevance and adequacy of educational assessment instruments (Govindasamy et al., 2024).

Research Procedure

The research procedure consisted of four stages. The first stage involved preparation, including instrument development, project planning, and coordination with instructors. The second stage involved implementing Project-Based Learning through authentic garment production projects. During this phase, learners participated in project planning, production scheduling, custom-made uniform construction, motif placement, product presentation, and reflective evaluation. The third stage involved systematic observation of learning activities and assessment of project outcomes. The final stage consisted of data processing, interpretation, and conclusion drawing based on the research objectives. This procedure ensured that data collection and assessment were aligned with the learning process and competency standards of vocational education.

Data Analysis

Data were analyzed using descriptive statistical techniques. Observation scores were calculated using mean scores and interpreted according to predetermined assessment categories ranging from poor to excellent implementation. Learning outcome data obtained from the product assessment rubric were converted into quantitative scores and analyzed using descriptive statistics, including mean values and percentages. Learners achieving scores between 82 and 100 were categorized as competent, while scores below 82 were categorized as not yet competent according to institutional competency standards. Statistical calculations were performed using Microsoft Excel to facilitate data tabulation, scoring, percentage calculations, and descriptive analysis. Descriptive statistical analysis is considered suitable for educational evaluation studies that aim to describe learning implementation and competency achievement without testing causal relationships (Ismail et al., 2022).

RESULT

Learning Activities through the Implementation of Project-Based Learning

The research findings consisted of observation data on instructor and learner activities during the implementation of Project-Based Learning (PjBL), as well as performance assessment data related to the production of custom-made daily uniforms combined with hand-drawn batik. The collected data were analyzed using descriptive statistics and subsequently categorized according to the predetermined assessment criteria. The study was conducted with learners enrolled in the 2025 Entrepreneurial Skills Education Program at LKP Kriya Busana Majapahit.

Instructor Activities

The implementation of Project-Based Learning was evaluated through structured observations of instructor activities conducted by three observers. The observations focused on the instructor's performance throughout the six phases of PjBL, including

essential questioning, project planning, scheduling, project monitoring, product testing, and reflection.

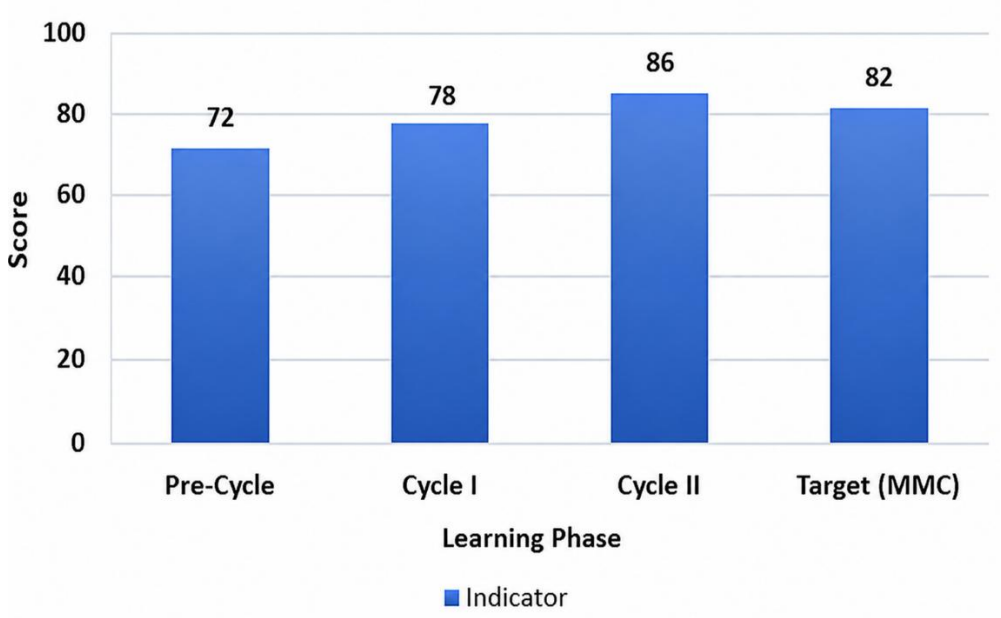

Figure 1.
Instructor Activity Observation Results

The observation results indicate that the instructor effectively facilitated all stages of the Project-Based Learning process. The instructor successfully guided learners in project planning, monitored project progress, provided constructive feedback, and facilitated reflective evaluation activities. Overall, the instructor activity score reached an average of 3.95, which falls within the "excellent" category, indicating a very high level of instructional implementation.

Learner Activities

Learner participation was also evaluated through structured observations conducted by the same three observers. The assessment focused on learner engagement throughout the learning process, including participation in project planning, collaboration, product development, presentation, and evaluation activities.

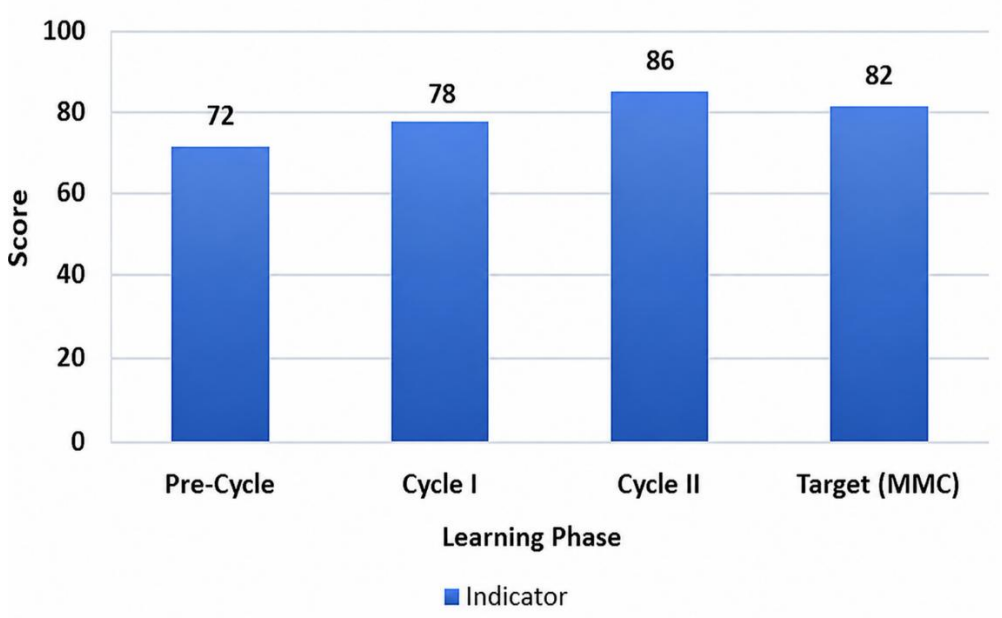

Figure 2.
Learner Activity Observation Results

The findings reveal that learners actively participated in all stages of the Project-Based Learning process. Learners demonstrated enthusiasm during project planning, collaborated effectively with group members, actively engaged in product development, and confidently presented their project outcomes. The average learner activity score was 3.87, which is categorized as "excellent." This result suggests that the implementation of Project-Based Learning successfully encouraged active learner participation and engagement throughout the instructional process.

The observation results for both instructor and learner activities were assessed by three observers, all of whom were vocational instructors involved in the Entrepreneurial Skills Education Program at LKP Kriya Busana Majapahit. The consistently high scores indicate that Project-Based Learning was implemented effectively and according to the planned instructional procedures.

Learning Outcomes in the Production of Custom-Made Uniforms Combined with Hand-Drawn Batik

Learning outcome data were obtained through performance assessments conducted during the production of custom-made daily uniforms combined with hand-drawn batik. The participants consisted of 28 learners divided into four groups, with seven learners in each group. Learners were categorized as competent if they achieved a score of at least 82, which represented the minimum competency standard established by the institution. Scores below 82 were categorized as not yet competent.

The product assessment was based on several indicators covering preparation, production processes, technical performance, product quality, aesthetic appearance,

and project completion. Individual scores were subsequently aggregated and averaged to determine overall learning achievement.

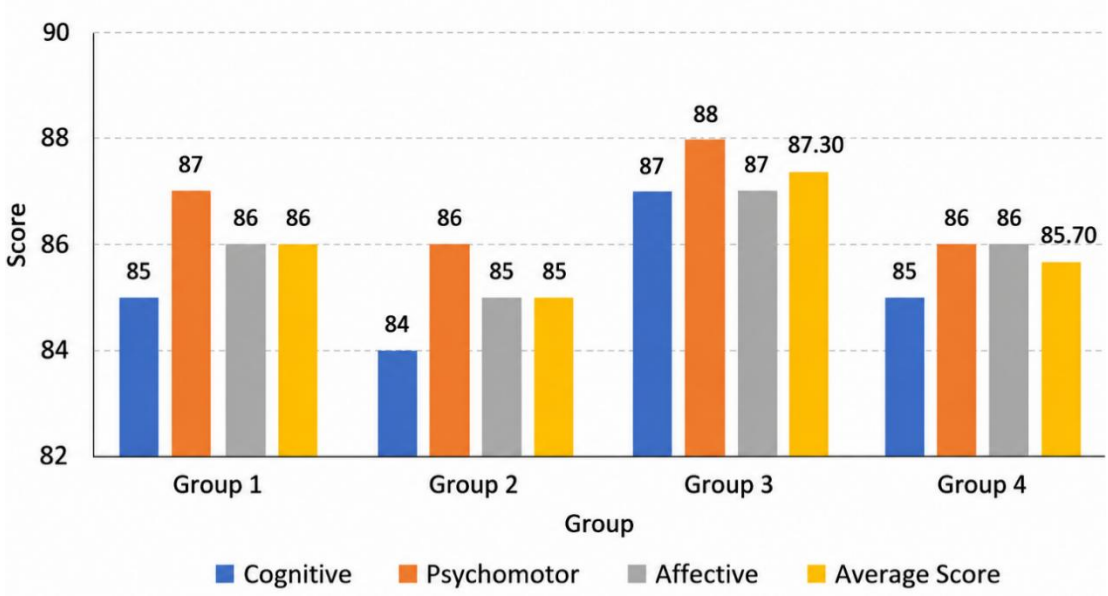

Figure 3.
Product Assessment Scores for Custom-Made Uniform Production Combined with Hand-Drawn Batik

The distribution of learners' scores was further analyzed to determine the frequency of achievement across score categories.

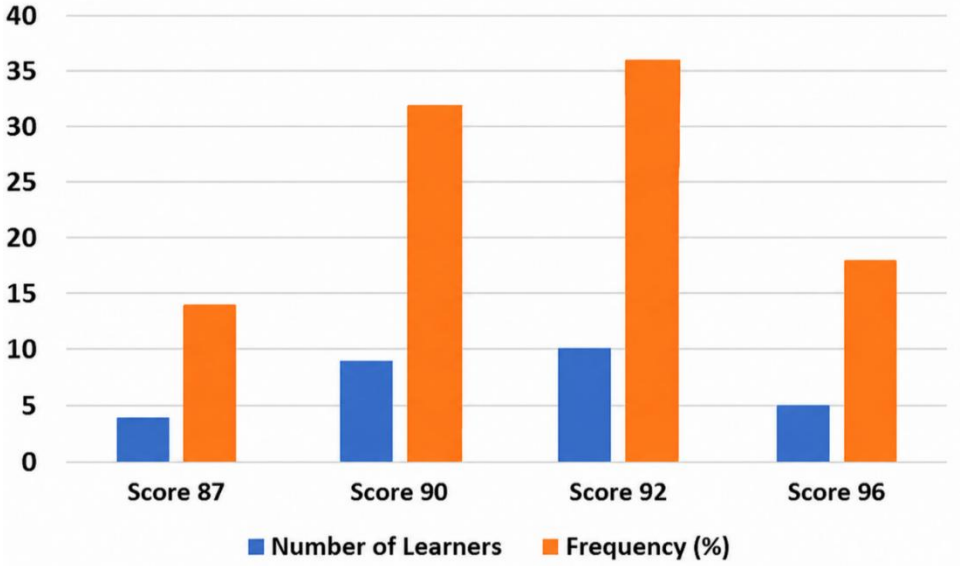

Figure 4.
Frequency Distribution of Learning Outcome Scores

Based on Figure 6, learners' performance in producing custom-made uniforms combined with hand-drawn batik demonstrated highly satisfactory results. The highest frequency was observed in the score category of 92, achieved by 10 learners (35.7%). This was followed by a score of 90 obtained by 9 learners (32.1%), a score of 96 obtained

by 5 learners (17.9%), and a score of 87 obtained by 4 learners (14.3%). These findings indicate that all learners achieved scores above the minimum competency standard established by the institution.

The overall mean score was 91, indicating a high level of competency achievement among the participants. The results suggest that the implementation of Project-Based Learning in the production of custom-made uniforms combined with hand-drawn batik successfully supported learners in achieving the expected vocational competencies. Furthermore, the findings demonstrate that authentic project-based activities provide effective learning experiences that contribute to both technical skill development and successful competency attainment.

DISCUSSION

The findings indicate that Project-Based Learning (PjBL) was implemented successfully in the production of custom-made uniforms combined with hand-drawn batik. This conclusion is supported by the high instructor activity score (3.95) and learner activity score (3.87), both categorized as excellent. These findings suggest that the learning process was conducted according to the essential stages of PjBL, including project planning, scheduling, implementation, monitoring, product presentation, and reflection. According to Indriati et al. (2024), effective project-based learning requires learners to engage in authentic tasks that encourage active participation and responsibility throughout the learning process. The consistently high implementation scores demonstrate that the instructional activities were successfully aligned with the principles of learner-centered vocational education.

The results support H1, which proposed that Project-Based Learning can be effectively implemented in the production of custom-made uniforms combined with hand-drawn batik within an entrepreneurial skills education program. The successful implementation observed in this study reflects the suitability of PjBL for vocational learning environments where competency development is closely linked to practical experiences. Learners were actively involved in decision-making, production planning, and collaborative problem-solving activities throughout the project. Similar findings were reported by Schnell (2025), who found that project-based instruction increased learner engagement and participation in vocational training programs. However, while previous studies primarily focused on engineering and technical education, the present study extends the application of PjBL to fashion and garment production involving cultural heritage elements, thereby providing a broader understanding of its applicability in vocational education.

The high level of learner participation observed in this study can also be explained through the perspective of experiential learning. Experiential learning emphasizes that knowledge is acquired through direct experience, reflection, and active experimentation

in authentic contexts. During the production process, learners were required to solve practical problems related to measurements, pattern construction, fabric cutting, motif alignment, and garment assembly. Such activities encouraged learners to develop both technical and cognitive competencies simultaneously. Research conducted by Chang et al. (2024) demonstrated that authentic vocational projects improve learner engagement because students perceive the learning tasks as meaningful and directly connected to professional practice. Therefore, the active participation observed in this study reflects the effectiveness of authentic project experiences in supporting vocational competency development.

The learning outcome results further revealed that all learners achieved scores above the institutional competency threshold, with an overall mean score of 91. This finding indicates that the learners successfully demonstrated the required competencies in producing custom-made uniforms combined with hand-drawn batik. The achievement is consistent with competency-based vocational education theory, which argues that learning success should be reflected in observable performance and product quality rather than solely in theoretical knowledge. According to Daryono et al. (2023), competency achievement in vocational education is strongly influenced by opportunities for learners to apply knowledge within realistic work situations. The present findings suggest that PjBL provided such opportunities through authentic production activities that mirrored actual industry practices.

The results also support H2, which proposed that Project-Based Learning supports the achievement of high learning outcomes in the production of custom-made uniforms combined with hand-drawn batik. Learners were required to complete a comprehensive production process, ranging from project planning to final product evaluation, allowing them to integrate technical knowledge with practical skills. Similar results were reported by Lesman et al. (2023), who concluded that project-based instruction significantly improves vocational learners' practical achievement and product quality. In the Indonesian context, Qiuxia et al. (2024) also found that project-oriented learning enhanced learners' psychomotor competencies and independent learning behaviors in vocational training settings. The consistency between these studies and the current findings reinforces the argument that PjBL is particularly effective in supporting competency-based learning outcomes.

Despite these similarities, the present study offers several distinctive contributions. Previous studies generally examined project-based learning in science education, engineering, technology, or general vocational contexts. In contrast, this research focused on the production of custom-made uniforms combined with hand-drawn batik, a learning activity that requires precision, creativity, cultural appreciation, and entrepreneurial awareness simultaneously. The integration of traditional batik craftsmanship into a project-based learning environment creates a unique educational

context that has received limited attention in previous research. This characteristic represents an important contribution because it demonstrates how project-based approaches can simultaneously support vocational competence development and cultural preservation. Consequently, the study expands existing knowledge regarding the implementation of PjBL in creative and culturally oriented vocational education.

Several factors may explain the positive outcomes observed in this study. First, the project activities were directly related to real-world vocational tasks, increasing learners' motivation and sense of responsibility toward project completion. Second, collaborative group work enabled learners to exchange ideas and solve technical problems collectively throughout the production process. Third, the custom-made nature of the project required learners to apply industry-standard procedures, thereby strengthening the authenticity of the learning experience. Nevertheless, the findings should be interpreted with caution because the study employed a One-Shot Case Study design without a control group or pre-test measurement. As a result, the study cannot determine the magnitude of learning improvement relative to other instructional approaches. Future research may employ experimental or quasi-experimental designs to compare the effectiveness of Project-Based Learning with alternative instructional models and provide stronger evidence regarding its impact on vocational competency development.

CONCLUSION

The results of this study demonstrate that Project-Based Learning (PjBL) constitutes an effective instructional approach in vocational fashion education, particularly in the production of custom-made uniforms combined with hand-drawn batik. The effectiveness of implementation is reflected in consistently high engagement from both instructors and learners, as indicated by activity scores of 3.95 and 3.87, respectively. These findings suggest that structured project-based learning environments foster active participation, collaboration, and responsibility in completing authentic production tasks. More importantly, the achievement of a mean learning outcome score of 91 indicates that learners were able to meet and exceed the institutional competency standards, confirming that experiential and product-oriented learning contributes directly to vocational mastery. In a broader educational context, this study reinforces the relevance of PjBL as a pedagogical model that bridges classroom learning with industry-based practices, particularly in creative and skill-intensive fields such as fashion design and batik production. Therefore, the study provides evidence that vocational education can be strengthened through learning models that emphasize authentic tasks, learner autonomy, and real-world production processes.

From a practical standpoint, vocational institutions should consider integrating Project-Based Learning more systematically into competency-based training programs,

especially those oriented toward creative industries. Adequate infrastructure, materials, and production tools must be ensured to support the sustainability of authentic learning projects. Instructors are encouraged to further develop their role as facilitators by strengthening mentoring strategies, monitoring learning progress more effectively, and improving time and project management guidance. Meanwhile, learners should continue to develop independence, creativity, and professional discipline as core competencies required in both employment and entrepreneurial contexts. Future implementation of PjBL should also consider continuous improvement mechanisms to ensure alignment between learning outcomes and evolving industry demands.

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