Jurnal Penelitian Pendidikan
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Implementation of Project Based Learning Based on the Independent Curriculum in Preparation Learning for Fashion Making at Vocational Schools

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Abstract
The implementation of the Independent Curriculum in Vocational High Schools (SMK) requires learning that is contextual and relevant to the characteristics of vocational education. Project Based Learning (PjBL) is recommended, but its implementation in vocational learning still faces various challenges. This study aims to describe the implementation of Project Based Learning based on the Independent Curriculum and an indication of its impact on students' competence in learning Phase F Fashion Making Preparation at SMK. This study uses a mixed methods approach with a sequential exploratory design involving 37 teachers and 120 students from three vocational schools in Semarang City. Data were collected through questionnaires, observations, interviews, as well as pre-test and post-test tests and analyzed descriptively. The results of the study show that the implementation of PjBL is still partial with variations in readiness between schools. Key challenges include limited practice facilities, authentic assessments, and learning time. The implementation of PjBL shows indications of improving student competence, as shown by an increase in knowledge scores from 62.4 to 81.7 and skill achievements in the good and excellent categories.

Keywords: vocational education, project based learning, Independent Curriculum

INTRODUCTION

Vocational education plays a strategic role in preparing human resources who have work competencies in accordance with the needs of the business world and the industrial world. The orientation of vocational education lies not only in the mastery of technical skills, but also in the development of applicative thinking skills, problem solving, and adaptation to dynamic changes in industry demands (OECD, 2020). Therefore, learning in Vocational High School needs to be designed contextually so that students' learning experiences reflect real working conditions.

The transformation of education policy through the Independent Curriculum provides a wider space for educational units to design learning that is flexible, student-centered, and oriented towards strengthening essential competencies. The curriculum emphasizes the importance of meaningful learning through authentic learning experiences that encourage students' active involvement in the learning process (Kemendikbudristek, 2022a). The implementation of the Independent Curriculum requires teachers to choose a learning approach and model that is in line with the characteristics of vocational competence.

One of the learning models that is seen as relevant to the characteristics of vocational education is Project Based Learning. This model facilitates students to learn through the design and completion of projects that depart from real problems, thus allowing for simultaneous integration of knowledge, skills, and attitudes (Krajcik & Shin, 2022) Project-based learning provides a learning experience that

emphasizes process, collaboration, and reflection, which is much needed in the context of vocational learning.

Various studies show that Project Based Learning contributes positively to the improvement of higher thinking skills, creativity, and students' learning involvement in vocational education. Studies conducted by (Fitri et al., 2024; Morales-Menendez et al., 2019) shows that PjBL can increase students' work readiness through learning that is oriented towards problem solving and production of real works. These findings strengthen the relevance of PjBL as a learning model that supports the achievement of vocational competence.

In the Fashion Skills program, the Phase F Fashion Preparation element has a crucial role as the initial stage before students enter the fashion production process. These elements include design analysis, pattern planning, material selection, as well as production process planning that refers to fashion industry standards. The learning characteristics of this element demand technical accuracy, procedural understanding, and contextual decision-making skills (Kemendikbudristek, 2022b).

Although Project Based Learning has great potential, its implementation in vocational learning does not always run optimally (Rizkylillah, 2025). Research shows that vocational teachers still face challenges in designing projects that truly represent the context of the industry, especially in practical subjects that demand high standards of product quality (Gebhardt et al., 2022; Kovalchuk et al., 2022). These challenges have an impact on the implementation of PjBL which tends to be administrative and does not fully support deep learning.

The challenges of implementing PjBL are increasingly complex with the implementation of the Independent Curriculum in Phase F at vocational schools. Recent studies show that teachers' readiness to understand the project-based learning paradigm, limited practice facilities, and difficulties in designing authentic assessments are still the main obstacles in the implementation of new curriculum-based vocational learning (Rees Lewis et al., 2019; Zhao et al., 2023). This condition shows that there is a gap between the demands of curriculum policies and learning practices in the field.

On the other hand, empirical studies that specifically examine the implementation of Project Based Learning within the framework of the Independent Curriculum in the Fashion Skills Program are still very limited. Most research on PjBL has focused on measuring learning outcomes, while studies describing the implementation process, contextual challenges, and learning dynamics in vocational classrooms are rare (Naseer et al., 2025; Omelianenko et al., n.d.; Suparmi et al., 2024; Xu et al., 2024). This limitation indicates that there are research gaps that need to be filled.

Based on this description, this study aims to provide an empirical overview of the implementation of Project Based Learning based on the Independent Curriculum in the Phase F Fashion Preparation learning at vocational schools. This research focuses on the process of implementing learning, the challenges faced in implementation, and indications of its impact on the development of students' competencies. The results of the research are expected to contribute to the strengthening of vocational learning practices and become a reference in the development of vocational education policies, especially in the field of fashion expertise.

METHOD

This research uses a mixed approach. The research approach was carried out with exploratory mixed method design (Creswell, 2014; Creswell & Plano Clark, 2018). This approach begins with the collection and analysis of qualitative data, which is then followed by the collection and analysis of quantitative data to reinforce the findings that have been obtained previously.

Teachers and students are used as subjects in the research of the Independent Curriculum-based learning model on the element of Preparation for Fashion Manufacturing in Phase F. It is hoped that teachers and students can provide the information needed to uncover various events that occur behind the application of the Independent Curriculum-based learning model in the element of Preparation for Fashion Making. The object of this study is the development of an independent curriculum-based learning model in the element of Preparation for Fashion Making phase F which was held in Semarang City.

Observations, questionnaires, and interviews were used for data collection in this study. The data collected includes the types of data, data categories, collection techniques, and data sources used in the

development of the Independent Curriculum Learning Model on the Elements of Preparation for Fashion Making in Semarang City.

Proving the validity of the content will be carried out by carrying out FGD by experts. FGD refers to a systematic method of collecting data and qualitative data information related to a certain issue through group interaction (Bisjoe, 2018). The three key elements in the FGD include focused discussions, groups, and direction (Siregar, 2019). The experts who will be involved in this FGD include experts in the field of fashion education, the field of evaluation/methodology, teachers of the elements of Preparation for Fashion Making, and 20 school principals.

Support for the analysis of test scores or the score of an instrument through empirical facts and theoretical reasons, relating to the accuracy of measurements, can be demonstrated through the concept of validity (Istiyono, 2020). Before the instrument is used to collect data, the validity of the instrument needs to be ensured to ensure consistent and stable assessment results (Prasetyaningtyas et al., 2023; Retnawati, 2016). The validity of the instrument, especially for questionnaires and questionnaires, can be tested using the Aiken's V method. The Aiken formula is used to calculate the content validity coefficient based on the calculation of several n experts on an instrument item, which assesses the extent to which the instrument item reflects the construction to be measured (Prasetyaningtyas et al., 2022). Aiken's V formula is (Aiken, 2003).

$$V = \Sigma S / [n(c-1)]$$

Description:
V = validity index from Aiken
S = r – lo
lo = lowest rating scale (e.g. 1)
C = highest rating scale (e.g. 5)
n = number of raters
r = rater acquisition score

An item's analysis can be considered valid if it meets the Aiken V limit. The validity of this research instrument was proven using 5 scales and assessed by 9 raters. The limit requirement for the rater coefficient of each item based on Aiken's table is 0.72 with a probability of 0.38 (Aiken, 2016).

Despite using different instruments and measurement scales, the level of reliability still refers to the consistency of two scores of measurement results on the same subject (Mehrens & Lehmann, 1973). A reliable measurement instrument will produce consistent measurement results (Rudner, 1994) and stable (Mehrens & Lehmann, 1973). The reliability of the instrument was estimated using the Interclass Correlation Coefficient (ICC), using the SPSS 26 program. An instrument is said to be reliable if the calculation results show 0.75 - 1.00 (Cicchetti, 1994).

Explanatory mixed method analysis, i.e. research data is quantitatively described and then followed by qualitative research (Beischel, 2013; Creswell, 2013). The qualitative descriptive analysis provided an in-depth description of the implementation of the independent curriculum in the elements of Preparation for Fashion Manufacturing phase F in Semarang.

The data analysis from the results of this FGD and interview is referenced in the theoretical framework of Creswell, Borg and Biklen, as well as Milles & Huberman. The data analysis process involves filtering and simplifying data, presenting information in a structured manner, and drawing conclusions or verifying the findings (Creswell, 2013; Creswell & Plano Clark, 2018; Matthew B. Miles, 2014), which is done using Atlas.Ti software. Atlas Ti, as one of the Computer Aided Qualitative Data Analysis Software (CAQDAS), provides convenience for researchers to carry out planned, structured, and efficient data analysis in the context of research (Dyah Purwandari & Rusman, 2022). The data were analyzed through triangulation of data from the study respondents, and the researcher concluded the findings using the researcher's point of view. Next, the data is deformed and presented in a language that has been analyzed by the researcher.

RESULTS AND DISCUSSION

Results

Implementation Pattern of Project Based Learning in the Independent Curriculum

The results of the study show that the implementation of Project Based Learning (PjBL) based on the Independent Curriculum in vocational learning is still taking place in a variety of ways between schools and between learning actors. From the perspective of teachers, only 38% reported that they had fully implemented the Independent Curriculum, including the preparation of Learning Objectives Flow (ATP), the development of teaching modules, and the consistent implementation of project-based learning. Most teachers (42%) are still in the partial implementation stage, while 20% of teachers stated that they have not implemented the Independent Curriculum substantially in learning practices. This pattern indicates that the process of translating curriculum policies into classroom practice has not taken place evenly.

Students' perceptions show a tendency that is in line with the findings of the teacher. As many as 35% of students stated that they had experienced full project-based learning, while 45% felt that the application of PjBL was limited through a combination of lecture and project methods. As many as 20% of students stated that they had never participated in project-based learning. The alignment between the findings of teachers and students indicates that there is a gap between learning planning and the actual learning experience that students receive.

Variations in the implementation of PjBL are also seen in the difference in readiness between schools. SMK Negeri 6 Semarang shows a relatively higher level of readiness, characterized by the availability of more adequate practice facilities, school management support, and more systematic learning planning. On the other hand, SMK Ibu Kartini and SMK Al Asror are still in the adaptation stage, with the implementation of PjBL which tends to be selective and depends on the availability of resources and teacher readiness.

Challenges of PjBL Implementation in Elements of Preparation for Fashion Making

A number of main challenges affect the implementation of PjBL in the element of Preparation for Fashion Making. Limited practice facilities and infrastructure emerged as the most dominant obstacle, reported by 67.57% of teachers and 65.83% of students. The limitation of laboratory tools, materials, and facilities has a direct impact on the sustainability of learning projects, especially at the stages of pattern making and fashion production practices.

In addition to the aspect of facilities, the limited allocation of learning time is also a significant obstacle. A total of 64.86% of teachers and 56.67% of students stated that the available time was not enough to complete all stages of the project optimally. This condition causes some projects to have to be simplified or stopped before reaching the expected depth of the learning process.

Pedagogical challenges also color the implementation of PjBL. As many as 45.95% of teachers admitted that they experienced difficulties in designing authentic assessments that were able to comprehensively assess students' technical skills and creativity. In addition, 40.54% of teachers and 45.83% of students assessed that teachers' readiness in implementing PjBL still needs to be improved. Variations in students' motivation and discipline also affect the effectiveness of group work, although the percentage is relatively lower than structural constraints.

The findings of the interviews deepen our understanding of the quantitative data. Teachers highlighted the limitations of practical materials such as fabrics, pattern-making tools, and sewing machines, as well as uncertainty in compiling assessment instruments that are able to authentically represent learning processes and outcomes. Students revealed that material and time limitations often hinder the continuity of projects, even causing some projects to not be completed optimally.

The Impact of Project-Based Learning on Student Competency

Analysis of students' cognitive achievement showed a substantial improvement after the implementation of project-based learning. The average pre-test score of 62.4 which is in the category is quite an increase to 81.7 in the post-test with the good category. This increase of 19.3 points reflects the strengthening of students' conceptual understanding of the preparation material for making clothes

through involvement in real projects.

In the psychomotor aspect, the observation results showed that 63.33% of students achieved the category of good to very good skills. The improvement in skills can be seen in the ability to make patterns, cut fabrics according to the direction of the fibers, and do marker making with a higher level of precision. These findings show that project-based learning provides an effective space for the development of technical skills that are at the core of vocational education competencies.

21st Century Skills Development

Project-based learning also has an impact on students' 21st century skill development. The collaboration aspect showed the highest achievement with an average score of 3.4, which reflected the active involvement of students in group work. Creativity earned an average score of 3.3, reflected in the diversity of design ideas and solutions generated during the project process. The communication aspect achieved an average score of 3.2, showing the ability of students to present the results of their work even though some still showed limited confidence.

In contrast, critical thinking skills showed relatively low achievement with an average score of 3.0. This limitation is mainly seen in technical decision-making activities, such as making pattern adjustments when the fitting results are not suitable. These findings indicate that although PjBL is effective in developing collaboration and creativity, strengthening critical thinking still requires a more targeted pedagogical strategy.

Integration of Quantitative and Qualitative Findings

The results of interviews with teachers and students explain the mechanism behind the quantitative findings. Teachers view PjBL as an approach that is in line with the characteristics of Fashion Learning because it can connect theory with real work practice. The use of assessment rubrics is seen as helping to increase the objectivity of skills assessments, although it still needs to be refined.

Students stated that direct involvement in the project increased motivation and a sense of belonging to the learning process. The resulting fashion products provide a meaningful learning experience because they can be exhibited and appreciated. Overall, the integration of quantitative and qualitative findings shows that PjBL based on the Independent Curriculum contributes to the improvement of cognitive, psychomotor, and some 21st-century skills competencies, noting that the consistency and depth of implementation is strongly influenced by institutional readiness and resource support.

Discussion

The results of the study show that the implementation of the Independent Curriculum in vocational schools, especially in the preparation elements for Phase F fashion making, has not been fully optimal. This is in line with the findings (Kristanti et al., 2019; Smale-Jacobse et al., 2019) which states that the implementation of the Independent Curriculum in vocational schools still faces obstacles in terms of facilities, teacher readiness, and connectivity with industry

From the teacher's side, most of them are still in the partial stage. These findings support the view Suparyati & Habsya (2024) that the competence of vocational teachers in managing project-based learning still requires continuous training to suit the needs of the global industry. Teachers' concerns about authentic assessments are also in line with Retnawati's opinion which emphasizes the importance of valid and reliable assessment instruments to ensure the quality of learning (Istiyono et al., 2014; Kholis et al., 2020; Retnowati et al., 2021).

From the student's side, partial implementation leads to different learning experiences between schools. This is in line with research (Lestyoningsih & Hidayati, 2020), found that the implementation of Project Based Learning (PjBL) in Vocational Fashion Schools can improve critical thinking skills, but its success is highly dependent on the consistency of teachers in applying the PjBL syntax. In this study, students who have experienced PjBL stated that they were more motivated, in accordance with Vygotsky's constructivist theory that contextual and collaborative learning is able to increase learning engagement (Devi, 2019; Salsabila & Muqowim, 2024).

The difference in readiness between schools is also interesting to observe. SMKN 6 Semarang, which has adequate facilities and better school management support, is better prepared to implement the

Independent Curriculum. On the other hand, SMK Ibu Kartini and SMK Al Asror are still in the adaptation stage. This reinforces the findings Tobing & Manurung (2021) that partnerships with industry (IDUKA) and institutional support are critical to the success of vocational education.

Theoretically, these findings are consistent with the Technology Readiness Level (TKT) framework. The implementation of the Independent Curriculum model in the preparation element of fashion making can currently be categorized as still in TKT 2–3, which is a limited trial stage, not yet to the massive application in all classes.

The limited practical facilities in vocational schools are the main factors that hinder the implementation of industry-based learning. This is in accordance with the conditions in this research vocational school, where the fashion laboratory has not fully supported PjBL (Andriani & Widiyono, 2024; Febrian et al., 2024). Assessments in vocational education must assess real skills, not just final results (Munaroh, 2024; Tatagno et al., 2008). The difficulties of teachers in the field show that there is an assessment literacy gap, so training in the preparation of rubric and authentic instruments is urgently needed.

The implementation of PjBL takes longer because it involves the stages of investigation, collaboration, production, and reflection (Nugraha et al., 2022; Subiyantoro, 2025; Susilawati, 2021). The limited class hours at vocational schools make teachers often condense the project stages, so that the quality of the learning process is reduced. The application of PjBL in Fashion is able to increase students' critical thinking, but success depends largely on the teacher's readiness to guide the syntax and motivation of students to participate actively. The findings of this study are consistent, schools with teachers are more ready to show better implementation than other schools.

Theoretically, these challenges show that the implementation of the Independent Curriculum in fashion learning is still in the adoption phase, not yet in the institutionalization phase. Systemic support is needed in the form of teacher training, provision of facilities, and more flexible schedule integration.

Constructivist theories emphasize the importance of experiential learning and sociocultural learning (Matriano, 2020; Moore-Hamil & Fernandez, 2024) that emphasize the role of collaboration in learning. PjBL improves the ability to think critically in Fashion Designers. PjBL is suitable for vocational learning because it emphasizes 21st century (4C) skills. In this context, PjBL adapted to the preparation elements of fashion making not only improves technical competencies (patterns, cuts, markings), but also non-technical competencies (collaboration, creativity, responsibility). This is in accordance with the objectives of the Independent Curriculum which emphasizes well-rounded competence.

However, the implementation of PjBL still requires support: 1) teacher training in drafting authentic projects and assessments; 2) Adequate fashion laboratory facilities, and 3) Partnerships with the fashion industry so that projects are relevant to the world of work.

CONCLUSION

The conclusions of this study are:

1. It has begun to be implemented in vocational schools, but it is still partial. Some teachers (37.8%) and students (31.67%) felt full implementation, while others were still limited due to differences in the readiness of schools, teachers, and facilities.
2. The main challenges include limited infrastructure (tools, materials, laboratories), difficulties in authentic assessments, limited practice time, and variations in teacher readiness and student motivation.
3. The most effective model is Project Based Learning (PjBL) based on the Independent Curriculum, because it has been proven to improve students' knowledge, psychomotor skills, and collaborative and creative attitudes, although the critical thinking aspect still needs to be improved.

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