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Students' perception of Project-based Learning at IT in Education Course

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Abstrak

Penelitian ini bertujuan untuk mendeskripsikan persepsi mahasiswa terhadap implementasi *Project-based Learning (PjBL)* pada mata kuliah IT in Education di program studi Pendidikan Bahasa Inggris, Universitas Nahdlatul Ulama Purwokerto. Penelitian ini menggunakan metode deskriptif kuantitatif untuk memperoleh gambaran yang sistematis mengenai persepsi mahasiswa terhadap proses pembelajaran yang diterapkan. Data dikumpulkan melalui kuesioner yang didistribusikan kepada mahasiswa semester empat menggunakan *Google Form*. Instrumen kuesioner mencakup berbagai aspek, antara lain, persepsi mahasiswa terhadap materi ajar, penerapan PjBL dalam proses belajar mengajar, serta peran dosen dalam membimbing dan memfasilitasi mahasiswa selama proses pembelajaran berlangsung. Hasil penelitian menunjukkan bahwa 60,5% mahasiswa setuju bahwa materi ajar mudah dipahami, 50% mahasiswa setuju bahwa PjBL meningkatkan keterampilan IT dan motivasi mereka, serta 44,7 % mahasiswa menilai dosen membantu mahasiswa dalam menyelesaikan proyek yang diberikan. Untuk memperkuat data kuantitatif, peneliti melakukan wawancara sebagai data tambahan, yang hasilnya mendukung temuan utama penelitian ini. Secara keseluruhan, hasil penelitian menunjukkan bahwa mayoritas mahasiswa memliki persepsi positif terhadap penerapan PjBL pada mata kuliah IT in Education. Penelitian ini menegaskan bahwa PjBL merupakan metode pembelajaran yang penting dan efektif dalam meningkatkan motivasi, keterampilan serta keterlibatan mahasiswa. Dengan demikian, penerapan PjBL direkomendasikan untuk terus dikembangkan guna mendukung kualitas pembelajaran yang lebih interaktif dan bermakna.

Kunci: IT in education, persepsi, project-based learning,

Abstract

This research aims to describe the students' perceptions towards the implementation of Project-based Learning in IT in Education Class of English Language Education Study Program of Universitas Nahdlatul Ulama Purwokerto. This research used descriptive quantitative method to provide a systematic overview os students 'responses to the applied learning approach. The data were collected through a questionnaire distributed to fourth semester students using Google Forms. The questionnaire covered several aspects, including students' perception of the learning materials, the implementation of Project Based Learning in teaching and learning process and the roles of teacher in Project Based Learning. The result shows that 60,5% of students agreed that the teaching material was easy to understand, and 50% of students agreed that Project Based Learning improved their IT skills and Motivation. Related to the role of teacher, there were 44,7% of students perceived that the teacher played an active role in completing the assigned project. Furthermore, to strengthen the quantitative finding, interviews were also conducted as supporting data, and the result were consistent with the main finding og the study. Overall, the findings indicate that most students have positive perception of the implementation of PjBL in the IT in education course. This study highlights that PjBL is an essential and effective teaching; method that enhance students' motivation. Skils, and engagement. Therefore,

the implementation of PjBL is recommended to be continuously developed to support more interactive and meaningful learning experiences.

***Keywords**: education, perceptions, project-based learning*

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Introduction

The education curriculum continuous to have improvements and updates. It is done to make education in Indonesia continue to develop along with the time. To illustrate this, our country used Merdeka Curriculum which provides flexibility for students to create quality learning based on the students' need and learning environment (Kemendikbudristek, 2022). In this curriculum, the learning activities lead to the students' soft skills and character development. Ryan & Deci (2020) noticed that teachers are encouraged to use teaching strategies that engage students and foster critical thinking, problem solving, collaboration and creativity. Teachers must be able to be facilitator to guide students to achieve the learning goal. Similarly, Schunk et al. (2014) state that teachers do not only responsible for delivering knowledge but also helping students in achieving the learning goals and create contextual learning experiences.

One of teaching approach aligned with those objectives is project-based learning (PjBL). This approach supports students to work collaboratively in groups to design, develop, and evaluate project both inside and outside the classroom (Devkota et al,. 2017). The role of the teacher is crucial in scaffolding the learning process through structured guidance, explicit instructions, and continuous feedback (Hmelo-Silver et al., 2019). Therefore, teachers must provide clear and specific instruction to ensure that students understand the tasks given.

Several studies have shown that project-based learning (PjBL) supports both cognitive and non-cognitive development, including increased motivation, engagement, and ICT competence (Guoet al, 2020). Students tend to show greater interest in project-based assignment, which enhance their ability to think critically, analyze problems, and develop solutions. Liu et al. (2019) also report significant improvements in students' technological skills through project-based implementation. Furthermore, Selasmawati and Lidyasari (2023) argue that project-based activities foster authentic and meaningful learning experiences. This approach also enhances students' collaboration skills and contributes to a more productive classroom environment.

In addition, PjBL strengthens digital literacy and ICT competencies, which are essential for higher education and future professional careers (Liu et al., 2019; Lesmana et al., 2023). Therefore, its implementation in IT in Education courses is highly appropriate. Liu et al. (2019) emphasized that project-based activities significantly improve students' technological proficiency. Through PjBL, students gain hands-on experience in designing, implementing, and evaluating projects using digital tools, thereby integrating theoretical knowledge with practical applications (Chu et al., 2022).

In addition, Project-Based Learning (PjBL) supports collaborative learning by engaging students in group work to complete tasks, exchange ideas, and solve problem collectively (Tambunan et al., 2024). The students tend to finish their tasks while discussing with their peers. Allowing them to share ideas and reach solution more effectively. Thomas & Brown (2016) also highlight that such collaborative processes foster interpersonal communication and team work skills.

Despite its advantages, the implementation of PjBL presents several challenges, including unequal participation, time management difficulties, and varying levels of technological proficiency among students (Larmer et al., 2017). Therefore,

understanding students perceptions of PjBL is essential to evaluate its effectiveness and identify areas for improvement in the learning process. Ramadania (2021) argues that the influence of students' perception in group-based or digital learning environments play a crucial role, as students who perceive tasks as meaningful and accessible are more likely to engage actively engaged.

Alyani & Ratmanida (2021) report that students tend to respond positively to PjBL when instructional materials are clearly designed and expectations are well communicated. Penuel & Shepard, (2016) emphasize that well-designed scaffolding promotes deeper conceptual understanding, while Habók & Nagy (2021) highlight its contribution to improved learning outcomes. Moreover, a structured PjBL framework enables student to manage complex task and develop higher-order thinking skill more effectively (Larmer et al., 2017).

Selasmawati & Lidyasari (2023) emphasize the importance of structured project design, while Dewi et al. (2025) highlight the role of consistent teacher as effective facilitator and feed back in shaping positive learning experiences. Ramadania (2021) further explains that student' perceptions of digital tools and learning platforms influence their motivation and engagement, particularly in ICT- based learning environment.

Moreover, students' motivation and engagement increase when learning activities are perceived as meaningful and relevant to their future career (Ryan & Deci, 2020). Sauri et al. (2022) further support this finding, by demonstrating that the implementation of project-based learning contributes to higher levels of students' motivation and active involvement in learning activities.

The IT in Education course in higher education is particularly suitable for the implementation of PjBL, as it enables students to integrate technology into pedagogical practices and develop digital learning media (Guo et al., 2020). Liu et al. (2019) further explains that project-based environments enhance students' ability to apply technological tools effectively in educational contexts. Students' perceptions of these tools also play a crucial role in determining their motivation and overall learning success (Ramadania,2021)

Therefore, this study addresses this gap by examining how students perceive the implementation of PjBL in an IT in Education course. The novelty of this study lies in its focus on integrating students' perceptions with three key aspects: motivation, skill development, and teacher facilitation within a technology-based-learning environment. This integrated perspective provides a more comprehensive understanding of how PjBL function in practice.

Based on the background of the study, this research aims to describe students' perceptions of the implementation of Project-Based Learning (PjBL) in the IT in Education course. It focuses on how students perceive the use of PjBL in the learning process, including its influence on their motivation and engagement. In addition, the study examines how PjBL contributes to students' skill development, particularly in ICT and collaboration, as well as the role of teacher facilitation in supporting its implementation.

The significance of this study is both theoretical and practical. Theoretically, this study contributes to the existing literature on PjBL by providing insights into students' perceptions in a technology-integrated learning environment. Practically, the findings can inform educators and lecturers in designing more effective PjBL-based instruction, particularly in IT in Education courses. In addition, this study supports the implementation of the Merdeka Curriculum by providing evidence-based recommendations to enhance student-centered learning and improve learning outcomes in higher education.

By engaging in authentic projects, students are able to apply theoretical knowledge, develop problem-solving strategies, and strengthen essential 21st-centuri skills. Y. R. Anggara & Yulistianti (2025) emphasize that such projects foster digital literacy and collaborative competence. In addition, Zhang, et al. (2020) report that PjBL promotes critical thinking and active learning engagement.In this context, teachers play a vital role in facilitating learning by monitoring students' progress and providing continuous feedback (Habók & Nagy, 2021). Chu et al. (2022) also highlights that structured guidance improves both academic achievement and skill development. Similarly, Wahyuni & Kustijono (2020) underlines the importance of sustained instructional support in strengthening students' academic and soft skills.

Exploring students' perception of PjBL in IT in Education is therefore essential. Perception data provide valuable insights into students' learning experiences and the effectiveness of instructional materials (Yulia, 2020). Chen et al. (2017) further argue that students' perceptions also reflect the adequacy of teacher support and the overall quality off classroom implementation. Ramadania (2021) further emphasizes that perceptions of digital learning platforms influence engagement, satisfaction, and learning outcomes.

Examining students' perceptions enables educators to identify strengths and weaknesses in project design, instructional clarity, and engagement strategies. Therefore, this study aims to describe students' perception of PjBL in IT in Education, with particular emphasis on motivation, skill development, and teacher facilitation. The findings are expected to contribute to improved instructional practices, enhance learning outcome, and support the effective implementation of the Merdeka Curriculum In higher education.

Method

This study employed a descriptive quantitative research design to explore students' perceptions of the implementation of Project-Based Learning (PjBL) in the IT in Education course. This design was chosen because it emphasizes the systematic collection and analysis of numerical data, allowing phenomena to be described as they naturally occur without manipulating any variables (Creswell & Creswell, 2023).

The descriptive quantitative approach enables researchers to objectively describe phenomena and present findings in tables, charts, and percentages, facilitating clear and structured interpretation of students' perceptions (Devkota et al., 2017).

The participants of this study were fourth-semester students of the English Language Education Study Program at Universitas Nahdlatul Ulama Purwokerto who were enrolled in the IT in Education course.

The questionnaire was distributed via Google Form, which facilitated data collection during the pandemic and allowed participants to respond at their convenience (Zhao & Chen, 2023).

Data were collected using a closed-ended questionnaire adapted from (Ramadania (2021). The instrument addressed several key indicators, including students' perceptions of teaching materials, learning activities, and teacher roles in PjBL.

Student responses were measured using a 5-point Likert scale, ranging from Strongly Disagree (SD) to Strongly Agree (SA). The use of a Likert scale enables the quantification of students' opinions and facilitates structured comparison of perceptions (Alyani & Ratmanida, 2021).

The questionnaire consisted of ten items that assessed students' perceptions of material clarity and interest, IT skills, learning motivation, project design, and teacher roles.

Data analysis was conducted by calculating the percentage of responses for each questionnaire item. This approach is part of descriptive quantitative analysis, which allows researchers to systematically summarize and describe data without manipulating variables (Creswell & Creswell, 2023).

The formula for calculating percentages was applied as follows:

$$\boldsymbol{P = \frac{F}{N} \times 100\%}$$

Where:

- P = Percentage
- F = Frequency of respondents in each answer category
- N = Total number of respondents

This method allows the researcher to present quantitative results clearly, enabling structured interpretation of students' perceptions.

The percentage results were presented in tables, accompanied by descriptive explanations to facilitate interpretation. In addition, a brief qualitative analysis was conducted based on short interviews with several participants to complement the quantitative data.

To facilitate interpretation, the percentage scores were categorized based on an interpretation scale adapted from Riduwan (2015), where scores of 81%–100% are

classified as *very good*, 61%–80% as *good*, 41%–60% as *fair*, 21%–40% as *poor*, and 0%–20% as *very poor*. The interpretation was determined based on the combined percentage of Agree (A) and Strongly Agree (SA) responses.

The percentage results were presented in tables and supported by descriptive explanations to facilitate interpretation. In addition, a brief qualitative analysis was conducted through short interviews with several participants to complement the quantitative data. These interviews aimed to explore the reasons behind students' perceptions and provide additional context (Chen et al., 2017). They also highlighted students' experiences with PjBL, emphasizing qualitative insights to strengthen the findings (Hmelo-Silver et al., 2019). However, the primary focus of the study remained on numerical data.

This combination of quantitative and qualitative methods ensured that the research data were valid and reliable in portraying students' perceptions (Guo et al., 2020). It also allowed the researchers to provide evidence-based recommendations for improving PjBL strategies in higher education (Silitubun et al., 2025).

Results and Discussion

Students' Perception of PjBL of IT in Education

Table 1. Students' Perception on Teaching Materials in Project-Based Learning

Statement	D (%)	N (%)	A (%)	SA (%)	Interpretation
The material given by the teacher is clear and easy to understand	–	–	86.7	6.7	Very Good
The material given by the teacher is interesting	–	6.7	66.7	20.0	Good
The material taught using PjBL is suitable for students' learning needs	6.7	–	73.3	20.0	Very Good

Based on the table above, the result showed that the majority of students have a good or positive response for teaching material. As shown in the statement number 1, *"The material given by the teacher is clear and easy to understand."*. It is proven by 86.7% agree, 6.7% strongly agree, and 6.7% strongly disagree. The percentage of agree is higher. It means the students agree that the teacher gave clear material that made the students easy to understand. The second statement written *"The material given by the teacher is interesting."* have the results 66.7% agree, 20% strongly agree, 6.7% neutral, and 6.7% strongly disagree. Most of the students chose "agree" on the statement. It can be said that the students felt that the teacher provided interesting teaching material. The teaching material also suitable with the students' need in education or teaching and learning. As seen on the percentage of students who chose "agree" on the third statement *"The material taught by using project-based learning is suitable with the students' need in education/teaching and learning."* was the highest. The results showed 73.3% agree, 20% strongly agree, and 6.7% disagree.

The interview findings support these results. Students emphasized that the materials were relevant to current educational demands, especially in the digital era. Several participants stated that learning to create blogs, digital quizzes, and interactive media was directly connected to their future profession as teachers.

One participant explained that education today cannot be separated from technological development, and teachers must be able to integrate digital tools into classroom practice. Another student mentioned that applications such as Quizizz, Kahoot, Canva, and Google Forms made learning more engaging and less monotonous. These responses indicate that students perceived the materials not only as understandable but also meaningful and applicable in real teaching contexts.

Table 2. Students' Perception on the Use of PjBL in Learning Activities

Statement	D (%)	N (%)	A (%)	SA (%)	Interpretation
PjBL increases my motivation to learn ICT skills	6.7	6.7	73.3	6.7	Good
PjBL improves my IT skills	–	–	60.0	33.3	Very Good
PjBL is designed systematically from explanation to final project	13.3	–	73.3	13.3	Very Good

Table 2 shows the results for students' perception on the use of PJBL in Learning Activities. It can be seen from the result in the first statement, *"Project based learning increases my motivation to learn ICT skills."* that 73.3% of students agree, 6.7% strongly agree, 6.7% neutral, 6.7% disagree and 6.7% strongly disagree. The highest percentage indicated that the students agree that the use of project-based learning in learning activities motivates students to learn ICT skills. The next question is *"Project based learning improves my IT skills."* which showed 60% agree, 33.3% strongly agree, and 6.7% strongly disagree. Therefore, it can be concluded that the percentage of students who chose "agree" was the highest. It means that project-based learning could improve the students' IT skills. In addition, project-based learning was also designed systematically. Starting from explanations, exercises, to the final project. There were 73.3% students who chose agree, 13.3% strongly agree, and 13.3% disagree with the statement *"Project based learning is designed systematically starting from explanations, exercises, to the final project"*.

The interview data further illustrate how PjBL enhanced students' motivation and technical competence. Many students reported that they gained new skills, such as designing digital learning media, creating online quizzes, editing content, and managing educational blogs. Some students admitted that before taking the course, they were unfamiliar with creating Google Forms or interactive quizzes. Through project-based tasks, they gradually learned how to design questions, manage scoring systems, and use various application features.

One student acknowledged that she previously lacked confidence in using technology but felt more capable after completing the project. These statements confirm that hands-on experience through PjBL contributed to practical skill development and increased technological confidence.

The systematic structure of the course was also highlighted during interviews. Students noted that the lecturer provided explanations before assigning the project and allowed consultation during the process. This structured progression helped them complete the final product more effectively.

Table 3. Students' Perception toward Teachers' Roles in Project-Based Learning

Statement	D (%)	N (%)	A (%)	SA (%)	Interpretation
The teacher helps students solve problems during the project	13.3	20.0	66.7	–	Good
The teacher monitors the progress of the project	13.3	–	73.3	13.3	Very Good
The teacher provides a clear project timeline	13.3	–	73.3	13.3	Very Good
The teacher gives clear feedback on project results	13.3	6.7	53.3	26.7	Good

Furthermore, in the table 3, it shows the teacher's roles in project-based learning. As shown in the first statement, *"Teacher helps students to solve the problems in working on the project."* shows that most of students agree that the teacher helps students when faced problems in finishing the project. It is proven by 66.7% agree, 20% neutral and 13.3% disagree. Besides that, students also gave positive response on "*Teacher monitors the progress of my project."*

with 73.3% students chose "agree", 13.3% strongly agree, and 13.3% disagree. The result indicated that more than half of students felt that the teacher monitored the progress of the students' project.

Besides the teachers monitored the students' project, in using project-based learning, the students point out that the roles of teacher were good such as in giving clear timeline, regarding consultation time, revision and collecting project. It was shown in the statement *"Teacher gives clear timeline, regarding consultation time, revision, and collecting project."* with 73.3% students chose "agree", 13.3% strongly agree, and 13.3% disagree. It can be seen that students who respond agree and strongly agree had a high percentage. Moreover, students also gave a good response in the last statement, *"Teachers gives clear feedback related to the result of my project."* which showed 53.3% agree, 26.7% strongly agree, 6.7% neutral, and 13.3% disagree. The highest percentage was on "agree" answer which means the students agree that the teacher in project-based learning, the teacher gave clear feedback related to the result of their project.

The interview findings reinforce these results. Students described how the lecturer provided step-by-step guidance when they encountered technical difficulties, such as difficulties in randomizing questions in Google Forms, setting time limits in Quizizz, or optimizing blog features. The lecturer did not simply provide answers but guided students through the process, helping them understand the solution.

Students also mentioned receiving feedback after presenting their projects. The feedback included suggestions for improving content clarity, optimizing application features, and enhancing presentation quality. In several cases, the lecturer asked reflective questions that encouraged students to revise and improve their work independently.

These qualitative insights indicate that the teacher functioned as a facilitator who provided scaffolding, monitoring, and constructive feedback throughout the project cycle.

Discussion

Based on the results shown in the table 1, the majority of students gave positive responses toward the teaching material provided by the teacher. The statement: *"The material given by the teacher is clear and easy to understand,"* 86.7% agreed and 6.7% strongly agreed, while only 6.7% strongly disagreed indicates that the materials were generally perceived as clear as comprehensible. The clear and easy instructional materials is important for supporting active learning. Yulia (2020), emphasizes that clarity of teaching materials significantly contributes to the effectiveness of the learning process, both in online and offline settings. Similarly, Chen et al. (2017) assert that well-structured materials enable students to focus on applying concept rather than understanding instruction, which particularly important in technology-focused and practical courses. These findings suggest that instructional clarity in PjBL environment contributed significantly to students' ability to engaged effectively ICT-related tasks.

The second statement, *"The material given by the teacher is interesting,"* 66.7% agreed, 20% strongly agreed, 6.7% were neutral, and 6.7% strongly disagreed. indicating the interesting material found in this course. Interesting materials play an important role in increasing students' learning motivation. Kusuma & Sari (2021) emphasize that materials connected to students' prior knowledge enhance engagement. in addition, Ryan & Deci (2020) also stated that basic motivation is important in supporting learning. All in all, we can conclude that the teaching materials in this course successfully promoted engagement and meaningful learning experiences.

The third statement, *"The material taught using project-based learning is suitable for the students' needs in education/teaching and learning,"* also received a positive response with 73.3% agreed, 20% strongly agreed, and 6.7% disagreed. These results suggest that students perceived the use of Project-Based Learning (PjBL) as aligned with their educational needs. This finding is supported by Lesmana et al. (2023) and Laili et al. (2025), who found that project-based learning enhances students' critical thinking skills and promotes meaningful learning experiences , while Guo et al. (2020) note that it enhances problem solving-solving skills by demonstrating the direct relevance of course concept. These findings indicate that PjBL effectively bridges theoretical understanding and practical application in IT education

course. As a conclusion, teaching materials that are clear, interesting, and aligned with students' educational needs—especially when delivered through project-based learning have a positive impact on students' perceptions and engagement in the learning process.

The findings in Table 2 shows that Project-Based Learning (PJBL) positively influenced students' motivation to learn ICT skills with the data 73.3% agreed and 6.7% strongly agreed. Project-Based Learning enhances intrinsic motivation by promoting autonomy, collaboration, and authentic engagement. Mardizal et al. (2023) emphasize that such environments foster self-directed learning, while Ryan & Deci (2020) underline the importance of autonomy and competence in motivating learners. The authentic and technology-integrated nature of projects likely strengthened students' sense of ownership and relevance.

Furthermore, the statement "*Project-based learning improves my IT skills*" was also met with a high level of agreement, with 60% agreeing and 33.3**%** strongly agreeing. This indicates that students not only feel more motivated but also believe that PJBL effectively contributes both the conceptual understanding and the development of their practical competencies. Liu et al. (2019) that project-based activities facilitate knowledge internalization and problem-solving development. These findings also aligm with the previous studies that PjBL promotes digital literacy, critical thinking, and problem solving-skills. Liu et al. (2019) claim that project-based activities facilitate knowledge internalization and problem-solving development. These findings are consistent with previous research indicating that Project-Based Learning supports the development of digital literacy and ICT competencies (Silitubun et al., 2025). Furthermore, PjBL has been shown to improve students' critical thinking and problem-solving abilities through meaningful engagement in authentic tasks (Guo et al., 2020). Such experiential learning processes contribute to deeper understanding and long-term retention of skills.

Additionally, the statement regarding the systematic design of PjBL"*Project-based learning is designed systematically starting from explanations, exercises, to the final project*" also received strong positive responses. With the data are 73.3% agree and 13.3% strongly agree, the structured design of PjBL, beginning with explanations, and guided exercises and culminating a final project, was also positively viewed by students. The effectiveness of PjBL is closely The effectiveness of PjBL is closely related to the implementation of a structured learning process that guides students in completing projects systematically and developing their skills progressively (Lesmana et al., 2023; Tambunan et al., 2024).By having systematic design, students can reinforce their competence step by step while avoiding excessive cognitive demands. Larmer et al. (2017) emphasize that scaffolding facilitates gradual skill development, while Penuel & Shepard (2016) highlight that the importance of clear steps and timelines to help students achieve the learning goals. Furthermore, the successful of PjBL implementation can be identified by giving students autonomy and providing systematic. Moreover, a clear, sequential structure prevents students from feeling overwhelmed and helps them monitor their learning progress more effectively.

In summary, the findings indicate that students perceive PjBL as an engaging, skill-oriented, and systematically organized learning approach in ICT courses. This result aligns with existing literature that recognizes PjBL as an effective instructional strategy, particularly in technical and competency-based education contexts.

Table 3 clearly displays the teacher's role is in carrying out Project-Based Learning (PjBL). Most students (66.7%) agreed that their teacher helped them when they faced problems during the project. This suggests that students truly felt supported throughout the learning process. As explained by Habók & Nagy (2021), in PjBL the teacher is not just someone who delivers material, but someone who guides students as they work through real and sometimes challenging problems. With this kind of support, students can explore ideas independently while still knowing that help is available when they need it.

A similar pattern appears in students' responses about project monitoring. Around 73.3% agreed that their teacher regularly monitored the progress of their work. This shows that students were aware of their teacher's involvement and supervision. ongoing monitoring is an essential element of effective PjBL, because it helps students

focused and responsible for completing their tasks (Sauri et al., 2022).

Clear organization also seems to play an important role. As many as 73.3% of students agreed and 13.3% strongly agreed that the teacher provided a clear project timeline. This indicates that students value structured guidance. Wahyuni & Kustijono (2020) explain that clear instructions and timelines help students manage complex assignments and reduce confusion. When students know what to do and when to do it, they feel more confident and are better able to manage their time. Regular monitoring and timely feedback also encourage students to reflect on their progress and make improvements along the way.

Finally, 80% of students felt that they received clear feedback from their teacher. This is an important finding, as feedback is a key part of the learning cycle in PjBL. Chu et al. (2022) emphasize that feedback allows students to revise their work, strengthen their understanding, and improve their final products. Overall, the positive responses toward the teacher's role show that students appreciate guidance, especially in technology-based classes where technical difficulties can easily occur. This aligns with Hmelo-Silver et al. (2019), who highlight the importance of scaffolding in helping students navigate complex learning tasks.

Overall, the findings highlight the interconnection between instructional clarity, structured project design, and active teacher facilitation. These elements collectively create a supportive learning ecosystem that enhances motivation, engagement, and ICT competence. Effective PjBL is therefore not limited to assigning projects but involves careful planning, contextual relevance, and continuous guidance to optimize student learning outcomes.

Conclusion

Based on the results of this study, students demonstrated positive perceptions toward the implementation of Project-Based Learning (PjBL) in the IT in Education course. The teaching materials were perceived as clear, engaging, and aligned with students' educational needs, supporting effective understanding and active participation.

The findings further indicate that PjBL positively influences students' motivation and ICT skill development. The structured progression from guided instruction to independent project completion facilitated gradual skill acquisition and strengthened both conceptual and practical competencies. Teacher facilitation played a critical role in monitoring progress, providing feedback, and supporting problem-solving, ensuring that student-centered learning remained structured and purposeful.

These findings carry important implications for instructional practice and curriculum development. Integrating PjBL strategies aligned with the Merdeka Curriculum can enhance autonomy, competency development, and 21st-century skills, including critical thinking, collaboration, creativity, and digital literacy. Thoughtful implementation that combines structured design, meaningful project tasks, and active teacher support can significantly improve learning quality in ICT-related courses.

Future research should expand the scope to include diverse institutions and academic levels while incorporating mixed-method approaches to provide deeper insights into long-term learning outcomes. Overall, Project-Based Learning represents an effective pedagogical strategy in IT in Education, capable of strengthening motivation, technological competence, and readiness for the demands of the 21st-century educational and professional landscape.

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