PROJECT-BASED LEARNING AND UNITY OF SCIENCE: ENHANCING THE CRITICAL THINKING OF STATE ISLAMIC UNIVERSITY STUDENTS

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ABSTRACT

This research aims to explore the implementation of Project Based Learning (PjBL) as a teaching method to foster students' critical thinking abilities at State Islamic University. The research method involved interviews with students and educators engaged in project-based learning. The findings indicated that Project Based Learning effectively cultivates students' critical thinking by providing practical experiences, team collaboration, and accountability for their education. The implications of this research highlight the importance of integrating Project Learning into the curriculum at State Islamic University to enhance students' critical thinking skills. It underscores educators' need for training and support to implement this teaching method effectively. Project Based Learning is academically relevant and significantly impacts students' social and professional advancement. Continuous development and adaptation of this approach prepare students to face real-world challenges with high levels of critical thinking and creativity. Implementing Project Learning also has the potential to enhance problem-solving skills, communication abilities, and high adaptability, all of which are highly required in today's job market. This study recommended that other educational institutions adopt the project-based learning method as part of their teaching strategies to produce globally competitive graduates.

Keywords*: Critical, Project Based Learning, State Islamic University*

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INTRODUCTION

One duty of human beings created on earth is to seek knowledge. Seeking knowledge is obligatory for every Muslim throughout their life, from birth until death. It is mentioned in a hadith about the obligation of every Muslim to seek knowledge. The Prophet Muhammad (peace be upon him) said: طَلَبُ الْعِلْمِ فَرِيْضَةٌ عَلَى كُلِّ مُسْلِمٍ *"Seeking knowledge is obligatory for every Muslim, both male and female."* (HR. Muslim) Therefore, it is crucial to attain knowledge through a good educational process. Education based on the belief that all knowledge comes from God is a fundamental principle in many Islamic educational institutions, including State Islamic Universities (Hatija, 2024). This concept promotes academic development and fosters strong spirituality in the pursuit of knowledge. The virtue of those who seek knowledge, being

those who possess the intellect to discern what is good and right, is mentioned in the Quran, Surah Az-Zumar verse 9:

أَمَّنْ هُوَ قَٰنِتٌ ءَانَآءَ ٱلَّيْلِ سَاجِدًا وَقَآئِمًا يَحْذَرُ ٱلْءَاخِرَةَ وَيَرْجُواْ رَحْمَةَ رَبِّهِۦ ۗ قُلْ هَلْ يَسْتَوِى ٱلَّذِينَ يَعْلَمُونَ وَٱلَّذِينَ لَا يَعْلَمُونَ ۗ إِنَّمَا يَتَذَكَّرُ أُوْلُواْ ٱلْأَلْبَٰبِ

Meaning: "*(Are you, O polytheist, more fortunate) or is it the one who worships during the hours of the night, prostrating and standing, while fearing the Hereafter and hoping for the mercy of his Lord? Say: Indeed, only those with intellect can take heed*".

In Tafsir Ibn Kathir, Allah's words (Say, *"Are those who know equal to those who do not know?*") mean, are those who worship Allah and set up rivals to mislead people from His path equal? (Indeed, only those with intellect can take heed) only those who understand these groups' differences possess reason (Abdullah, 1994). This verse emphasizes that knowledge obtained through education is a gift from Allah that must be valued and used wisely. In the context of the State Islamic University, understanding that every field of study, whether science or humanities, is part of the knowledge that comes from Allah encourages students to develop critical thinking based not only on academic knowledge but also on moral and spiritual values. Thus, integrating project-based learning and the unity of science becomes crucial in shaping a generation of students who are not only intellectually competent but also responsible for applying religious values in their daily lives.

The success of an education system is partly determined by the educational methods employed (Halawa & Mulyanti, 2023). Project Based Learning (PjBL), based on the Unity of Science in higher education, integrates various disciplines into its learning process. However, this approach also sparks conflicts in universities due to differing approaches and perspectives among disciplines, affecting interdisciplinary collaboration, curricula, and the overall understanding of science (Hatija, 2024). Interaction among students from diverse academic and cultural backgrounds is crucial to address this. In projects that combine elements from different disciplines, students learn to understand, listen to perspectives from various angles, resolve conflicts, collaborate, and appreciate contributions from each discipline. This enriches their learning experience and fosters a more holistic understanding of complex societal issues. Project Based Learning (PjBL) has been well-received in higher education, where students engage in projects demanding problem-solving and directly applying their learned knowledge. Research indicates that PJBL enhances subject understanding and strengthens collaboration, problem-solving, and communication skills (Listiani, 2020). This approach fosters student-centered learning, promotes active engagement, and prepares students with relevant skills for entering the workforce (Ernawati, 2022).

The selection of UIN Walisongo Semarang as the study subject in researching the implementation of Project Learning (PjBL) based on Unity of Science is grounded in several rational reasons. UIN Walisongo Semarang demonstrates a strong commitment to integrating science and religion within the Unity of Science framework, aligning well with the PjBL approach and emphasizing holistic and practical understanding (Adinugraha dkk., 2018). Moreover, UIN Walisongo is recognized as one of Indonesia's leading Islamic universities, consistently enhancing education and

research quality. With supportive infrastructure and experience, UIN Walisongo facilitates exploring best practices in Unity of Science-based PjBL and addresses implementation challenges.

This research aims to explore the effectiveness of Unity of Science-based PjBL in developing critical thinking among UIN Walisongo students. This method seeks to create comprehensive and contextual student learning experiences by integrating scientific elements from various disciplines. The study's findings are expected to offer valuable insights for advancing higher education at UIN Walisongo and for educators interested in incorporating innovative approaches into learning.

RESEARCH METHODS

The research method used in this research was the interview method. Interviews are an in-depth and interactive data collection technique where the researcher interacts directly with respondents to gain an in-depth understanding of the research topic. This approach is to the theory of Miles and Huberman that interviews are an effective way to obtain an in-depth understanding of individual experiences, views, and attitudes regarding the phenomenon under study (Fadli, 2021). Interviews were conducted using a structured interview guide, and the interview process was carried out individually to ensure the intimacy and depth of the information obtained. Data collection in this research was carried out in-depth in the interview process. Interviews were conducted with students and lecturers at Walisongo State Islamic University, Semarang, Central Java, Indonesia, who have a vision based on the unity of knowledge in their learning. These informants have experienced and applied learning using the Project Based Learning method in their education.

Table 1. Informant Profile

No.	Initials	Position
1.	D1	Lecturer
2.	D2	Lecturer
3.	M1	Student
4.	M2	Student
5.	M3	Student
6.	M4	Student

The data validation technique in this research was a key aspect in ensuring the accuracy and reliability of the research results. Data sources were selected by considering their participation in learning using the method of Project Learning in lectures. The secondary data used are written documents such as books, articles, scientific journals, and newspapers relevant to the research topic. This approach allowed researchers to gain comprehensive insight into how the Unity of Science-based Project Learning can shape students' critical thinking in the academic environment of the State Islamic University. In the context of this research, data validation may involve several steps, such as checking the consistency of responses from various respondents,

cross-checking survey data with the institution's internal records, and conducting discussion sessions or focus groups to ensure accurate data interpretation.

Additionally, the ongoing participation of key stakeholders such as lecturers and students was crucial in the data validation process to ensure that the research results truly reflected the reality and needs of exploring project-based learning methods in the university environment. By implementing comprehensive data validation techniques, research on the application of project-based learning in the environment of state Islamic universities can significantly contribute to enhancing the understanding and implementation of practices that support an inclusive educational environment and optimize learning potential.

RESULTS AND DISCUSSION

Project-Based Learning (PjBL) has become an increasingly popular learning approach at the tertiary level. According to Murfiah, Project Based Learning (PjBL) is a learning model that uses projects or activities as the main tools. In this model, teachers ask students to explore, assess, interpret, synthesize, and present information to produce various learning outcomes (Nababan dkk., 2023). This model cannot be implemented in a single learning session as it requires considerable time. In line with Ngalimun's view, PjBL differs from other learning models as it emphasizes long-term, holistic, interdisciplinary, and student-centered learning activities, allowing students to engage in practices related to real-world issues (Maesaroh, 2022). In this learning method, students are involved in real projects that require applying the knowledge and skills they learn in real-world contexts (Kaamaruddin dkk., 2024).

This approach allowed students to develop collaboration, problem-solving, and creativity skills, which were critical in their later professional careers. It also encourages intrinsic motivation and deep understanding because students are actively involved in learning. According to recent research by Johnson, Project Learning effectively increases conceptual understanding, strengthens collaboration skills, and inspires sustainable curiosity in tertiary-level students (Jamal dkk., 2023). This study highlights the importance of project design that is relevant to learning content and takes into account students' diverse learning styles. Thus, this method provides a meaningful learning experience and prepares students with the skills needed to succeed in an increasingly complex and changing world of work. Project-based learning (PJBL) is an educational method that engages students in complex projects that reflect real-world challenges (Ginanjar dkk., 2021). This method places students at the center of the learning process, encouraging them to seek information, think critically, and develop creative solutions to their problems (Wardani, 2023). In the context of higher education, particularly for university students, this learning method has significant potential to enhance their critical thinking skills.

Table 2. Significant Advantages of Project-Based Learning

No	Main Points	Explanation
1	Application of theory in practice	Students are challenged to integrate theoretical knowledge learned in class with real-life situations, requiring critical analysis, information evaluation, and synthesis of various concepts, thus understanding and applying information in relevant contexts.
2	Promotion of collaboration and discussion	Through group work, students interact, exchange ideas, provide feedback, view problems from different perspectives, ask critical questions, develop strong arguments, and hone effective communication skills.
3	In-depth problem-solving	Projects require students to find innovative solutions to problems involving problem identification, information gathering, data analysis, and evidence-based decision-making, sharpening logical and systematic thinking skills.
4	Development of independent learning	Students are responsible for their learning process, managing time, resources, and priorities, encouraging them to think independently and critically, and becoming critical thinkers capable of evaluating information and making decisions independently.
5	Meaningful and relevant learning experiences	Projects related to real-world situations make learning more contextual and meaningful, increasing students' motivation to learn and develop critical thinking skills throughout their academic and professional careers.

All knowledge should be inseparable from the greatness of Allah. But all knowledge, whether religious or modern, fundamentally originates from one source, which is Allah. All scientific discoveries must be able to demonstrate the greatness of Allah (Laila, 2014). Achievements in modern science should align with obedience to Allah. The Unity of Science (UoS) approach can be implemented through five paradigms: integration, collaboration, dialectics, prospective, and pluralistic (Wahyuddin, 2017). These five paradigms assert that knowledge does not stand alone but is interconnected with other fields of expertise (Tsaqib dkk., 2023). This combination aims to enrich perspectives and deepen the study of the material. Unity of Science (UoS)-based learning is an approach to teaching at the tertiary level that emphasizes integrating various scientific disciplines to understand complex phenomena in the real world.

This approach combines scientific principles from multiple fields, such as science, technology, mathematics, and humanities, to provide a holistic understanding of a topic. Through this learning, students gain a deep knowledge in their specific field and broaden their horizons across traditional boundaries between disciplines. This concept of education is also crucial in shaping one's character. Pursuing knowledge

must be based on good manners (Baihaqi, 2018). Therefore, project-based learning and the unity of science can guide good morals and integrate knowledge perfectly into daily life, derived from education grounded in religion. Consequently, revitalizing character education through Islamic religious education is essential in providing direction and supervision to the younger generation. This is achieved by instilling religious values, the strength of faith, piety, knowledge, and karakul karma (moral character) so they do not get caught up in globalization. They can maintain Islamic traditions and good values (Ismail & Nugraha, 2024).

Project Based Learning (PjBL) based on the Unity of Science is implemented within the State Islamic University.

The teaching methods implemented within the university environment must align with the established educational curriculum (Muslimin & Ruswandi, 2022). The curriculum is designed to implement learning innovations so students can face various industrial and future challenges. Curriculum development that adapts to the evolving times will produce job-ready graduates who meet the expected learning outcomes. This curriculum is the primary guide in determining the competencies students must achieve at each educational level. By aligning teaching methods with the curriculum, instruction can become more structured and systematic, thus facilitating the achievement of educational goals. Utilizing techniques such as project-based learning and the unity of science by the curriculum ensures that academic content is covered but also aids in developing the critical and integrative skills students need in the real world.

Furthermore, aligning teaching methods with the university curriculum ensures that the teaching and learning process meets national and international standards. This is crucial for university graduates to possess widely recognized competencies and be prepared to compete in the global job market. A well-designed curriculum allows for the implementing of innovative and relevant teaching methods, such as project-based learning, which can provide practical experiences and real-world applications of the theories studied in class. According to the results of interviews conducted with lecturers implementing Project Based Learning at the Walisongo State Islamic University, Semarang, Central Java.

Figure 1. Interview with Lecturer

This research shows that implementing this method results in 1.) the material provided must be adapted to existing needs in society and learning objectives, 2.) the Project Learning method effectively forms students' critical thinking, and 3.) it is not

just ordinary learning. Still, it provides implications for solutions to environmental problems in the real world. These three things have different explanations, as expressed by informant D1.

"As for the material presented, we always adapt it to the needs of society. This ensures that what is taught can be applied in everyday life. For example, in project-based learning in higher education, we use a curriculum designed by the study program. However, its implementation depends on the approach taken by each lecturer."

Apart from that, informant D2 explained that implementing the Project Based Learning method depends on the learning objectives that will be achieved in the learning.

"When we talk about project-based learning, it is more towards creativity, and in critical thinking, I prefer to use an inquiry approach in learning. So, this method is actually just one way to achieve the goal. If the goal is to be critical, then the learning process must be related to this. The point is, it depends on the learning objectives."

Based on the interview above, lecturers who have implemented Project Learning provide explanations for implementing the UoS-based project learning method, which must be adapted to the material currently needed by the community and the learning outcomes they want to achieve. Project-based learning materials must be adapted to community needs to have a significant impact. By integrating elements that are relevant to real problems faced by society, students can develop a deeper understanding of the concepts studied and hone the practical skills needed in everyday life. In "Project-Based Learning: Design and Implementation for Middle School and High School" (2021) by Thom Markham, the strategies and approaches contained in project-based learning can be adapted well to create meaningful and relevant learning experiences for students and things. This can also be applied at the tertiary level for students.

In addition, project-based learning materials must be adapted to learning outcomes or objectives at the tertiary level to provide students with in-depth and relevant learning experiences (Santoso, 2023). By ensuring that the projects undertaken by students are by the learning objectives set, educational institutions can ensure that students acquire the necessary knowledge and skills and develop critical, collaborative, and innovative thinking abilities. So, in this case, the key to implementing Project Based Learning on a UoS basis is material adapted to the community's needs and the learning outcomes to be achieved.

From that, Learning using the Unity of Science-based Project Learning method also effectively forms students' critical thinking, as stated by informant D1.

"As I see it, the concept of project-based learning does take things in a more interesting direction. When the material taught is closely connected to everyday reality, and students are invited to think critically, it is not just learning, but also a small transformation in the way we view the world. Clearly, this is one way that is effective in forming critical thinking for students."

This is different from D2, which states that Project Learning directs the results of this method to prioritize creativity or skills but still forms students' critical thinking from this learning method. Apart from that, it also prioritizes the learning objectives to be achieved.

"It's not that I reject the project-based learning approach as a way to encourage critical thinking, but more about clarifying learning objectives and how this can produce creativity in students in honing their skills. So, when the learning objectives are clear, then we can apply appropriate learning methods appropriate."

The interview results provide information that the Project Learning method effectively shapes students' thinking and training skills in better creativity; this was also acknowledged by informants M1, M2, M4, and M5.

M1: *"Yes, you know, it's not often, but you've definitely experienced what is called project-based learning. For example, making videos, writing articles, or most often presentations. That, right, makes us think more critically and improve It's really an experience, it really sharpens your own brain."*

M2: *"I think project-based learning is cool, yes. Apart from making me more critical, it also provides space for creativity and innovation. Plus, I can improve other skills too, you know. Like, my analysis and evaluation are getting better."*

M4: *"Of course, yes, in influencing critical thinking. We must be able to follow the way the lecturer works and be open to new methods. This broadens our thinking style as students."*

M5*: "My analysis and evaluation skills encourage me to think harder. From this material, we make learning videos as part of project-based learning. Moreover, when real-life problems are combined with solutions from various scientific disciplines, we can conclude that everything comes from God Almighty."*

From the results of the interview, it was not only the lecturers who apply Project Learning who state that this method is effective in forming students' critical thinking but also the students themselves who feel from their experience that the UoS-based Project Learning method really forms critical thinking for each individual and also increase creativity within oneself. Project-based learning based on the Unity of Science has been proven to be an effective method in forming students' critical thinking and improving creativity skills at the tertiary level. In this approach, students were allowed to explore various scientific disciplines in an integrated manner, solve complex problems, and apply their knowledge in real contexts. This encourages them to think analytically, create innovative solutions, and work collaboratively.

Apart from having a positive impact, learning using this method also has implications for the needs needed in society or providing appropriate solutions based on the results of the learning that has been carried out. As said by informant D1.

D1, *"Yes... the material must be understood deeply and broadly, not just memorized but also in every aspect the material needs to be developed, and understood to its meaning, so*

it needs to be linked to life so that having the material taught can provide implementation to community problems."

As said by informant D1, it is indeed in the material. The learning that has been carried out in education can provide solutions or answers to problems that occur in society, provided that the material studied must be understood in depth and the aspects contained in the material are well developed. Learning in higher education must be relevant to existing societal problems so that students can become effective agents of change. Learning materials that reflect the social realities of society not only improve their understanding of academic concepts and prepare students to face real-world challenges (Kamaruddin dkk., 2024). By integrating actual problems into the curriculum, universities can produce graduates who are better prepared to face various social, economic, and political challenges (Rusman, 2014). Apart from that, it is also mentioned in the Qur'an in qs. Al alaq verses 1 – 5,

اِقْرَأْ بِاسْمِ رَبِّكَ الَّذِيْ خَلَقَۚ ﴿١﴾ خَلَقَ الْاِنْسَانَ مِنْ عَلَقٍۚ ﴿٢﴾ اِقْرَأْ وَرَبُّكَ الْاَكْرَمُۙ ﴿٣﴾ الَّذِيْ عَلَّمَ بِالْقَلَمِۙ ﴿٤﴾
عَلَّمَ الْاِنْسَانَ مَا لَمْ يَعْلَمْۗ ﴿٥﴾

Translation: "*Read in the name of your Lord who created. Created man from a clinging substance. Read, and your Lord is the most Generous. Who taught by the pen? Taught man that which he knew not*."

In this verse, Ibnu Katsir's interpretation explains that this verse emphasizes the importance of knowledge and learning. Allah taught humans with the pen, a symbol of knowledge and learning. This shows that science is a form of worship commanded by Allah. Humans should value science and use it to increase their understanding of the world and for the good of humanity and civilization (Mukmin, 2016). So this explains, in conclusion, that science is never separated from the problems that occur in the surrounding environment and that science develops along with the times; all knowledge in the world is oriented back to the Quran.

Factors that Influence Success in Implementing Unity of Science-Based PjBL in the Learning Context at State Islamic Universities

In implementing something in life, there must be supporting factors in its execution. These factors were essential to achieving the desired outcomes. In executing various programs or projects, particularly in the context of education, the success of implementation heavily relies on adequate supporting factors. These factors include human resources, funding availability, infrastructure, and policy support (Amin & Romelah, 2024). Without holistic and synergistic support from all these elements, the implementation of a program often cannot proceed optimally, and the program's ultimate goals may not be fully achieved.

Furthermore, the role of these supporting factors was crucial in creating a conducive environment for program implementation. For instance, in implementing project-based learning methods in educational institutions, support from competent

educators, a relevant curriculum, and adequate facilities is vital. Additionally, supportive policies and active participation from all related parties, including students, parents, and the community, were key to the successful implementation of the program. Educators often choose project-based learning methods to achieve various objectives, including developing students' logical and critical thinking skills (Ilmudinulloh & Ahmad, 2022). Thus, understanding and identifying these supporting factors was an essential first step in planning and implementing an effective program. The implementation of Project Based Learning cannot be separated from the factors that influence the implementation of Project Based Learning based on the Unity of Science, namely, three factors: 1.) educators, 2.) the role of a lecturer to students, and 3.) understanding the material in depth. As stated by informant D1, educators were the main key in implementing the Project Based Learning learning method.

"Of course, it is very important to understand that the success of implementing Project Based Learning is very dependent on the readiness of educators, both teachers and lecturers, who have mastered the material before implementing it."

Educators play a central role in the learning process, delivering information to students and facilitating understanding, skill development, and character formation (Simamora dkk., 2024). Competent educators can design effective learning strategies, select materials that meet students' needs, and create a learning environment conducive to growth and exploration. The success of implementing Project Based Learning (PjBL) based on the Unity of Science through competent educators hinges on their deep understanding of PjBL principles and their ability to design relevant and challenging projects for students. They must also guide and support students throughout the learning process, ensuring active engagement and achievement of learning goals (Sembiring dkk., 2024). Educators must continuously develop themselves through training and experience to remain at the forefront of educational innovation. Without quality educators, learning would be a mechanical process lacking inspiration (Putri dkk., 2024). They are key to unlocking success for every student, guiding them towards profound understanding and realizing their full potential.

Furthermore, the role of a lecturer in this learning method was crucial. Lecturers acted as teachers and facilitators who helped students develop their critical and creative abilities. Through the PjBL approach, lecturers can encourage students to collaborate in teams, solve real-world problems, and integrate various disciplines into their projects. A strong relationship between lecturers and students can foster a supportive learning environment where students feel comfortable expressing their ideas and experimenting with new solutions.

Apart from informant D1, student informants also said that it is true that the role of lecturers is one of the second factors in helping to implement Project Learning based on the Unity of Science. As stated by informants M3 and M5.

M3, *"Lecturers really have an important role in this project, they provide guidance and tips that really make the work easier."*

M5, *"The role of lecturers is varied; some use this project as a learning tool, but some prefer to give assignment-based projects. With those directly involved, there will be an evaluation of every step we take. They will check our progress and provide "Continue input until it's finished. As a result, students become more self-critical than just listening to lectures."*

Apart from that, the third factor in supporting project-based learning was material that needs to be understood in depth. As stated by informant D1.

"In presenting material, it is important to ensure that every aspect provided has been developed thoroughly. Only with comprehensive mastery of the material being taught, students can assemble concepts according to their individual understanding. Mastering the material comprehensively is the main key in supporting the successful implementation of the approach project-based learning."

So, this showed that material is the second key to implementing learning. Understanding the material in learning in higher education was the main foundation for building a solid and in-depth understanding of a particular field of science. The concept of "Unity of Science" underscores the importance of integration between various scientific disciplines in understanding complex phenomena. In this context, a strong understanding of the material was the key to connecting diverse concepts from multiple scientific disciplines. When students understand the material thoroughly, they can see the whole picture and the relationships between various aspects of science. This helped them to develop deep analytical skills and facilitated the discovery of innovative solutions to solving multidisciplinary problems. Thus, a strong understanding of the material was important for academic success and for developing the critical and creative thinking skills needed in the complex and ever-evolving world of work.

Obstacles Faced in Implementing Unity of Science-Based PjBL

Apart from those factors that supported the implementation of the Project Learning method, there were also obstacles faced in implementing this learning based on the Unity of Science. The obstacles that occurred were 1.) obstacles to mastering the problem and 2.) limited costs and innovation or what could be called a lack of resources. Informants D1 and D2 conveyed this by conveying the obstacles they had overcome in implementing the Unity of Science-based Project Based Learning method.

D1, *"In my opinion, the obstacles are clear, yes, because when we talk about project-based learning, we have to understand well the problems that generally occur in society. So, combining lesson material with actual situations in the field is very important. The goal is not only so that the material feels useful and can be applied, but also provides motivation for students to apply it seriously."*

D2, *"As stated, 'The obstacles in project-based learning are of course costs. In addition, the resulting innovation is often hampered by repetitive activities, so special guidance is needed. The project-based learning process cannot be completed instantly; but rather through stages involving the roles of lecturers and students. Starting from planning, where students and lecturers work together to determine the plan, to implementation*

which ensures the plan is carried out well. It is important to avoid discrepancies with the steps that have been determined along the way. Finally, evaluation is the key to measuring the extent to which goals can be achieved."

Implementing the Unity of Science-based Project-Based Learning (PjBL) method faces supporting factors and several obstacles that must be addressed. As noted by D1 and D2, it is concluded that there are inhibiting factors, such as the lack of educators' understanding of the material presented, which results in suboptimal learning processes in higher education. Students must explore topics in-depth and apply their knowledge in real-world contexts (Listiani, 2020). This can be challenging for students new to this approach or do not have strong foundational knowledge. Additionally, a lack of resources in terms of funding and innovation also hinders the learning process using this Project method.

The limitations in budget and innovation were significant obstacles in implementing Unity of Science-based PjBL. PjBL projects often require adequate resources for technology, specialized materials, or inviting guest speakers and facilitating field activities. Not all educational institutions have sufficient budgets to support these needs, which can hinder their ability to implement PjBL effectively. Furthermore, several other challenges are often faced in applying project-based learning methods in higher education (Wijnia dkk., 2024). One of the main issues was insufficient time for lecturers to manage the projects. This can be due to busy schedules or other duties that lecturers must handle.

Moreover, a lack of student engagement was also a serious challenge. Students may not be sufficiently motivated or fully involved in the implementation of projects, possibly due to a lack of support from lecturers or insufficient problem-solving skills. Also, difficulties in managing facilities, equipment, and materials were constraints. Lecturers may face challenges accessing adequate facilities or managing the equipment and materials needed for the projects. Finally, managing the various needs of students, including support needs, information, and additional resources, was also a problem. Lecturers may struggle to identify students' needs or to meet existing needs.

To address the difficulties in applying the project-based learning model at the higher education level, there are several solutions that lecturers or educators can implement. First, lecturers can optimize available schedules and time by creating efficient schedules or making the most available time. Second, lecturers can encourage student involvement in projects by making them feel engaged and responsible for their outcomes. Third, lecturers can manage facilities, equipment, and materials well, whether by making the most of existing facilities or ensuring that equipment and materials are well managed.

Fourth, lecturers can pay close attention to students' needs by identifying or addressing unmet needs. Fifth, lecturers can utilize technology to support the implementation of the project-based learning model, such as using specialized applications or other technologies that facilitate project work (Falah dkk., 2023). Sixth, lecturers can review emerging difficulties and develop effective solutions by identifying

existing problems or finding suitable solutions. Finally, lecturers can reassess the project-based learning model used to ensure it meets the needs and conditions of the students and the existing learning environment. By applying these various solutions, implementing the project-based learning model at the higher education level can become more effective and successful. Although the project-based learning method based on the Unity of Science offers an innovative and beneficial approach to education, managing the existing obstacles is crucial to ensuring the success and sustainability of this method's implementation in the educational environment.

CONCLUSION

The research on implementing Project Learning (PjBL) based on Unity of Science at Walisongo State Islamic University in Semarang, Central Java, has identified several significant findings. Interviews indicated that this PjBL approach effectively delivered material relevant to societal needs and learning objectives and fostered students' critical thinking. Moreover, PjBL implementation also offers solutions to local environmental issues, not merely generating conventional learning outcomes. The success of implementing PjBL based on the Unity of Science in higher education was influenced by several key factors. The role of educators was crucial in designing effective learning strategies and creating an environment conducive to student growth. A profound understanding of the subject was also critical, enabling students to connect concepts across various disciplines. Nevertheless, this research faced several challenges, such as time constraints for interviewing informants with busy schedules and ensuring consistency in data collection from diverse respondents. To address these challenges, future research could explore alternative data collection methods beyond interviews, such as using questionnaires to gather responses from more participants in a shorter period. Additionally, leveraging data collection or analysis technology, such as big data analytics or computational methods, could enhance efficiency and accuracy in related studies. Thus, future research is expected to optimize the data collection process and provide more comprehensive results to support the development of PBL implementation based on the Unity of Science in higher education.

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