

Enhancing Entrepreneurial Attitudes through Project-Based Learning: A Study on Universitas Jambi Graduates

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ABSTRACT

This study investigates the effectiveness of Project-Based Learning (PjBL) in enhancing entrepreneurial attitudes among graduates of Universitas Jambi. It focuses on how experiential and collaborative PjBL activities contribute to developing key entrepreneurial traits such as proactiveness, creativity, resilience, and adaptability—beyond traditional classroom approaches. Using a Design-Based Research (DBR) framework, this mixed-methods study combines quantitative and qualitative approaches. Data were collected from 384 final-year students through surveys, observations, and interviews. Quantitative analysis employed a paired-sample t-test, while qualitative insights were gathered through in-depth interviews with students and faculty. Statistical findings reveal that PjBL significantly improves entrepreneurial attitudes. The implementation of PjBL showed a t-value of 7.966 for entrepreneurial effectiveness, and a t-value of 2.637 for the influence of entrepreneurial attitude quality—both exceeding the critical t-value (1.6252) at a 5% significance level. These results confirm the positive impact of PjBL on entrepreneurial mindset development. Supporting factors such as faculty mentorship and access to business incubators further strengthened these outcomes. The study concludes that PjBL is an effective pedagogical strategy for fostering entrepreneurial competencies in higher education. It enables students to apply entrepreneurial principles through real-world problem solving, teamwork, and critical reflection. Future studies should explore longitudinal impacts on career outcomes and the integration of digital tools and industry partnerships to maximize PjBL's effectiveness in entrepreneurship education.

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1. INTRODUCTION

In the context of global competition, education serves as a crucial instrument for enhancing the quality of human resources. High-quality human capital is typically characterized by creativity, productivity, and performance—both individually and in teams—across an increasingly dynamic and competitive global environment (Fatimah, 2013; Primandaru, 2017). To remain competitive in this era of globalization, educational institutions must be capable of producing graduates who are not only academically competent but also innovative, adaptable, and ready to face multifaceted challenges. Universitas Jambi (UNJA), as a higher education provider, recognizes the imperative to develop such human resources, aiming to equip its graduates with the skills and knowledge necessary to compete both nationally and internationally.

However, the persistence of high levels of open unemployment among higher education graduates in Indonesia indicates a significant disconnect between academic outcomes and employability (Utomo, Rapii, & Majdi, 2016). This situation reflects a tendency among graduates to adopt the role of job seekers rather than job creators. A contributing factor to this issue is the lack of life skills and entrepreneurial competence, which are critical for navigating the modern labor market (Santoso & Handoyo, 2019). This challenge underscores the urgent need for universities to intensify their efforts in fostering entrepreneurial mindsets and skills among students to promote economic resilience and national development. Notably, Listyawati (2017) and Mirawati, Wardana, and Sukaatmadja (2016) highlight that for a nation to achieve developed status, at least 2% of its population should be entrepreneurs.

Aligned with this vision, Universitas Jambi aspires to transform into a "World Entrepreneurship University." This institutional vision is operationalized through the strategic plan known as UNJA SMART, which reflects the national higher education priorities outlined in Regulation of the Minister of Education and Culture of the Republic of Indonesia No. 22 of 2020, and Ministerial Decree No. 754/P/2020 regarding Key Performance Indicators for State Universities. The strategic objectives of UNJA SMART encompass five pillars: (1) improving student achievement, (2) transforming governance, (3) enhancing academic reputation, (4) aligning graduate relevance with industry needs, and (5) integrating digital technologies to support higher education services.

Specifically, these objectives aim to prepare graduates who are competitive in the workforce, improve lecturer quality through national and international Tridharma Perguruan Tinggi networks, enhance curricula aligned with global trends, and ensure that academic programs attain international accreditation. Furthermore, initiatives such as student talent development, international mobility, research innovation, and career services are central to realizing these goals.

One strategic area in which UNJA seeks improvement is the incorporation of entrepreneurship education into its academic framework. The inclusion of entrepreneurship courses is expected to strengthen student independence and life skills. Suryana (2014) emphasizes that entrepreneurship learning can transform student perceptions, attitudes, and behaviors, fostering a proactive and creative approach necessary for becoming successful entrepreneurs. However, current efforts, such as the provision of a single two-credit entrepreneurship course, remain inadequate for the comprehensive development of entrepreneurial competence.

Developing entrepreneurial attitudes and competencies requires structured, iterative, and experiential learning processes. Graduates with entrepreneurial skills are more likely to possess higher levels of independence and adaptability in the job market. This recognition has led UNJA to explore pedagogical approaches that can enhance entrepreneurship education more effectively. One promising method is Project-Based Learning (PjBL), a pedagogical strategy that facilitates experiential and contextual learning by engaging students in collaborative, real-world projects (Mayasari et al., 2024; Samsiadi & Romelah, 2020). Pane and Dasopang (2017) further assert that effective learning must involve interactive processes between educators and students, supported by appropriate methods and models.

PjBL has shown potential in fostering critical thinking, innovation, creativity, and problem-solving—skills essential for entrepreneurial success (Sousa, 2018; Korobov et al., 2019; Ma'dan et al., 2020). According to Izati et al. (2018) and Prasetyo et al. (2020), PjBL enables learners to construct core concepts and apply them in practical settings through collaborative and contextual activities. Similarly, Wahyuni and Fitriana (2021) and Jumani (2021) emphasize that PjBL supports the development of real-world competencies through immersive learning experiences.

Studies have demonstrated that PjBL not only improves student engagement and collaboration but also directly impacts entrepreneurial mindset formation (Rofieq et al., 2019; Ngereja et al., 2020; Almulla, 2020; Hanum et al., 2023). It cultivates entrepreneurial traits such as self-efficacy, initiative, and risk-taking—critical for business initiation and growth (Widiyat & Ni'matuzahro, 2017; Dubey, 2022). Moreover, PjBL can strengthen students' belief in their entrepreneurial potential and enhance their intention to pursue entrepreneurial careers (Soetjipto et al., 2022). When effectively implemented, PjBL contributes to the overall competitiveness of graduates, whether they choose to enter the job market or start their own ventures (Djakona et al., 2021; Wibisono & Thao, 2023).

Additionally, collaboration with external stakeholders in implementing entrepreneurship projects can enhance students' exposure to real-world business challenges, providing further relevance and impact to their learning experiences (Mustakim, 2014; Nizar, 2014). Thus, integrating PjBL into entrepreneurship education holds potential not only for enhancing the quality of university graduates but also for addressing broader socio-economic challenges through the cultivation of entrepreneurial capacities.

This study aims to: (1) analyze the quality of entrepreneurial attitudes among Universitas Jambi graduates, (2) design an effective Project-Based Learning model to improve entrepreneurial competencies, and (3) evaluate the impact of PjBL implementation on enhancing graduates' entrepreneurial attitudes. The novelty of this research lies in its contextual approach to embedding PjBL in entrepreneurship education, offering new contributions to the literature and practical insights into curriculum reform in Indonesian higher education.

2. METHODS

Design Based Research (DBR) method, where design-based research (DBR) is a flexible development model adjusted to the needs of students (Bakker et al., 2013). DBR analysis using Mixed Methods: A combination of quantitative and qualitative methods is often used to obtain more comprehensive data (Creswell, 2019).

Population in this study are All University of Jambi students who are related to business, management, or economics who follow the PjB method. Samples are usually taken from students in study programs related to business, management, or economics who follow the PjBL method. In determining the minimum representative sample using the Lemeshow equation formula (Lemeshow, 1997) so that the sample amounted to 384 students whose learning process used PjBL with the following calculations:

$$n = \frac{Z^2 \times P \times Q}{L^2}$$

Information:

- n is the minimum sample size
- Z is the standard value of the normal distribution at the desired confidence level (e.g., for a 95% confidence level, Z = 1.96)
- P is the prevalence of the outcome or the proportion of the population that has a particular characteristic (e.g., 50%)
- Q is the complement of P, i.e., Q = 1 - P
- L is the level of precision or margin of error allowed (e.g., 5%)

The formula is an estimate of the sample proportion based on the sample characteristics regarding the entrepreneurial attitudes of UNJA graduate students, so that the research sample is as follows:

$$n = \frac{1.96^2 \times 0.5 \times (1 - P)}{0.1^2}$$

$$n = \frac{1.96^2 \times 0.5 \times (1 - 0.5)}{0.1^2}$$

$$n = \frac{3.8416 \times 0.25}{0.05^2}$$

$$n = \frac{0.9604}{0.0025} = 384,16 = 384$$

From the formula, the estimated proportion of the sample used in this study was 384 UNJA graduate students whose entrepreneurial attitude quality will be seen. Data collection technique used in the study is Questionnaire and In-Depth Interviews. Questionnaire using for Quantitative instruments such as questionnaires are used to measure students' entrepreneurial attitudes before and after the implementation of PjBL (Likert Scale). At the same time, In-Depth Interviews using to gain a deeper perspective on students' and lecturers' experiences during PjBL implementation.

Data analysis with mixed methods allows researchers to evaluate the impact of PjBL numerically (quantitative) and examine students' experiences and perceptions in more depth (qualitative). So that PjBL learning tools can be developed. Qualitative Methodology for Case study design can be used to dig deeper into the experiences of students and lecturers involved in the implementation of PjBL, thus allowing for in-depth analysis of the process and outcomes of project-based learning. Quantitative Methodology for This study can use a quantitative paired sample t-test design which tests the effectiveness between PjBL implementation and entrepreneurial attitudes.

The procedure used in this research with the original Design Based Research (DBR) Model adapted from Reeves (2006) through the stages as shown in the diagram below:

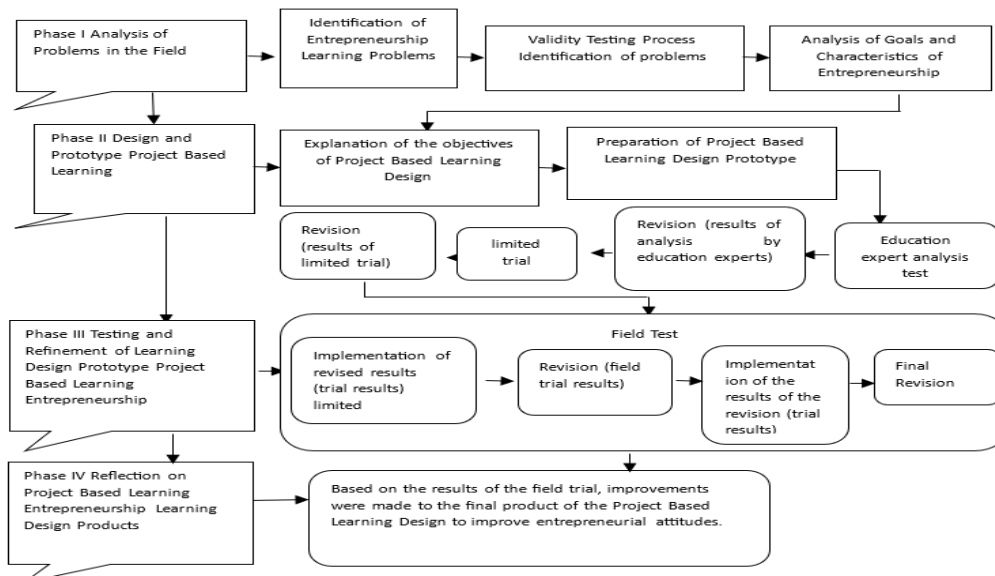


Figure 1. Project Based Learning Design Procedure

The procedural stages related to this DBR research, as outlined in the table above, can be explained as follows:

Phase I: Identification and Needs Analysis Process

Identifying and analyzing needs collaboratively between researchers, learning experts, and students to determine development needs, with the following steps: 1) Identifying entrepreneurship learning

problems. In this research, the identification process involves exploring: (a) the need for a Project-Based Learning (PjBL) design in the learning process, and (b) long-term expectations of knowing and understanding entrepreneurship. Data collection techniques at this stage include interviews, Focus Group Discussions (FGD), and the implementation of the learning system involving lecturers and students in the study. Additionally, observations and documentation are also conducted; 2) Validation testing of problem identification. The validation process is carried out by cross-referencing the obtained information with insights from curriculum and learning experts, as well as the lecturers and students involved in the research; 3) Analysis of objectives and characteristics. This stage involves identifying the objectives and characteristics of the PjBL learning design to determine the required learning tools and materials.

Phase II: PjBL Learning Design and Prototype

After the identification and needs analysis process, the next step is to develop the design and prototype of PjBL learning. This process is carried out through collaborative discussions between researchers and curriculum and learning experts involved in the study. At this stage, the objectives of the PjBL entrepreneurship learning design are outlined, followed by the development of the PjBL learning prototype. Once the design and prototype have been finalized, they undergo validation testing by curriculum and learning experts through a questionnaire-based evaluation. The next step is a limited trial, involving 50 students participating in entrepreneurship learning. These students were selected because they had already undergone the MBKM (Merdeka Belajar Kampus Merdeka) entrepreneurship internship program. The trial aims to gather feedback for refining the initial version of the PjBL learning design prototype.

Phase III: Testing and Refining the Prototype of the PjBL Entrepreneurship Learning Design

At this stage, field testing is conducted to refine the PjBL entrepreneurship learning design prototype, with the following steps: 1) Purpose of Field Testing: The field test aims to assess the effectiveness of the PjBL entrepreneurship learning design; 2) Field Test Design: The effectiveness of the PjBL entrepreneurship learning design is tested through an experimental approach, where researchers provide explanations to students about entrepreneurship learning; 3) Test Subjects: The subjects of this study are students participating in entrepreneurship learning at Universitas Jambi; 4) Data Collection: Data is collected through observations, questionnaires, and interviews; 5) Data Analysis Techniques: The study employs both qualitative analysis and t-tests. Qualitative analysis is used to examine the field test implementation process regarding the explanation of the PjBL entrepreneurship learning design. The t-test is conducted to evaluate the effectiveness of the PjBL entrepreneurship learning design. Next, to determine the magnitude of the paired t-test effect, Cohen's *d* effect size will be used with the following criteria: 0.20 (small), 0.50 (moderate), and 0.80 (large).

Phase IV: Reflection on the Learning Design Product

At this stage, the results of the field test are used to refine the PjBL entrepreneurship learning design, making it ready for use by students in entrepreneurship education, providing them with the knowledge to develop an entrepreneurial mindset upon graduating from Universitas Jambi. An evaluation is also conducted based on the design principles used. The expected outcomes of this research include: 1) Contributing to the improvement of learning quality at Universitas Jambi, especially in terms of fostering entrepreneurial attitudes among students; 2) Developing an effective learning model through PjBL; 3) Demonstrating that PjBL can enhance entrepreneurial attitudes in graduates of Universitas Jambi; 4) Providing a new contribution to the entrepreneurship literature, particularly regarding the development of learning methods that can improve students' entrepreneurial attitudes; 5) Helping to improve the competitiveness of UNJA graduates in the job market or in starting their own businesses, aligned with the demands of the current business world; and 6) Providing a foundation for the development of policy recommendations to the university or government for the creation of educational programs aimed at fostering entrepreneurial attitudes.

Indicators of ability to complete learning projects (PjBL) in entrepreneurship can include various aspects, both in terms of process and results. Here are some indicators that can be used to assess this ability:

Table 1. PjBL Syntax in Entrepreneurship for Graduates of Jambi University Students

No	Implementation of Project Based Learning (PjBL)	PjBL Syntax in Entrepreneurship for UNJA Graduates
1	Identification of problems	1. Ability to identify problems clearly and specifically 2. Collect relevant data to understand the root of the problem
2	Problem Analysis	1. Using various methods and analysis tools to evaluate problems 2. Understand the impact of various factors that contribute to the problem
3	Decision-making	1. Develop various alternative solutions 2. Evaluate the pros and cons of each alternative 3. Choose the most effective and efficient solution based on the analysis carried out.
4	Solution Implementation	1. Plan the steps to implement the chosen solution 2. Allocate the resources needed for implementation 3. Coordinate the team and direct efforts to solve problems
5	Evaluation and Monitoring	1. Monitor the results of solution implementation to ensure its effectiveness 2. Collect feedback and data to evaluate results 3. Make adjustments if necessary to improve or optimize the solution
6	Creativity and Innovation	1. Demonstrate the ability to think creatively and generate innovative ideas in solving problems. 2. Implement unconventional or out-of-the-box solutions when the situation requires
7	Effective Communication	1. Able to communicate problems and solutions clearly to the team and stakeholders. 2. Listen and consider input from others in the problem-solving process..
8	Resilience and Adaptability	1. Demonstrate resilience in the face of challenges and failures. 2. Able to adapt quickly to changing market situations and conditions
9	Team Collaboration	1. Collaborate with team members to find the best solution. 2. Encourage participation and contribution from the entire team in the problem-solving process..

Furthermore, to measure the quality of PjBL-based Entrepreneurship Attitudes for graduates of Jambi University students, several indicators can be seen in the following table:

Table 2. Syntax of the PjBl-Based Entrepreneurship Attitude Quality Instrument for Graduates of Jambi University Students

No	Entrepreneurship Attitude Quality Indicators	Syntax of the Quality of Entrepreneurship Attitude Instrument Based on PjBl for UNJA Student Graduates
	Mentality	<ol style="list-style-type: none"> 1. Dare to accept criticism and suggestions 2. Take the initiative to move forward 3. Do your best 4. Never give up to achieve success
	Entrepreneurial skills	<ol style="list-style-type: none"> 1. Personal entrepreneur skill (inter control, risk taker, innovative, change oriented, Persistent atau militant, Visionary leader, Ability to manage chage) 2. Business manaagement skill (Planning and goal setting, Decision making, Human relations, Marketing, Finance, Accounting, Management, Control, Negotiation, Venture launch, Managing growth) 3. Technical skills (Writing, Oral communication, Monitoring environment, Technology)
	Entrepreneurial creativity	<ol style="list-style-type: none"> 1. New 2. Useful 3. Understable
	Innovation	<ol style="list-style-type: none"> 1. Structure 2. Culture 3. Human Resources
	Critical Thinking Skills	<ol style="list-style-type: none"> 1. Easy to understand other people's points of view 2. Have many alternative answers and creative ideas 3. Can be a good and reliable coworker 4. More independent in facing problems 5. Can find many new opportunities

3. FINDINGS AND DISCUSSION

3.1 Analysis of the Quality of Entrepreneurship Attitudes of Graduates of Universitas Jambi Students

Based on the procedures described in Figure 1, for stage I, an analysis of the problems in the field was carried out. At this stage, identification of entrepreneurship learning problems was carried out, validation tests of problem identification were carried out, and analysis of the objectives of entrepreneurial attitude characteristics were carried out. Where at this stage an understanding was produced to analyze the quality of entrepreneurial attitudes of Jambi University graduates. Entrepreneurial attitudes seen from Mentality, Entrepreneurial Skills, Entrepreneurial Creativity, Innovation, and Critical Thinking Skills in this study were used to assess the quality of entrepreneurial attitudes. The main challenge faced is how to measure all of that objectively. A comprehensive assessment tool must be developed to determine the extent to which graduates are able to apply these entrepreneurial attitudes in the real world. After conducting an in-depth study, this study shows that the quality of entrepreneurial attitudes of Jambi University graduates will greatly depend on the effectiveness of the entrepreneurship curriculum applied, practical experience gained during college, and support from the campus environment and lecturers in encouraging innovation and creativity.

The effectiveness of learning can be seen from the students' performance results obtained before and after using PjBL in the following chart:

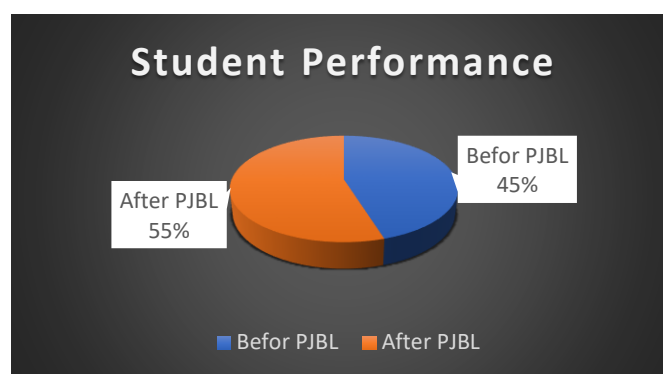


Figure 2. Student Performance

A graphical representation chart 2 shows that PjBL encourages initiative, collaboration, and problem-solving, which can enhance positive attitudes such as confidence, perseverance, and responsibility. The project-based learning process also fosters a proactive attitude in facing academic and real-world challenges. The positive attitudes developed through PjBL interventions, such as intrinsic motivation and independent learning, can improve academic performance. Students with a more open attitude toward challenges and strong teamwork skills tend to have a deeper understanding of the subject matter.

The effectiveness of the Entrepreneurship Curriculum is not only delivering theory, but also providing opportunities for students to learn from live projects and business simulations. This has been shown to improve students' decision-making abilities and entrepreneurial skills. According to research by Satria et al. (2019), students involved in a curriculum that includes project-based learning show greater interest in entering the world of entrepreneurship because their understanding of business becomes more practical and relevant. The role of entrepreneurship curriculum and business incubators in strengthening students' attitudes towards entrepreneurship (Firmansyah & Nugroho, 2017).

Practical Experience During College or Direct experience, such as internships or campus entrepreneurship activities, allows students to practice their business skills in the real world, increase self-confidence, and build a courageous attitude in taking risks. A study by Dewi and Wibowo (2019) showed that internship experience or internship programs in a real business environment strengthen students' readiness for entrepreneurship. In the study, students who underwent internship programs had better attitude qualities, such as the courage to face business challenges. Student access to business incubator facilities as training that provides opportunities to develop entrepreneurial skills through direct practical experience (Susilo & Hartati, 2018).

A campus environment that provides supporting facilities, such as a business incubation center and guidance from experienced lecturers, plays an important role in shaping entrepreneurial attitudes. This support helps students develop creative business ideas and understand innovative business practices. According to research by Rahayu, et.al (2021), the importance of the role of lecturers as mentors and their influence in motivating students to have a more resilient and innovative entrepreneurial mindset. In addition, Hidayat and Wahyuni (2016) stated that guidance from lecturers plays an important role in developing students' creativity and resilience in facing business challenges. The impact of university-based incubator programs on student creativity in entrepreneurship, as well as how guidance from practitioners helps students start innovative businesses (Suhartanto & Primayana, 2018).

Enhancing Innovation and Creativity Through Collaboration, where Collaboration in the campus environment and involvement in cross-disciplinary activities facilitate the exchange of ideas that lead to innovation. When students are encouraged to collaborate, they are more likely to develop creative products or services that are different from those in the market. Cross-disciplinary collaboration can facilitate the exchange of ideas and drive innovation in an academic context (Aksakallı & Yıldırım,

2021). Collaborative initiatives in universities and how collaborative leadership supports cross-disciplinary work for innovation (Beech & Earle, 2017). Design thinking approaches involving cross-disciplinary collaboration can generate innovative solutions in various fields (Brown, 2019). The role of individual differences in collaborative group dynamics and how this affects creativity and innovation (Choi & Chang, 2019). Collaborative networks allow individuals from different disciplines to share knowledge and experiences with each other, which often results in creative and innovative ideas. The exchange of diverse perspectives helps enrich thinking and supports the creation of new solutions. The impact of collaborative innovation networks in the higher education sector on innovation outcomes, with a focus on idea exchange. (Thomson & Sabharwal, 2019).

3.2 Project Based Learning Design in Improving the Quality of Entrepreneurship Attitude of Graduates of Jambi University Students

After the identification and analysis process of needs is carried out in stage I, the next step is the procedure in stage II, namely compiling the design and prototype of PjBL learning. This compilation process is carried out through collaborative discussions between researchers and curriculum and learning experts involved in the research. At this stage, the objectives of the PjBL entrepreneurship learning design are described and then the prototype of the PjBL learning device is compiled. The results of the design and prototype of the PjBL learning device that have been agreed upon are then validated by curriculum and learning experts. At this stage, this is done by providing an assessment on the questionnaire. The next step is a limited trial, involving 50 students who are taking part in entrepreneurship learning, which is intended to obtain input to improve the initial product of the PjBL learning design device in the form of a draft RPP.

The design and prototype of PjBL learning in the form of a structured PjBL-based learning plan design that focuses on practical experience, Jambi University students who can develop a strong entrepreneurial attitude. Mardikanto & Prayogo, (2022) say that in their research discuss the design of structured project-based learning to develop entrepreneurial skills in higher education, with a focus on students' practical experience. Al-Bataineh & Bader (2021) show present evidence that project-based learning can increase students' entrepreneurial intentions through practical experience. Boes & Ghosh (2017) provide about discuss a practical approach in implementing PjBL for entrepreneurship education, with a focus on developing an experience-oriented curriculum.

A study by Çalışkan & Şahin (2020) conducted a meta-analysis to assess the impact of PjBL on the development of entrepreneurial skills among students. Eftekhari & Jafarzadeh, (2021) analyzed how PjBL can improve students' entrepreneurial skills by providing relevant practical experiences. Gelin & Liem (2018) described PjBL strategies in higher education to improve learning experiences and develop entrepreneurial skills. To solve the second problem formulation, it is not enough to just design and create a PjBL learning prototype in the form of a lesson plan, it is necessary to carry out Testing and Refinement of the PjBL Entrepreneurship Learning Design Tool (RPP) Prototype which will be carried out in stage III.

Through relevant projects and adequate support, graduates are expected to be better prepared to face challenges in the world of entrepreneurship and be able to make positive contributions to society. In this case, the design and prototype of PjBL learning in the form of a lesson plan in an entrepreneurship course. One example of a real-world project that can be assigned to students to assess the quality of their entrepreneurial attitude is launching a temporary small business (pop-up business). In this project, students are required to design, operate, and manage a small-scale business within a specific period, such as opening a coffee shop, an online store, or a service-based business tailored to market needs. They must conduct market research, develop marketing strategies, manage finances, and directly face business challenges. Additionally, students can be tasked with developing an innovative product that serves as a solution to a specific societal problem, requiring them to validate ideas, analyze opportunities, and create a sustainable business plan. Throughout the project, aspects such as creativity, initiative, risk-taking, adaptability, and managerial skills are observed to measure students'

entrepreneurial attitude. Through this approach, they not only learn entrepreneurship theory but also develop practical skills essential for the real business world.

Compared to traditional lecture-based entrepreneurship courses, a project-based approach like a pop-up business provides students with a more in-depth and practical learning experience. In the traditional learning model, students typically receive theoretical knowledge about entrepreneurship, such as business planning concepts, marketing strategies, and financial management, without direct practice in running a business. This approach often results in students having a limited understanding of real-world business challenges, as they do not experience decision-making processes, risk management, or actual market dynamics firsthand.

On the other hand, through real-world projects like a pop-up business, students not only learn theoretical concepts but also develop practical skills by tackling real-world problems. They learn how to adapt to market changes, manage limited resources, and cultivate creativity and risk-taking. This hands-on experience is more effective in shaping strong entrepreneurial attitudes, such as initiative, perseverance, and innovation—qualities that are difficult to develop solely through classroom lectures. Therefore, experience-based projects are more relevant in preparing students to become competitive entrepreneurs in today's dynamic business environment.

3.3 The Impact of Project Based Learning Design in Improving the Quality of Entrepreneurial Attitudes of Graduates of Jambi University Students

To measure the Impact of Project Based Learning Design in Improving the Quality of Entrepreneurship Attitude of Graduates of Jambi University Students, the research procedure will be carried out in stages III and IV. In stage III, testing and refinement of the PjBL-based Lesson plan prototype will be carried out, requiring systematic trials, continuous evaluation, and refinement based on the results of field tests on a sample of 384 people which makes them more prepared to face the competitive and dynamic business world. The following are the results of the field test using the paired sample t-test formula:

Table 3. Paired Samples Tests

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	PJBL Implementation – Effectiveness of PJBL in Entrepreneurship	19.409	47.743	2.436	24.199	14.618	7.966	383	.000
Pair 2	Entrepreneurial Attitude Quality – Effectiveness of PJBL in Entrepreneurship	4.482	53.654	2.738	.902	9.865	2.637	383	.012

Source: Ouput SPSS Version 25

The results of the study indicate that the design and prototype of PjBL learning in the form of RPP in Improving the Quality of Entrepreneurial Attitudes of Jambi University Graduates provides access to students and lecturers in using the development of PjBL-based RPP which has been proven effective in helping the learning process of entrepreneurship courses as indicated by the paired sample test formula, namely the calculated t value > t table (1.6252) with a significance level < 0.05. Thus, this interactive and challenging PJBL learning design can improve the quality of entrepreneurial attitudes of Jambi University graduates. Next, to determine the impact of PJBL implementation on the effectiveness of PJBL in entrepreneurship and the impact of entrepreneurship quality on the effectiveness of PJBL in entrepreneurship, the Cohen's d effect size will be assessed using the paired t-test calculator as follows.

Please enter the sample mean (M), sample standard deviation (s) and sample size (n) for each group. Two things to note: (1) if you intend to report Glass's δ , then you need to enter your control group values as *Group 1*; and (2) if you don't provide values for n , the calculator will still calculate Cohen's d and Glass's δ , but it won't generate a value for Hedges' g .

Group 1		Group 2	
Mean (M):	<input type="text" value="19.409"/>	Mean (M):	<input type="text" value="4.482"/>
Standard deviation (s):	<input type="text" value="47.743"/>	Standard deviation (s):	<input type="text" value="53.654"/>
Sample size (n):	<input type="text" value="384"/>	Sample size (n):	<input type="text" value="384"/>

Success!

Cohen's $d = (4.482 - 19.409) / 50.784573 = 0.293928$.

Glass's $\delta = (4.482 - 19.409) / 47.743 = 0.312653$.

Hedges' $g = (4.482 - 19.409) / 50.784573 = 0.293928$.

Figure 3. Cohen's d Effect Size

The Cohen's d effect size result is 0.29, indicating that the impact of PjBL implementation on the effectiveness of PjBL in entrepreneurship and the impact of entrepreneurship quality on the effectiveness of PjBL in entrepreneurship is categorized as small. This is due to various limitations in implementing the PjBL model. The limitations of the PjBL model include: 1) Time Constraints: PjBL requires a longer duration for project completion, which may not always align with the allocated academic schedule; 2) Resource Availability: Limited access to necessary materials, technology, or funding can hinder the effectiveness of PjBL implementation; 3) Teacher Readiness: Educators need proper training and experience to facilitate PjBL effectively, which may not always be available; 4) Student Engagement: Some students may struggle with self-directed learning, teamwork, or problem-solving, affecting project outcomes, and 5) Assessment Challenges: Evaluating students' progress and performance in a project-based setting can be more complex compared to traditional assessments.

Relevant studies conducted by Mardikanto & Prayogo (2022) show that the design of structured PjBL for higher education emphasizes interactive elements and real challenges in improving students' entrepreneurial attitudes. Structured and challenging PjBL can develop strong entrepreneurial skills and attitudes through direct experience (Eftekhari & Jafarzadeh, 2021). The impact of PjBL on the development of entrepreneurial skills through the analysis of various studies, shows how practical and interactive experiences improve the quality of entrepreneurial attitudes (Çalışkan & Şahin, 2020). PjBL can improve students' learning experiences in higher education, focusing on entrepreneurial attitudes through interactive and challenging activities (Gelin & Liem, 2018).

Implementation of PjB, students are more directly involved in the learning process through real projects that require creative thinking, initiative, and practical solutions. This trains them to think as proactive entrepreneurs in finding business opportunities. This attitude is very important in building a strong entrepreneurial foundation for graduates. Through problem-based projects, PjBL helps students develop problem-solving skills that are very valuable in entrepreneurship. When they are faced with challenges that must be solved independently or in teams, they learn to find creative and innovative solutions. These skills increase self-confidence and courage to face business uncertainty.

PjBL provides students with the opportunity to engage in real-world relevant learning experiences, such as business case studies, simulations, and entrepreneurship projects. These experiences allow them to face real business challenges, so that they are more mentally and skillfully prepared to enter the business world after graduation. The implementation of PjBL can be more effective with adequate support from the campus, such as guidance from lecturers, access to business incubators, and collaboration with industry, so that graduates are ready to enter the world of entrepreneurship with a resilient attitude. Projects in PjBL often present obstacles that students must overcome, both in terms of technical aspects and in group dynamics. This experience teaches them to be resilient, which is an important character in entrepreneurship. They learn to bounce back from failure and keep trying, which is important in the challenging business world. PjBL motivates students

to think outside the box and increase their creativity in generating innovative business ideas. Projects given in PjBL often encourage students to conduct market research and analyze consumer needs, so that they are encouraged to develop unique and competitive products or services.

The implementation of PjBL in the curriculum of Jambi University has been proven to have a significant positive impact on the quality of entrepreneurial attitudes of graduates. By involving students in a structured yet flexible learning process, PjBL prepares them to face the challenges of the business world. Increasing proactive attitudes, problem-solving abilities, collaboration skills, and resilience are some of the real impacts of the implementation of PjBL, which are very relevant to the development of entrepreneurship in the modern era. The implementation of PjBL can also be more effective with adequate support from the campus, such as guidance from lecturers, access to business incubators, and collaboration with industry, so that graduates are ready to enter the world of entrepreneurship with a resilient attitude.

In Phase IV, the results of the field test are used to refine the PjBL entrepreneurship design product that is ready to be used by students in entrepreneurship learning as knowledge to have an entrepreneurial attitude after graduating from Jambi University. An evaluation is also carried out in accordance with the design principles used. After the product of the learning implementation plan is complete and evaluated, it results in the development of learning devices based on Project-Based Learning (PjBL) in an effort to improve the entrepreneurial attitude of Jambi University graduates presenting various benefits as well as challenges. Overall, the implementation of PjBL facilitates a more relevant and in-depth learning experience for students, especially in terms of improving critical thinking skills, collaboration, and innovation. Through this PjBL device, students are involved in real projects that involve planning, development, and evaluation processes, which help them experience a simulation of the real business world.

Further reflection shows that the PjBL tool has succeeded in building a proactive, creative, and adaptive attitude in students—important characteristics for entrepreneurs. Students showed significant improvements in terms of courage to take risks and resilience in facing project challenges. However, this reflection also shows several obstacles, such as limited time and supporting resources, which require improvements to the learning tool in the future. Additional support, such as intensive guidance from lecturers and access to business incubator facilities, will greatly help optimize the results of this PjBL. Thus, the PjBL learning tool product at the University of Jambi provides a strong foundation in forming graduates who have a strong entrepreneurial attitude. Further development that considers increasing technological support and industry partnerships will further increase the effectiveness of this tool in producing graduates who are ready to face the challenges of the business world.

4. CONCLUSION

The study concludes that Project-Based Learning (PjBL) holds significant potential to enhance entrepreneurial attitudes and competencies among higher education students when supported by comprehensive institutional policies. The main findings highlight that effective PjBL implementation requires the integration of real-world, practice-oriented projects into the curriculum, faculty development through targeted training, and the provision of essential resources such as business laboratories, industry mentors, and funding for student initiatives. Additionally, the strategic use of digital tools—such as business simulations, data analytics, and e-commerce platforms—was identified as a key factor in strengthening entrepreneurial learning and assessment. Despite these promising results, the research is limited by its contextual focus on a single university and lacks longitudinal data to measure long-term impacts on graduate outcomes. Future research should explore the scalability of PjBL across diverse institutional settings, examine the long-term entrepreneurial success of graduates, and investigate how emerging technologies can be further integrated into entrepreneurship education to enhance student engagement, innovation, and real-world impact.

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