



Enhancing The 6Cs as 21st Century Skills Among Higher Education Students Through An Entrepreneurial Project Learning

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Abstract: The purpose of this study is to examine the impact of enhancing 21st-century skills, specifically the 6Cs (critical thinking, collaboration, communication, creativity, citizenship, and character), through project-based entrepreneurship learning. The research utilized a quantitative approach by surveying with questionnaires on two different class groups. The sample in this study consists of undergraduate students from the Faculty of Economics and Business at Universitas Jenderal Soedirman, selected through a random sampling technique comprising 104 students. The data were analyzed using SPSS 27 software, including the stages of classical assumption testing and an Independent Sample T-Test. The results indicate that the implementation of project-based entrepreneurship learning has a significant impact on enhancing 6C skills among students. Statistical tests indicate a significant difference between the group participating in entrepreneurship PjBL and the group that did not, with the average 6C skills being higher in the PjBL group. The integration of project-based entrepreneurship learning into the higher education curriculum is recommended to further develop 6C skills among students.

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Introduction

The education system has undergone a massive transformation in the 21st century. This transformation is a response to the increasingly complex and dynamic needs of students, requiring a comprehensive learning approach that encompasses a broader set of competencies (Sullivan & Downey, 2015). The 21st-century skills are generally understood to encompass a range of competencies, including critical thinking, problem-solving, creativity, communication, digital literacy, and civic responsibility (Kim, Raza, & Seidman, 2019). These skills encompass not only knowledge, but also attitudes and abilities that are essential for success in everyday life, work, and the modern societal environment (Malik, 2018; Shabrina & Astuti, 2022). The Indonesian Ministry of Education and Culture has adopted six 21st-century skills, known as the 6Cs, to enhance the educational curriculum. The 6Cs include critical thinking, collaboration, communication, creativity, citizenship, and character (Anekwe, 2020; Miller, 2015). The 6Cs refer to a set of skills that are highly beneficial for developing students in the 21st century by enhancing the quality of learning and educational practices (Montessori, Murwaningsih, & Susilowati, 2023; Waite & McDonald, 2019).

Both global and regional organizations must continue to strive to strengthen education systems to create quality education across all levels, from preschool to higher education (UNESCO, 2023). Students and graduates play a larger role in society, as they are allowed to



explore various fields of study and are equipped with a wide range of skills for success in both current and future careers. (Harrison, 2017; Yang, Schneller, & Roche, 2015). Students play a crucial role in creating new job opportunities with the skills they possess (Mezhoudi, Alghamdi, Aljunaid, Krichna, & Düşteğör, 2023). Many countries have integrated entrepreneurship education into their higher education curricula. Career preparation programs in the United States focus on preparing students to enter the workforce or to start their businesses (entrepreneurship) (Rodriguez & Lieber, 2020). Entrepreneurship education is also implemented in European Union countries as a form of educational transformation, providing practical experiences during studies (Pařová, Vejačka, & Kakalejčik, 2020). Students need to be equipped with competencies that can enhance the competitiveness of the younger generation in the future, one of which is instilling entrepreneurial character and skills (Arief, 2020).

Entrepreneurial competence is part of the key competencies for Lifelong Learning from the European Commission, defined as the capacity to take action based on opportunities and innovative ideas both within the curriculum and in the higher education environment, to create business and social value (McCallum, Weicht, McMullan, & Price, 2018). Additionally, entrepreneurial competence develops students' skills to apply knowledge to real-world actions (Mittal & Raghuvaram, 2021). Entrepreneurship education with a learning system that is highly action-oriented and based on real-world experiences will strengthen the process of competence development (Wala & Salmen, 2021). The implementation of entrepreneurship education using project-based learning has a significant impact on enhancing entrepreneurial mindsets, particularly in communication, collaboration, creativity, critical thinking, and problem-solving (Rodriguez & Lieber, 2020). This study focuses on the 6Cs skills, with the addition of citizenship and character. Project-based learning has been widely utilized and proven to influence the development of students' citizenship and character. Art projects and citizenship projects implemented in elementary education have an impact on fostering a sense of citizenship and critical thinking among students (Muhammad, 2023; Putter & Costandius, 2023). The research findings also indicate that project-based learning positively influences the development of positive character values in students, such as responsibility, perseverance, empathy, and respect (Arrasyid, Herpratiwi, & Yulianti, 2022; Zhao & Wang, 2022).

However, there has yet to be an empirical study analyzing project-based learning in entrepreneurship education for enhancing 6C skills among higher education students. This research attempts to use a solid theoretical foundation to examine the relationships among variables by employing Experiential Learning Theory (Kolb, 2014). Learning strategies based on Experiential Learning Theory encourage higher education institutions to utilize interactive, collaborative, student-centered teaching methods, focusing on the skills that graduates must possess (Urquidi-Martín, Tamarit-Aznar, & Sánchez-García, 2019). Experiential learning plays a crucial role in providing students with practical skills that are relevant for preparing them to meet future job demands (Huang & Jiang, 2021; Lantu, Suharto, Fachira, Permatasari, & Anggadwita, 2022). To achieve this, higher education must employ interactive and collaborative teaching methodologies that are student-centered and focus on the skills that graduates need to possess (Urquidi-Martín et al., 2019). The learning process requires students to find solutions to a problem as they integrate their existing knowledge (Mitchell & Rogers, 2020), making project-based learning a method that can be implemented (Muhammad, 2023; Rodrigues, 2023). Experiential learning can enhance students' problem-solving skills (Suksong, Chomsuwan, & Suamuang, 2023), Active and creative knowledge, and critical thinking of students (Urquidi-Martín et al., 2019), as well as



acquiring real-world skills as competencies needed by students in the future (Korkmaz & Kalaycı, 2019; Mayombe, 2023).

There has been extensive discussion on the importance of studying 21st-century skills and practices, which encompass a variety of competencies across fields and disciplines, such as problem-solving, collaboration, and information literacy (Chu, Reynolds, Tavares, Notari, & Lee, 2021). In addition to requiring strong technological capabilities, 21st-century skills also include several soft skills, such as collaboration, critical thinking, problem-solving, and intercultural skills (Kennedy & Sundberg, 2020), as well as communication and creativity (Kim et al., 2019). Project-based Learning (PjBL) in 21st-century education is one of the effective teaching models to implement, as it encourages students to be more active and creative, particularly in problem-solving (Megawati, Lukito, & Rachmasari, 2023). The efforts made to achieve this involve focusing learning activities on students and creating a collaborative learning environment, thereby enabling students to become competent in 21st-century learning (Afifah, Ilmiyati, & Toto, 2020; Rahmawati & Rahmawati, 2024). Research by Baran, Baran, Karakoyun, and Maskan (2021) revealed a significant improvement in students' 21st-century skills (namely collaboration, communication, problem-solving, creativity, responsibility, critical thinking, and information technology literacy) after participating in PjBL activities. Educators recommend using PjBL as it has been shown to align well with students' communication, creativity, collaboration, and critical thinking skills (Allison, 2018).

Thus, this research aims to examine the impact of enhancing 6C skills (critical thinking, collaboration, communication, creativity, citizenship, and character) through project-based learning processes in entrepreneurship education at the higher education level. This research is significant as it provides new insights into the use of project-based entrepreneurial learning models to enhance 21st-century skills among university students, equipping the younger generation to engage in a modern and dynamic work and societal environment. The research findings will contribute to the development of Experiential Learning Theory to influence a broader range of student competencies, including citizenship and character skills, and serve as a foundation for educational institutions in designing educational systems in this era.

Research Method

This study employs a quantitative approach with a survey method to examine the differences in 6C skills between students who participate in project-based learning (PjBL) in entrepreneurship and those who do not. The research data originates from Indonesia, specifically targeting a homogeneous sample of undergraduate students from the Faculty of Economics and Business for the academic year 2022/2023 at Universitas Jenderal Soedirman. This university has an education system that supports the transformation of 21st-century education and has incorporated entrepreneurship education as a compulsory subject in its curriculum. This study employed a random sampling technique, selecting students from a sample consisting of 52 classes implementing the Project-Based Learning (PjBL) method and 52 classes implementing the Non PjBL method.

Quantitative data were obtained through a questionnaire, which the researchers developed online based on several previous studies. The questionnaire as a measurement tool for the variables encompasses six dimensions: (1) critical thinking, (2) communication, (3) collaboration, (4) creativity, (5) character, and (6) citizenship. Each dimension includes three measurement items chosen based on a scale that follows a similar pattern and focuses on relevant characteristics. The measurement constructs are adapted from (Jang, Lee, & Kim,



2021; Setiyowati, Apriyani, & Qudsiyah, 2023; Vikri Iqbal, 2024), resulting in a total of 18 questions that have demonstrated validity and reliability.

According to Sarwono (2015), a questionnaire item is considered valid if it has a calculated r value > 0.30 . Based on the statistical data processing of 15 questionnaire items, it was found that the Corrected Item-Total Correlation values were all > 0.30 , with the lowest value being 0.659 for the item “*understanding global issues and responsibilities as a global citizen*” (which is > 0.30). Thus, all items in the questionnaire are declared valid. The results of the reliability test indicate that the questionnaire has met its consistency level. Ghozali (2016) states that a variable is considered reliable when it has a Cronbach’s Alpha value > 0.70 . The data analysis results indicate that the Cronbach’s Alpha value for the six competencies variable is 0.963 (> 0.70). The final version of the questionnaire was administered to respondents using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The data were subsequently analyzed using SPSS 27 statistical software.

Results and Discussion

The data analysis results begin with the classical assumption testing to ensure that the data meets the requirements for further statistical tests. The Normality Test is used to confirm that the data is normally distributed. In this study, the normality test was conducted using the Shapiro-Wilk method, as the sample size is small (53 respondents) and greater than 100 (Sugiyono, 2019). Table 1 shows the results of the normality test in this study, indicating that the significance value for Shapiro-Wilk is > 0.05 , thereby confirming that the data is normally distributed. The competency data for the PjBL class shows a significance value of 0.81 (> 0.05), and for the non-PjBL class, the significance value is 0.70 (> 0.05).

Table 1. Result of the Normality Test

	Class	Shapiro-Wilk		
		Statistic	df	Sig.
6 Competences	PjBL Class	0,960	52	0,081
	Non PjBL Class	0,959	52	0,070

In addition, a Homogeneity of Variance Test was conducted to ensure that the variances between the groups being compared (the group using PjBL and the group not using it) are homogeneous. The data are considered to meet the homogeneity requirement if the Significance value is > 0.05 . The data analysis results in Table 2 show that the Sig. Based on Mean value is 0.273 (> 0.05), indicating that the variance of the 6C data is homogeneous and can proceed to the next stage of analysis.

Table 2. Results of the Homogeneity Test

		Levene Statistic	df1	df2	Sig.
6 Competences	Based on Mean	1,217	1	102	0,273
	Based on Median	0,815	1	102	0,369

After these two classical assumption tests were satisfied, the study proceeded with an Independent Sample T-test to analyze the differences in 6C skills between the two groups. This test aims to determine whether there is a statistically significant difference in 6C skills (Critical Thinking, Creativity, Collaboration, Communication, Citizenship, Character) between students who received entrepreneurship PjBL and those who did not. The Independent Sample T-Test was chosen because this study compares two independent groups: the experimental group (using PjBL) and the control group (not using PjBL). Table 3 presents the results of the hypothesis test using the Independent Sample T-test. The results show that the Sig. (2-tailed) value is 0.004 (< 0.05), indicating a significant difference in 6C



skills between students who participated in entrepreneurship PjBL and those who did not. The Mean Difference indicates a value of 4.231, meaning that the average score of one group (entrepreneurship PjBL class) is 4.231 points higher than the other group (non-PjBL entrepreneurship class).

Table 3. Results of the Independent Sample T-Test

		F	Sig.	t	df	Sig. (2-tailed)	Mean Different
6 competences	Equal variances assumed	1,217	0,273	2,926	102	0,004	4,231
	Equal variances are not assumed.			2,926	100,8	0,004	4,231

Discussion

Creativity and innovation in learning have become one of the main recommendations that are truly needed in the 21st century to prepare students for the digital era (Kennedy & Sundberg, 2020). The results of this study show that there are significant differences in the six skills of students after being involved in entrepreneurial projects. These findings are in line with previous research that the project-based learning model in entrepreneurship is a learning process that can enhance the 21st-century competencies of students (Erdisna, Ganefri, Ridwan, & Efendi, 2020). Improvements in competencies such as collaboration, communication, problem-solving, creativity, responsibility, critical thinking, and information technology literacy are shown by students after engaging in PjBL activities (Baran et al., 2021). Students involved in entrepreneurial projects show an increase in critical thinking ability. They are more capable of analyzing problems and evaluating alternative solutions, as they are faced with various real challenges while executing the project. PjBL makes students more active and creative, especially in problem-solving (Megawati et al., 2023), focusing learning activities on students and creating collaborative learning (Afifah et al., 2020; Rahmawati & Rahmawati, 2024), thus enabling the creation of competent students in 21st-century learning.

Entrepreneurial project-based learning requires intensive teamwork, which contributes to improving students' collaboration skills. According to the research (Trongtorsak, Saraubon, & Nilsook, 2021), experience-based entrepreneurship learning strongly supports the creation of collaborative learning among students. Students learn to work together, appreciate each team member's contributions, and manage conflicts, teaching them the importance of collaboration in achieving common goals. Communication skills also show improvement. Students learn to convey their ideas and work results clearly and effectively, both verbally and in writing. Previous research states that entrepreneurship courses are important to include in the curriculum of higher education to enhance students' communication skills, as the communication sub-dimension has the highest effect on individual entrepreneurial perception (Abaci, 2022). Educators also recommend using PjBL because it has proven to align with students' communication, creativity, collaboration, and critical thinking skills (Allison, 2018). Student learning activities serve to build skills in analytical and critical thinking, as well as hone relevant skills for the future (Rahmawati & Rahmawati, 2024). Therefore, through project-based learning, students are more actively involved in the learning process, sharpening critical thinking abilities, fostering creativity in problem-solving, and enhancing collaboration and communication skills. PjBL also fosters awareness of students' roles as responsible and character-driven global citizens.

These findings support the theoretical foundation that active, student-centered learning frameworks, such as PjBL, not only enhance students' entrepreneurial abilities but



also align with broader educational objectives for modern, skills-based learning. By placing students in real-world scenarios, PjBL promotes the development of essential competencies required for the digital era, suggesting a valuable reconceptualization of traditional entrepreneurship education models. This insight invites educators and curriculum designers to view entrepreneurship not merely as a subject but as an integrative learning experience. The observed improvements in students' critical thinking, collaboration, and communication underscore the alignment of the PjBL model with constructivist and experiential learning theories, which advocate for learners to actively construct knowledge through meaningful, practical engagement.

The findings of this study have important practical implications for higher education. The integration of project-based entrepreneurship learning into the curriculum can be an effective strategy for developing 6Cs among students. Higher education institutions need to consider adopting this approach more broadly, providing adequate support and resources for the implementation of entrepreneurship projects.

Conclusion

This study demonstrates that the implementation of Project-Based Learning (PjBL) in the context of entrepreneurship has a significant impact on enhancing 6C skills (Critical Thinking, Creativity, Collaboration, Communication, Citizenship, and Character) among students. Statistical tests indicate a significant difference between the group participating in entrepreneurship PjBL and the group that did not, with the average 6C skills being higher in the PjBL group. This suggests that PjBL is effective in developing 21st-century competencies, which are crucial for facing the challenges of the digital era.

The application of PjBL encourages students to collaborate intensively, improving their communication skills, critical thinking, and creativity in addressing real-world challenges during the execution of entrepreneurship projects. Furthermore, this activity instills values of social responsibility and citizenship, which are essential for shaping the character and ethics of students as future entrepreneurs and global citizens. Therefore, the integration of project-based entrepreneurship learning into the higher education curriculum is recommended to further develop 6C skills among students.

Recommendation

Based on the discussion and practical implications above, it is recommended that lecturers adopt Project-Based Learning (PjBL) to foster essential 21st-century skills, integrating real-world entrepreneurship projects into their courses. For leaders and policymakers in higher education, supporting this integration by providing resources, training, and institutional support is crucial. This approach not only enhances students' entrepreneurial abilities but also aligns with broader educational goals of developing critical, collaborative, and innovative thinkers prepared for future challenges.

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