

Integrating Design Thinking into Entrepreneurship Education: A Learning Framework for Vocational High School Students

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ARTICLE INFO

Keywords:

design;
thinking;
entrepreneurship;
learning

Article history:

Received 2024-09-11

Revised 2024-10-27

Accepted 2025-03-08

ABSTRACT

Entrepreneurship education requires dynamic and contemporary learning methods. Design thinking is a promising approach to fostering independence, innovation, and problem-solving skills among students. This study aims to evaluate the effectiveness of the design thinking method in entrepreneurship learning and to analyze its implementation process in vocational high schools. This research employed an experimental design using a pretest-posttest model within the same class. A total of 41 vocational high school students participated as the study sample. Data were analyzed using paired sample t-tests in SPSS 26 to assess the impact of the intervention on students' entrepreneurial competencies. Findings indicate that the design thinking method is moderately effective in enhancing students' entrepreneurial skills. The learning process is conducted both inside and outside the classroom, fostering an experiential learning environment. Students demonstrate improved innovation and critical thinking skills, particularly in identifying and addressing problems based on customer feedback. The study highlights the potential of design thinking as an effective pedagogical approach for entrepreneurship education in vocational schools. By engaging students in real-world problem-solving, this method enhances their adaptability and responsiveness to market needs. Future research could explore its long-term impact and applicability in different educational settings.

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1. INTRODUCTION

In the modern era, the demand for entrepreneurial skills has significantly increased, making entrepreneurship education a crucial component of secondary education, particularly in Vocational High Schools (SMK). These institutions are designed to equip students with practical skills that can be directly applied in real-world settings, including management, marketing, finance, and negotiation. Beyond technical competencies, fostering creativity and innovation is essential in entrepreneurship education, as

it encourages students to develop new ideas and solutions to existing problems (Jardim, 2021; Prabowo et al., 2022).

Entrepreneurship learning also plays a critical role in shaping students' character by instilling initiative, responsibility, and decision-making skills. These attributes contribute to increased self-confidence and independence, which are vital for success in both personal and professional life (Hasan et al., 2024). In an era marked by rapid globalization and digital transformation, adaptability and innovation are increasingly valued in the workforce. Entrepreneurship education helps students build resilience and problem-solving capabilities, enabling them to navigate challenges in the job market more effectively.

Moreover, entrepreneurship education extends beyond individual career development; it has broader socio-economic implications. It not only empowers students to create their own employment opportunities but also enables them to generate jobs for others within their communities (Rokhmawati et al., 2024). Early exposure to entrepreneurship cultivates a proactive mindset, equipping students with the ability to identify and seize opportunities rather than passively waiting for them (Suprihatin & Dewi, 2018; Nurlela et al., 2023; Vernia et al., 2023; Nuriyanti et al., 2023). Given these benefits, integrating effective pedagogical approaches such as design thinking into entrepreneurship education is essential to optimize learning outcomes and prepare students for an increasingly dynamic economic landscape.

According to the researcher's initial observations, it is known that entrepreneurship learning in Vocational High Schools (SMK) has a lot of potential, but also faces various problems that can hinder its effectiveness. The following are several problems that often arise in entrepreneurship learning among vocational school students. The first is a lack of understanding of theory and practice. Many students do not have a deep understanding of the concept of entrepreneurship, because the curriculum often focuses more on theory without providing enough relevant practical experience. Second is the lack of facilities and resources. Schools often lack adequate facilities to support entrepreneurial activities, such as work space, technological devices, or teaching materials needed for practice. The three learning approaches are less varied. Monotonous and uninteresting teaching methods can make students lose interest. More interactive and creative activities may receive less attention.

Entrepreneurship learning also requires a touch of soft skills. Lack of focus on soft skills is still an obstacle when students enter the work industry. Many entrepreneurship programs emphasize technical aspects (production, marketing, management) compared to developing important soft skills such as communication, negotiation and teamwork skills. Entrepreneurship learning does not only focus on technical aspects or business knowledge, but also really requires the development of soft skills. Several soft skills are important in entrepreneurship. Developing these soft skills can increase the effectiveness of an entrepreneur and help in overcoming the challenges faced in running a business. By combining good technical knowledge and soft skills, entrepreneurs can increase their chances of success in the business world (Widiyanto et al., 2023).

Entrepreneurship learning in vocational schools is very strategic because it equips students with entrepreneurial skills to help them be ready to enter the world of work, both as employees and as entrepreneurs. This gives them the ability to create jobs for themselves and others. Entrepreneurship is also able to encourage students to think creatively and innovatively. They learn to identify business opportunities and create new solutions, which is critical to facing challenges in society. By understanding the principles of entrepreneurship, students can be more financially independent, both through small businesses while still at school and when they graduate (Supandi et al., 2023). Students skilled in entrepreneurship can play a role in local economic development by creating businesses that provide services or products needed by the community. Entrepreneurship learning in vocational schools is expected to be very important in forming a young generation who is creative, innovative and ready to face various challenges in the future (S. Widiyanto, 2022). One of the developments in entrepreneurship learning is in terms of learning methods. Methods are one of the important pillars in determining the success of learning outcomes. One method that needs to be developed is the design thinking method (Kernbach & Svetina Nabergoj, 2018). Design thinking is an approach or method used to solve problems by understanding user needs, innovating, and creating effective solutions (Rösch et al., 2023).

This design thinking method focuses on user understanding, ideation, and prototyping, which invites students to think critically and creatively (Waidelich et al., 2018). In this way, students are taught to identify existing problems and look for innovative solutions (Sriyono et al., 2022). Apart from technical skills, Design Thinking also trains students' soft skills, such as communication skills, teamwork and problem-solving abilities, all of which much needed in the world of entrepreneurship.

Research that has discussed the design thinking method is research from Foster (2021). This method is suitable for undergraduates and postgraduates in any business. This method also helps students process and design a product prototype based on their own input and experience with a product. Another research that has discussed design thinking is (Retna, 2019). He stated that some of the challenges include inadequate resources, time constraints, fear of bad grades, and the difficulty of switching to new ways of teaching and learning that are very different from traditional approaches. This method is something new for teachers who have never used it (Lee, 2020).

Based on the description above, researchers are interested in conducting research on design thinking methods. One of the densely populated industrial locations or areas is the Cikarang area. In this location, many companies emphasize quality products. The Cikarang area also has several vocational high schools (SMK). In accordance with suggestions and input from the education department, the researchers chose 2 vocational schools in Cikarang, West Java. The problem of this research is how effective is the design thinking method in entrepreneurship subjects? and what is the process of learning design thinking in entrepreneurship subjects? The aim of this research is to determine the effectiveness of the design thinking method in entrepreneurship subjects. The second objective is to find out the process of learning design thinking in entrepreneurship subjects.

2. METHODS

The method used in this research is an experimental method, pretest posttest model. Pretest-posttest is a method used in research to evaluate the effectiveness of an intervention or treatment by comparing the condition of participants before and after the intervention is carried out. The following are the stages in the pretest-posttest experience method. The stages and research process can be seen in table 1 below:

Table 1. Activities of Research

Step	Activity
Preparation	Determine the research objectives and hypotheses to be tested. Selecting a group of participants for the study, which can be random. Preparation also includes Material readiness and tool readiness process.
Pretest	Conduct baseline measurements on participants before intervention. This can be a test, to collect data about the variables you want to evaluate. The data obtained at this stage becomes the basis for comparisons
Posttest	Performing the same (or nearly the same) measurements on participants after the intervention is given. This stage aims to measure changes that occur as a result of the interventions that have been carried out. The data obtained at this stage will be compared with the data from the pretest.

At the pretest stage, students carry out learning activities according to the teacher's plan, namely producing cakes for Eid. There were 41 students who took part in this research from 2 vocational schools in the culinary arts study program. The sample selection was based on considerations and data from students who had carried out business activities, either at school or at home. Activities will be carried out from February to March 2023 in Cikarang, West Java. Pretest data was obtained by carrying out a test

before the method treatment, while pretest data was obtained after the method treatment was carried out. The data that has been entered will be processed in SPSS 26. In the experimental method, data selection refers to how researchers choose the subjects, samples, or data points to be included in an experiment. This study used random selection. Subjects are chosen randomly from a larger population, ensuring that each member has an equal chance of being selected. This helps eliminate bias.

The normality test used to determine the distribution of pretest and posttest data is the normality test using Kolmogorov Smirnov. The specific steps taken in the normality test using Kolmogorov-Smirnov are: The normality test using the Kolmogorov-Smirnov method is one way to determine whether the data obtained comes from a normal distribution or not. Determine the critical value of the Kolmogorov-Smirnov distribution table based on the selected significance level (for example, ($\alpha = 0.05$)) and sample size. The following are specific steps that can be taken, namely data collection, data in numerical form and on an interval scale. Apart from that, carry out the initial hypothesis, taking into account:

- Null hypothesis (H0): Data follows a normal distribution.
- Alternative hypothesis (H1): Data does not follow a normal distribution.

The use of one group pretest-posttest design as a research design is considered to be in accordance with the research objectives, namely to show differences in learning outcomes. Where before the students took the test, they had not received the design thinking process method. After learning the design thinking process, the researcher carried out a post test. Differences in learning outcomes will be seen from the pretest and posttest results. The pretest is taken from the results of customer evaluations before using the design thinking learning method.

3. FINDINGS AND DISCUSSION

Entrepreneurship learning using the design thinking method has several important steps. These steps have stages that are related to each other. These steps include, empathize, define, idea, prototype, and test. Design Thinking uses a human-centered approach, because the focus is on helping customers overcome their problems and achieve their desired goals. The following is Figure 1 which explains the steps of the design thinking method, namely,



Figure 1. Design thinking Process

Sumber: <https://eduparx.id>

In the empathize step, students understand user needs and problems through observation and interaction. Students strive to experience user experiences to gain deep insights. In the define stage, students collect information that has been obtained during the empathy stage to define the problem that needs to be solved. This is usually done by crafting a clear problem statement. Students record all customer problems and complaints, in this case customers who have purchased several cakes that have been marketed. Next, at the idea and prototype stage, each student produces ideas and potential solutions to customer problems and complaints, which is followed by creating something that can

provide an overview of the idea. The final stage is testing, which means testing the prototype with users to get feedback. This stage provides a lot of insight into what is working and what is not, allowing students individually or in teams to refine and refine the solution.

In the initial stage, students are given direction in class, before entering the design thinking learning stage. Students are given exercises and questions about the method. Activities continued in the practice of cake making, marketing and design thinking.



Figure 1. Indoor Activity

The activity continued with practical activities. Making Eid cakes is the focus of students who are involved in making various types of Eid cakes. Activities are guided by the class teacher and assisted by researchers..



Figure 2. Outdoor activity

Outdoor activities emphasize the stages of design thinking, namely: empathize, define, ideate, prototype, and test. In these activities, students engage in the empathy process, identify key problems, generate ideas, and develop new prototypes or product models based on customer feedback and complaints. They then conduct product trials that incorporate the revisions informed by this input. Based on these processes and the resulting findings, the entrepreneurial learning experience through the design thinking approach can be described as follows:

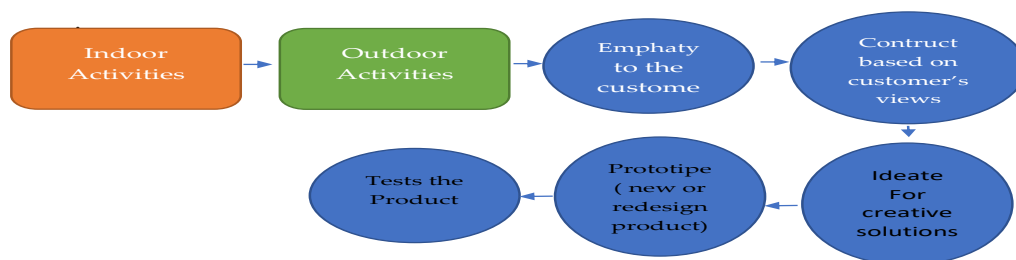


Figure 3. Step of design thinking

The process begins with activities in class, such as hearing an explanation of the flow of learning activities. After that, it continues with activities outside of class, such as producing products (cakes),

marketing, listening to customer complaints and input, constructing ideas, creating creative solutions, making products that match input and testing products with customers. After completing the pretest and posttest data, the data that has been collected is processed in SPSS 26. The data includes pretest and posttest data. Post-test scores are taken from the scores filled in by customers when students have carried out a series of design thinking processes. These values are,

Table 2. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre	62.8537	41	11.38104	1.77742
	Post	78.6829	41	9.71452	1.51715

In table 2 above, the pretest score is 62.8537, while the posttest score is 78.6829. There was an increase of 15.8292. This indicates a change in results, so it can be said that the design thinking method has quite good effectiveness

Table 3. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pre & Post	41	.614	.000

In Table 3, the significant value is 0.00, which means <0.005. This indicates that there is a relationship between pretest and posttest scores. The design thinking method has a correlation with increasing entrepreneurial learning outcomes.

Table 4. Paired Samples Test

		Paired Differences							Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	
					Lower	Upper			
Pair 1	Pre - Post	15.8292	9.39123	1.46666	-18.79350	-12.86503	-10.793	40	.000
		7							

In table 4, a significant value (2-tail) < 0.05 appears, which means there is a significant difference between the final variables. This shows that there is a significant influence between the differences in treatment without the design thinking method and using the design thinking method. Thus, the design thinking method has good effectiveness in learning entrepreneurship. Teachers should choose this method as a way to strengthen students' entrepreneurial learning base, both in the classroom and outside the classroom.

Discussion

The entrepreneurship learning method using the Design Thinking Process approach can be an effective way to help Vocational High School (SMK) students understand and implement the concept of entrepreneurship. In an entrepreneurial context, students can apply these stages to develop products or services. For example, they can identify market needs, explore business ideas, design products, and conduct user trials. The benefit of this method is that students learn to better understand the user's perspective and create relevant solutions. Apart from that, it helps students hone creative and

innovative thinking skills. Students are also able to work in teams, where students can learn from each other (Widiyanto, S & Purnomo, 2023). This is in line with research from Razzouk & Shute (2012). They state that design thinking is generally defined as an analytic and creative process that engages a person in opportunities to experiment, create and prototype models, gather feedback, and modify.

Design thinking is often done in a team context, which helps students learn to work together, share ideas, and explore diverse thinking. These group discussions can stimulate creativity and critical thinking, because students are exposed to various ways of thinking and approaches. The pretest score is 62.8537, while the posttest score is 78.6829. There was an increase of 15.8292. The increase in scores from pretest to posttest indicates an improvement in performance. Specifically, students have increased their understanding or skills in the assessed area, which could suggest that any interventions or educational methods applied were effective. The percentage increase of approximately 25.18% signifies a significant improvement, which is encouraging for measuring the effectiveness of the educational approach used.

This method is also able to bring students creative and innovative and creative problem solving processes, providing potential answers to the kind of knowledge and techniques designers can bring into HCI (human-computer interactive) (Park & McKilligan, 2018). Students compete to find innovations that arise because of complaints and problems raised by customers. In this case cake customers. The effectiveness of the design thinking method has also been studied (Albay & Eisma, 2021). The study concluded that the implementation of the design thinking process can facilitate teachers in creating a creative, interactive, engaging and learner-centered classroom. This research is directly connected to research (Aflatoony et al., 2018), which states that the success of evaluating the interaction design thinking curriculum in secondary-level education. Students use design thinking on how to evaluate students' design thinking skills in secondary level subjects (Mulyani, 2012).

Design thinking is an approach that focuses on solving problems by prioritizing a deep understanding of users and an iterative process in designing solutions. This approach can influence students' critical and innovative thinking abilities in certain ways, including empathizing with users (Septiko et al., 2012). Design thinking encourages students to understand user needs in depth. By teaching students to see problems from other people's perspectives, they become more critical in evaluating situations and finding relevant solutions. Carrying out an iterative process. This process is the practice of building, refining, and improving a project, product, or initiative. Teams that use an iterative development process create, test, and revise until they are satisfied with the end result taking an iterative approach. Apart from that, students can collaborate with fellow teams and with other teams. This develops their critical thinking skills because they must continually evaluate and refine their ideas based on feedback. Design thinking often involves teamwork, which encourages students to share ideas and assess solutions collectively. These interactions improve critical thinking skills, as students learn to argue and consider multiple perspectives before reaching an agreement. Design thinking will also encourage students to be creative in solving problems. Students are taught to think outside the box and explore a variety of solutions. The brainstorming and prototype development process encourages them to create innovative solutions. An increase in scores in a creativity evaluation can indicate that students are better able to create new and effective solutions to existing problems. Students are also able to reflect and organize the next learning continuity. After applying design thinking, students are encouraged to reflect on what they have learned during the process. This reflection helps them connect practical experience with theory, which builds their critical thinking capacity (Seco & Cendana, 2022).

If an increase in scores in the evaluation of critical and innovative thinking skills occurs after implementing design thinking, this indicates that students experience improvements in the way they solve problems and create innovative solutions. This is not only because of the technical skills they learn, but also because of the change in their mindset towards problems and solutions.

Researchers also made several important notes when learning activities took place. There are several weaknesses and challenges that teachers need to pay attention to, such as the need for time and

human resources which can be time-consuming; therefore, it is important to plan well. The availability of school facilities becomes a supporting force for prototyping and testing when the design thinking method process takes place.

4. CONCLUSION

This study highlights the effectiveness of the Design Thinking approach in enhancing vocational school students' ability to innovate and develop practical entrepreneurial solutions. The research findings indicate that structured learning processes—incorporating indoor and outdoor activities, empathy-building, idea generation, prototyping, and testing—significantly improve students' problem-solving skills and creativity. Collaborative projects further enable students to identify real-world issues, fostering a deeper understanding of user needs. Additionally, exposure to successful companies and startups serves as an inspiration, providing valuable insights into the innovation process. The study also suggests that hands-on prototyping using simple materials or digital tools enhances creative experimentation. However, this research has certain limitations, including its focus on a single group of vocational students, which may limit the generalizability of the findings to other educational contexts. Future research should explore the long-term impact of design thinking on students' entrepreneurial success and investigate its applicability in diverse learning environments. Further studies could also examine how integrating sustainability initiatives, such as waste recycling projects, can serve as a practical entrepreneurship model, enabling students to develop eco-friendly business solutions.

Acknowledgements: The researchers would like to thank the school principal who has helped with this research process. Don't forget to express your appreciation for the teachers who are willing to try methods in learning entrepreneurship.

Conflicts of Interest: The researcher states that this research activity is not in conflict with certain individuals or groups.

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