

Application of Technopreneurship learning model based on project-based learning in enhancing students' entrepreneurial motivation in higher education

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Abstract

The goal of the present investigation is to: (1) identify the effectiveness of the Technopreneurship educational framework based on Project Based Learning in increasing entrepreneurial drive among students in the Department of Electronics Engineering Education, Faculty of Engineering, UNM; (2) assess the level of entrepreneurial enthusiasm among learners in the Electronics Engineering Education Department, Engineering Faculty, UNM; and (3) investigate how it impacts of the Technopreneurs. In the present investigation, a quantitative analysis strategy, specifically using the survey method of inquiry, was utilized. The sample consisted of 36 students enrolled in the Technopreneurship course of the Applied Electronics Engineering Study Program (D4). Data was collected through questionnaires, and the data was evaluated via descriptive percentage analyses within the shape of simple linear regression. The study's findings are as follows: First, the execution of the Technopreneurship learning paradigm based on Project Based Learning is extremely excellent, with an average score of 89%. Second, students in the Electronics Engineering Education Department, Faculty of Engineering, UNM are entrepreneurially oriented, with an average score of 83%. Third, the Project Based Learning-based Technopreneurship learning technique has an 83% positive impact on building passion for entrepreneurship. Third, the Technopreneurship method of instruction based on Project Based Learning has an 83% advantageous effect on increasing entrepreneurship drive. As a result, it is possible to infer that using the Technopreneurship learning model based on Project Based Learning may improve the entrepreneurial drive of students in the Department of Electronics Engineering Education, Engineering Faculty, UNM.

Keywords: Technopreneurship, Learning Model; Project Based Learning; Entrepreneurial Motivation; Higher Education

1. Introduction

College institutions in Indonesia serve an important role in developing competent and talented human resources with expertise, allowing its graduates to compete on a worldwide scale. In the modern period, technical improvements have a significant impact on a country's worldwide competitiveness. For innovation and suitable technology, expertise in skills/competences and authoritative scientific knowledge in application of technology are essential.

In February 2021, the level of joblessness in the nation of Indonesia landed on 8.75 million individuals [1]. This figure has risen since February 2020, when it stood at 6.93 million individuals. In February 2021, graduates of vocational high schools (SMK) constituted the largest group of unemployed individuals, accounting for 11.45% of the total open unemployment rate (TPT), followed by high school (SMA) graduates at 8.55%, university graduates at 6.97%, and diploma 1/2/3 graduates at 6.61%. As a result, SMK graduates have the greatest unemployment rate, followed by SMA and higher education graduates. As a result, graduates, whether from vocational high schools, high schools, or further

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education, are expected to have the abilities and entrepreneurial spirit to generate career chances rather than simply being job searchers.

Starting in 2020, the unemployment rate grew due to job terminations impacting 212,394 people as a result of the coronavirus (COVID-19) pandemic that hit practically every country, including Indonesia [2].

The present difficulty for higher education graduates is the scarcity of career prospects for students who have completed their studies and are looking for work in their particular domains of interest. The average rise in the quantity of grads does not correspond to a growth in employment opportunities in both the public and commercial sectors. The quality of graduates from higher education does not satisfy the needs of the global industry [3].

The importance of education in imparting a grasp of the concepts and practices of technopreneurship is critical. Educators are critical to accomplishing the learning objectives. As a result, an entrepreneurship learning design based on technopreneurship is required to serve as a guide for implementing entrepreneurship education at the higher education level [4].

Efforts to train human resources to compete in the era of Industry 4.0 and embrace the era of Society 5.0 include enhancing conditions of technopreneurship and Information Technology (IT) in students over models and learning techniques that foster creativity and entrepreneurial motivation. Project Based Learning (PjBL) has an efficacious personalized learning technique that focuses on contextual knowledge through complicated activities. Project-Based Learning (PjBL) is an instructional method whereby activities are the center stage of the educational procedure. This PjBL model is a unique approach that includes assignment work and allows learners to actively expand their understanding and turn it into real things. In education, the priority is on thoughts which immerse learners in problem-solving abilities and significant activities to encourage innovation, as well as chances for learners to work individually in creating their own understanding, with real finished goods acting as the summit of accomplishment.

However, difficulties do arise during the learning process. The learning approach necessary should improve graduates' competencies and entrepreneurial motivation.

The goal of the present research is to: (1) assess the effectiveness of the Technopreneurship-based Project Based Learning model in enhancing entrepreneurial motivation among the learners of Electronics Engineering Education, Engineering Faculty UNM; (2) determine the level of entrepreneurial enthusiasm among students of Electronics Engineering Education, Engineering Faculty UNM; and (3) assess the impact entrepreneurial motivation of the Technopreneurship-based Project Based Learning model on.

2. Methodology

This study uses a quantitative approach for generalizable conclusions, and the research design is a survey method with a questionnaire as the data collection instrument to get information from a sample of respondents deemed typical of a specific community. The study's goal is to explain the relationship between implementing the Technopreneurship-based Project Based Learning paradigm and increasing students' entrepreneurial motivation.

This study's population consists of Applied Electronics Engineering (D4) students. The sample is made up of 36 fourth-semester students who were chosen at random without regard for gender or competency. When the population is less than a hundred, it is preferable to take a sample from the total population [5]. Because the population is only 36 people, the researcher uses all of them as the sample.

The variable X is independent variable as Project Based Learning model based on entrepreneurship. The dependent variable, Y, which is motivation of entrepreneurial. The following are the indicators of the independent variable (X), the Technopreneurship-based Project Based Learning model: Project selection; planning project completion phases; monitoring and scheduling of faculty project implementation; arrangement of project reports and presentations; and project results evaluation.

The following are the indications of the dependent variable (Y), entrepreneurial motivation: Diligence in approaching projects; Perseverance in dealing with challenges; Interest; Preference for working independently; Quick boredom with regular chores; Ability to keep one's opinion; Firmness in beliefs; and Enjoyment in identifying and overcoming problems.

The research findings were examined for validity and reliability. During the analysis phase, the researcher assessed validity.

3. Results

3.1 Variable Learning Model Description

Table 1 shows the application of a Technopreneurship learning model based on Project Based Learning in enhancing students' entrepreneurship motivation.

Table 1 Categories of Technopreneurship Learning Model Implementation based on Project Based learning

Score Value	Absolute Frequency	Relative Frequency	Criteria
81-100	32	89 %	Excellent
60-80	3	8 %	Good
41-60	1	3 %	Fair
21-40	0	0%	Poor
0-20	0	0%	Not Good
Total	36	100%	

Source: Processed data

Table 1 demonstrates that the application of the Technopreneurship learning model based on Project Based Learning has been generally effective in the learning process of Electronics Engineering students. Figure 1 depicts the histogram of the research findings.

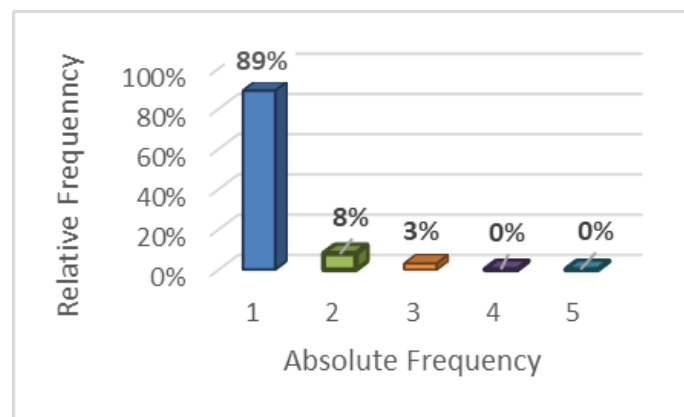


Figure 1 Model Application Diagram

Project Based Learning is being implemented very successfully in 32 students (89%). Meanwhile, 3 students (8%) said the learning activities with the Technopreneurship learning model based on Project Based Learning were well implemented, while 1 student (3%) said they were adequately implemented. Thus, the Technopreneurship learning model based on Project Based Learning is highly effective in students of the Diploma 4 Electronics Engineering Education Study Program, Engineering Faculty, UNM

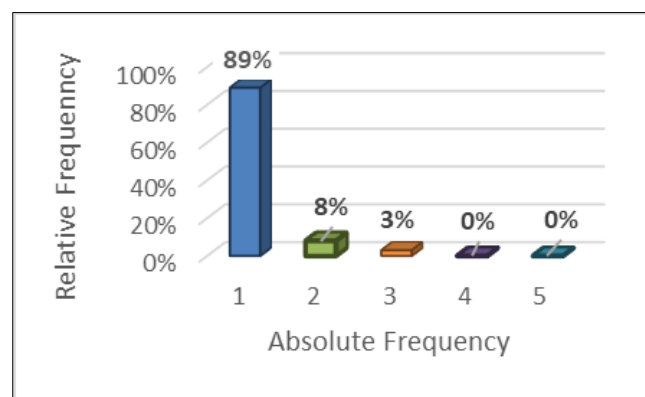
3.2 Description of Entrepreneurial Motivation

Variable The research results on entrepreneurial motivation of students can be seen in Table 2 below.

Table 2 Entrepreneurship Student Category

Score Value	Absolute Frequency	Relative Frequency	Criteria
81-100	5	14 %	Very high
60-80	30	83%	High
41-60	1	3 %	Low
21-40	0	0%	Quite Low
0-20	0	0%	Very Low
Total	36	100%	

Table 2 above shows that, in general, students have a high level of entrepreneurial motivation. The research results can be presented in Figure 2.

**Figure 2** Entrepreneurial Motivation Diagram for Students

According to the percentage of responses, 5 students (14%) claimed that they have a very high level of entrepreneurial motivation. Meanwhile, 30 students (83%) reported having a high level of entrepreneurial motivation, whereas 1 student (3%) reported having a low level of entrepreneurial motivation. As a result, students enrolled in the Diploma 4 Study Program in Electronics Engineering Education at Makassar State University's Faculty of Engineering have a high level of entrepreneurial enthusiasm.

3.3 Prerequisite Test Results

3.3.1 Normality Test Results

The data is considered regularly distributed if its significance value for the normality test is > 0.05 . The SPSS result for the normality test uses statistical analysis as well, namely the One Sample Kolmogorov-Smirnov test. The significance value for variable Y is 0.200, suggesting that the sig value is > 0.05 , according to the normalcy test table. As a consequence, the data is disseminated normally.

3.3.2 Linearity Test

H_0 is considered to be valid given the linearity significance value of $0.972 > 0.05$. As a result, a linear connection exists between the Project Based Learning variable and the entrepreneurial motivation parameter.

3.3.3 Outcomes of hypothesis evaluation

Formula for Simple Regression with Linearity The information gathered from the basic linear regression evaluation conducted with SPSS 16 software generated the following regression formula is:

$$Y = 119,262 + 0,812$$

The following formula has a particular message:

- The fixed number of 119.262 indicates that when the Project Based Learning model (X) is 0, the entrepreneurial ambition (Y) will be 119.262.
- The regression coefficient of the Project Based Learning variable (X) is 0.812, which suggests that if the Project Based Learning model grows by one score, so will the entrepreneurial motivation (Y).

Importance regarding the Design

Testing for hypotheses is utilized to evaluate how much variable X impacts variable Y. The study's findings indicate an F-value of 17.430, Sig 0.000 0.05, indicating that H_0 is disregarded and H_a is approved. As a result, a formula that is linear is formed, suggesting that the value of X effects the value of Y affirmatively.

3.3.4 Correlation Coefficient

The resultant correlation is 0.505, with a level of significance of $0.000 < \alpha < 0.005$. Thus, H_0 gets dismissed whereas H_a is approved, demonstrating a substantial link between the parameters X (Technopreneurship-based Project Based Learning model) and Y (entrepreneurial motivation). As a result, the Technopreneurship-based Project Based Learning paradigm may be used to create students with entrepreneurial motivation.

The output correlation is 0.505, with a significance value of $0.000 < \alpha < 0.005$. Thus, H_0 is rejected whereas H_a is approved, demonstrating a substantial link between the variables X (Technopreneurship-based Project Based Learning model) and Y (entrepreneurial motivation). As such, the Technopreneurship-based Project Based Learning paradigm may be used to create students with a spirit of entrepreneurship.

According to the outcomes of this study, the more effective execution of the Technopreneurship-based Project-Based Learning model, the greater the students' passion for entrepreneurship. If execution is inadequate, students' entrepreneurial motivation will suffer.

3.3.5 Coefficient of Determination

The computed coefficient of determination (R) is 0.505, leading to an overall coefficient of determination (R^2) of 0.255. This means that the Technopreneurship-based Project Based Learning paradigm contributes 25.5% to entrepreneurial drive, while the other 74.5% is impacted through causes beyond the boundaries of this study.

4. Discussion

4.1 Implementation of Technopreneurship-based Project Based Learning Model in Enhancing Entrepreneurial Motivation

The Project centered Learning model centered on entrepreneurship is an innovative and creative learning model. Project-Based Learning (PBL) focuses on a subject and disciplinary concepts, allowing students to do investigations, problem-solving, and other tasks centered on them, resulting in tangible goods. Projects are carried out cooperatively and innovatively in Project Based Learning activities, with an emphasis on topics relevant to students' lives or the requirements of the local community or industry. The impact of the Project Based Learning model on improving entrepreneurial motivation among electronics engineering students, as well as the integrated learning phases in the Technopreneurship course, is investigated in this study.

The benefits of the Technopreneurship-based Project Based Learning approach include making students' learning experiences more interesting and meaningful, as well as encouraging creativity and innovation in the products they generate during learning activities.

The following actions are included in the execution of the Technopreneurship-based Project Based Learning model: (a) questioning; (b) planning; (c) scheduling; (d) monitoring; (e) assessing outcomes; and (f) evaluating.

The most appropriate learning technique within the Project Based Learning framework for increasing entrepreneurial spirit among students is an integrated learning approach that combines entrepreneurship values. This entails incorporating entrepreneurship values into the entire process, from production to sales. Product presentation and sales activities allow students to hone their communication and promotion abilities, as well as their inventive product development, risk management, planning and establishing sales systems, and discovering market prospects. As a result,

integrating the Technopreneurship-based Project Based Learning model with entrepreneurship values is expected to improve academic achievement in terms of affective, cognitive, and psychomotor aspects, as well as increase students' entrepreneurial motivation in higher education.

Project-Based Learning promotes students to become more active learners, with teachers acting as facilitators and motivators while evaluating student products. When working on project tasks, students can perform collaborative research in groups of 4-5. Planning, organizing, bargaining, task distribution among group members, and acquiring relevant information for research are among the abilities required and developed by students inside the team.

The project completion steps' indicators involve students directly participating in the creation of genuine products fitted to the needs of society or the market, promoting students' creativity and innovation in product creation. The Project Based Learning paradigm fosters students' abilities, creativity, and independence while emphasizing direct involvement in the teaching and learning process.

4.2 Entrepreneurial Motivation of Electronics Engineering Students

Entrepreneurial drive can be found in everybody, although it is influenced by a number of circumstances. As described in this study, one of the elements that influences attitudes and entrepreneurial motivation is education, in which students learn about entrepreneurship through the teaching and learning process. In higher education, one approach is the Project Based Learning model.

According to the findings of this study, electronics engineering students exhibit a high level of entrepreneurial motivation. The study found that systematic adoption of the Project Based Learning model in teaching and learning activities increases students' entrepreneurial motivation. This is consistent with the opinion [6], who claims that standardized and structured training or education can foster an entrepreneurial spirit and motivation. Family education, in addition to formal education, makes a substantial impact to the development of kids' entrepreneurial spirit, ultimately leading to enhanced entrepreneurial motivation.

4.3 The Influence of Technopreneurship Project Based Learning Model on Entrepreneurial Motivation Enhancement in Electronics Engineering Students

Campus education that can establish entrepreneurial attitudes or spirits, which in turn inspire entrepreneurial motivation, can create an entrepreneurial environment in which students embrace challenges, are creative, innovative, and have the guts to take or manage risks (character). The Project Based Learning paradigm is the best instructional technique for increasing entrepreneurial motivation. The findings of this study's data analysis reveal a favorable relationship between the adoption of the Project Based Learning-based Technopreneurship model and the development of entrepreneurial motivation, indicating that the alternative hypothesis (H_a) is accepted. As a result, the research findings confirm the hypothesis that there is a positive relationship between the adoption of the Project Based Learning-based Technopreneurship model and student entrepreneurial motivation. This finding is backed by the hypothesis that the Project Based Learning model is one of the entrepreneurship instructional models that can develop entrepreneurial character, conduct, and motivation. This approach was developed by a researcher named John Dewey with the concept of "Learning by Doing," which states that the process of acquiring learning outcomes is accomplished by engaging in specific actions that are linked with the desired aims [7].

The descriptive analysis results show that implementing the Project Based Learning-based Technopreneurship model has an effect on increasing entrepreneurial motivation among students. The size of the Project Based Learning model's influence on students' entrepreneurial motivation is around 25.5%. Thus, it can be concluded that the Project Based Learning-based Technopreneurship model contributes approximately 25.5% to the enhancement of entrepreneurial motivation among Electronics Engineering students, with the remaining 74.5% influenced by other factors not investigated in this study.

In general, an examination of the indicators used to measure the variables of the Project Based Learning model, such as questioning, planning, scheduling, monitoring, assessing results, and evaluating, leads to the conclusion that the implementation of the Technopreneurship-based Project Based Learning model is excellent, with a score of 89%. Entrepreneurial motivation is measured using ten indicators, which are perseverance in facing tasks, perseverance in facing difficulties, interest, preference for working independently, getting bored quickly with routine tasks, being able to maintain one's opinion when confident, not easily letting go of one's beliefs, and enjoying seeking and solving problems. With an overall score of 83%, students' entrepreneurial motivation is considered high.

Enhancing entrepreneurial motivation frequently leads to the idea that entrepreneurs are born owing to hereditary characteristics. Only the descendants of entrepreneurs are thought to be successful. However, it is apparent that education has a critical role in moulding students' attitudes, abilities, and culture. The entrepreneurship is neither magical nor mysterious. Entrepreneurship is not influenced by heredity. Entrepreneurship, on the other hand, is tied to discipline and can be learned by anyone[8].

5. Conclusion

The use of the Technopreneurship-based Project Based Learning model helps boost student interest in entrepreneurship by incorporating entrepreneurial ideals into their educational endeavors.

Compliance with ethical standards

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Disclosure of conflict of interest

Authors have declared that no conflict of interest exist.

Statement of informed consent

The authors ensured that informed consent was obtained from all participants included in this study..

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