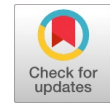


Design of Production-Based Entrepreneurship Technology Training Model to Improve the Skills of Engineering Students

Ganefri, Hendra Hidayat, Asmar Yulastri, Surfa Yondri



Abstract: *The high unemployment rate of engineering graduate students in higher education contributes to the increasing need for employment and the high number of job seekers in the era of the industrial revolution 4.0. Need solutions from this case, especially how engineering students in higher education provide alternative applied solutions that can be implemented. Entrepreneurship technology training is an alternative solution for engineering students in higher education. This study aims to design a model of production-based entrepreneurship technology training to improve the skills of engineering students in higher education. To produce a production-based entrepreneurship technology training model, four stages of development research are carried out: 1) Define; 2) Design; 3) Develop; and 4) Disseminate. This paper is limited to, the design stage of a production-based entrepreneurship technology training model. A sample of 550 students took entrepreneurship technology courses in higher education in Padang, Indonesia. Data collection instruments in the form of questionnaires and Focus Group Discussions. The results of this preliminary study are the framework of a production-based entrepreneurship technology training model consisting of five phases, namely, phase 1) Analysis of Entrepreneurial Material and Consumer Needs; phase 2) PIKEN: Evaluation of Student Entrepreneurship Competencies; phase 3) Designing a Business Start Up; phase 4) Formulation of Production-Based Business Plan; phase 5) Online Store Collaboration and Evaluation. This production-based entrepreneurship training model is expected to help reduce the unemployment rate of tertiary education graduates, especially vocational education graduates and students can survive with their entrepreneurial competencies.*

Keywords : Engineering education, Entrepreneurship Training, Competencies, Business Plan.

I. INTRODUCTION

Economic development and growth is very fast happening in the hemisphere, which has an impact on the socio-economic life of a Nation, including Indonesia. Engineering education is one of the driving forces of a nation's economy [1], so it is also expected in Indonesia.

Engineering education in Indonesia is developing well and has had a lot of influence on the socioeconomic nation. However, synergy between engineering education with the industrial world and stakeholders in the community is needed. Knowledge and skills developed in schools need to be adjusted to the needs of the community. With the hope that education can improve people's lives, both in terms of knowledge and the resolution of contextual problems faced daily. So far, learning engineering education has not been able to meet all the demands of the community, especially in the field of life skills according to local conditions of life of students [2]. Learning materials are often not in line with the development and needs of the community. Consequently, after graduating from school students cannot directly apply the theory obtained from the school. Known together, engineering education is very closely related to social transformation. Because engineering education is also part of the social system. The relevance of engineering education to the real world is an urgent need to be realized. The phenomenon that occurs, between engineering education and community development does not match and there is a significant gap. Community needs cannot be fully realized by educational institutions. Among the indicators of this problem, graduates of engineering education institutions are not ready to use because they only master the theory, lacking skills. The industrial world finally left the engineering school because there was no linkage. It was also due to engineering education learning materials not suitable to the potential of the area where students reside. The subject matter and context of student life are not coherent. So there is no transfer of learning in student life does not occur. Referring to these indications, job opportunities for engineering education graduates are basically not very encouraging. This number is indeed not ideal, so efforts should be made to increase the absorption of graduates to enter employment and create employment opportunities. Nationally, 80% -85% of engineering education graduates can enter the workforce, while 15% -20% is possible to continue their education to a higher level. If you look at this data, then an increase in the number of engineering education, which is one of the considerations because 52% of other school graduates do not study further, is it really a solution? Is not the most important and first is to improve the quality of the performance of the implementation of engineering education [3], so that the quality of graduates increases, then increase the number so that it reaches a certain proportion of about 65 percent of unemployed educated graduates of secondary education.

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Based on data held by the Central Bureau of Statistics, Indonesia, about the Open Unemployment Rate starting from August 2017 for 7.04 million people or 5.50 percent [4], and finally in August 2018 for 7 million people or 5.34 percent [5], this figure includes unemployed education graduates. This data describes the weaknesses of university graduates in the competition in the labor market. This is one of them because the learning process that occurs so far is still oriented to the target value.

The description of the quality of vocational education graduates extracted from Finch and Crunkilton [6], that: "The quality of vocational education applies a double measure, namely quality according to the size of the school or in-school success standards and quality according to the size of the community or out-of school success standards". The first criterion covers aspects of student success in meeting curriculum demands that have been oriented to the demands of the world of work. The second criterion, the ability of graduates to succeed outside of school is related to work or work skills that are usually carried out by the business world or the industrial world. Graduates of engineering education are expected to be able and ready to work as experts in their fields, and can open jobs, but in reality the rate of absorption of graduates in the world of work and industry is still far from the expected number, in addition to the factor of employment availability that is still not in accordance with the number of graduates produced, the quality factor of graduates is still the cause of many graduates who have not worked. It is hoped that through the development of engineering education, the unemployment rate can be reduced. Because it is different from other school education, engineering education is based on a curriculum that equips graduates with certain skills to fill employment or open business opportunities. In addition, Engineering education can also be directed to elevate local excellence as the nation's competitiveness capital. Engineering education curriculum is very possible to be developed in accordance with the potential of the region and employment / business arising from regional economic activity.

The big picture of graduation can provide input, that every year the world of work needs to absorb a large workforce, if this has not been able to be overcome by the government then there will be unemployment or more people looking for work. As education providers, schools are demanded to be more active in improving teaching and learning processes that are more directing students to education based on life skills. Through the lessons given are able to shape students to develop their potential, so they are brave to face, want to find solutions, and are able to overcome life and life problems.

There are also many engineering education graduates who continue further education. It is unfortunate indeed that when engineering education alumni who have developed vocational education are expected to be able to generate employment or join work in industries that are in accordance with their educational background and are demanded to be independent it turns out some want to continue their education. Besides that, the problem that occurs is that the learning climate in schools is less work oriented. That, a student must grow up in a certain learning environment. The college environment is basically divided into two, namely the physical environment in the form of various facilities and

infrastructure that support the achievement of goals and the non-physical environment in the form of basic values or basic values developed in an institution. This second environment is commonly referred to as institutional culture. A conducive learning climate must be supported by a variety of fun learning facilities such as: facilities, laboratories, environmental settings, lecturers' appearance and attitude, harmonious relations between students and lecturers and between the students themselves. A pleasant learning climate will arouse enthusiasm and foster student activity and creativity. Because curriculum development uses a competency approach, and is based on student activity and thinking ability (student activity and thinking skills), curriculum development requires a flexible space, and is easily adapted to students' needs.

One of the challenges of engineering education is globalization. Globalization that has entered the closest environment, namely the family environment, is a big problem that cannot be avoided. Fortifying families by providing understanding and education becomes an alternative solution early on. So preparing for education and providing literacy for the nation's children is our common work. National education needs to be formulated on how the quality of graduates is able to compete and compete in the global competition. Alternate urgent solutions through production-based entrepreneurship technology training, this training enables students of engineering education to improve engineering competence and gain ability in entrepreneurship. So that graduates of engineering education are able to compete in this globalization era.

II. LITERATURE REVIEW

A. Review of the Theory and Entrepreneurship Education in Higher Education

Research on entrepreneurship has been widely studied [7]-[12]. Education and training for entrepreneurship are the process of facilitating individual with the concepts and skills to be able to recognize business opportunities and have the insight, confidence and the ability to act [13]. Entrepreneurship education and training aimed to inspire students to evoke emotion, and a change of mindset [14]. In addition, studies of the theory, education and entrepreneurship training have actually been much studied by experts such as the theory of decision-making [15], [16]. It helps us to understand why some executives are able to see the opportunities that will benefit economically while others do not. These theories greatly assist learners in the field of natural face problems related to entrepreneurship issues. According to Ghoshal (2005) found an effective way to teach entrepreneurship requires a combination of theory and application.

Furthermore, to foster entrepreneurship as a mindset can be considered as an educational competency [18], [19], [20], based on instructional learning experience as well as in training [21], [22]. Besides, the enterprise has become an indication of a country's economic growth.



Positive impact on formal Entrepreneurship education is the ability gained through the education necessary to detect and evaluate better business opportunities [23], [24], increase the confidence of the perceived risk as well as scouting care and employment [25], [26], and promote entrepreneurial intention among students. The important part is that people tend to acquire knowledge that can provide benefits in the ability of skills through education (especially formal) are more practical, including entrepreneurship education.

B. Review of Production-Based Learning

Production-based learning is learning that prepares students in Engineering education with entrepreneurial skills and competency skills in the field of engineering, aimed at producing commercial products [27], [28], [29]. Production-based learning emphasizes the learning process, students can conduct learning activities oriented towards meeting the needs of the community.

III. METHODOLOGY

This research method is development research [30] with a quantitative descriptive approach that aims to produce a model of production-based entrepreneurship technology training. This paper is limited to, the design stage of a production-based entrepreneurship technology training model. A sample of 550 students took entrepreneurship technology courses in higher education in Padang, Indonesia. Data collection instruments in the form of questionnaires and Focus Group Discussions. Research and development is carried out with four stages of research development, namely: 1) Define; 2) Design; 3) Develop; and 4) Disseminate. At this design stage, the research team conducted Focus Group Discussion activities as a systematic and directed discussion of the production-based entrepreneurship technology training model [31]. Focus Group Discussion is a form of qualitative research where participants can ask questions about the production-based entrepreneurship technology training model discussed.

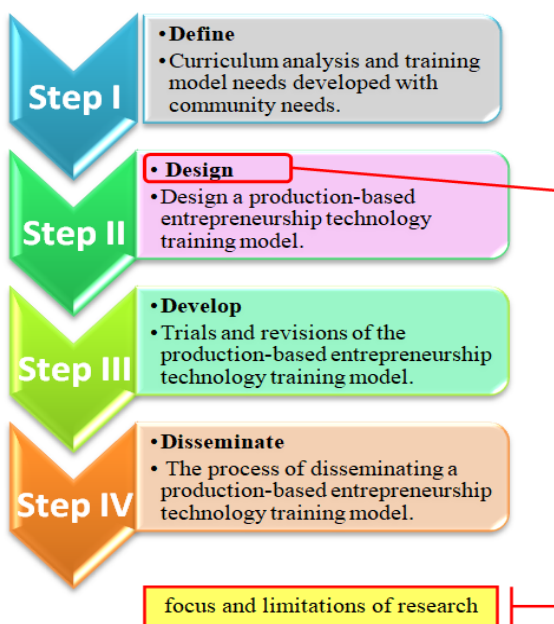


Fig. 1. The Framework of Designing a Production-Based Entrepreneurship Technology Training Model

IV. RESULT AND DISCUSSION

Learning entrepreneurship technology that is well regulated has a positive impact on students of engineering education, especially in the development of its competencies [32]. The results of the curriculum analysis and the needs of the community are explained about the existing training model namely; 1) training is still centered on the teacher and communication is still one-way, 2) training is still focused on theoretical activities and lacks in practical activities, 3) training strategies and models are still monotonous, and boring, 4) there are no instructions and training books that help facilitate training.

In addition, interviews were conducted with some students obtaining information such as, 1) most students expect learning entrepreneurial technology to be fun, challenging and obtain a variety of knowledge and experience, but conversely, learning becomes very boring when what is taught is predictable by students, 2) Learning entrepreneurship technology should have been based on community problems by providing alternative solutions to the problems found, then directed to create and deliver products that have commercial potential, such as electricity saver devices and water control at home [33].

Furthermore, the results of this preliminary study are the framework of a production-based entrepreneurship technology training model consisting of five phases, namely, phase 1) Analysis of Entrepreneurial Material and Consumer Needs; phase 2) PIKEN: Evaluation of Student Entrepreneurship Competencies; phase 3) Designing a Business Start Up; phase 4) Formulation of Production-Based Business Plan; phase 5) Online Store Collaboration and Evaluation.

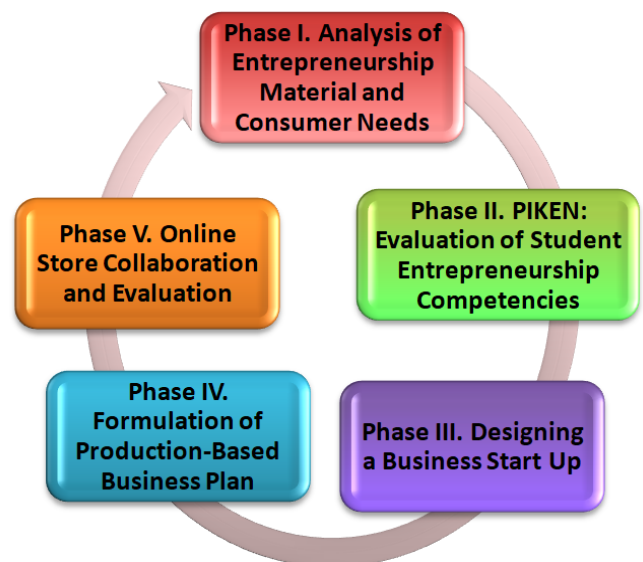


Fig. 2. Production-Based Entrepreneurship Technology Training Model

Based on the framework of the stages of the production-based entrepreneurship technology training model mentioned earlier in Figure 2, it is explained as follows:

Phase I. Analysis of Entrepreneurship Materials and Consumer Needs

Needs analysis becomes an important part in formulating a training model [34], because based on this needs analysis information researchers can design training models that are useful for engineering education students. Analysis of entrepreneurial material needs includes; 1) what training material can provide an entrepreneurial experience for Engineering education students, 2) what information technology is used to support entrepreneurship, 3) the facilities available already support the training material and provide student comfort. Furthermore, analysis of consumer needs also becomes very urgent and very necessary for synchronization between material and consumer needs. Analysis of consumer needs to be done in order to find out who are consumers who have problems and need solutions. The results of the analysis of consumer needs need to be mapped to obtain detailed information about consumer problems, consumer age, consumer work, and other information.

Phase II. PIKEN: Evaluation of Student Entrepreneurship Competencies

In this phase it is very important to know the ability and character of entrepreneurship in engineering education students. In one team not all have the ability to sell, not all have the ability to develop creative ideas, so placing the right people in the right team is very good at developing entrepreneurship. One alternative that is carried out by conducting evaluations and tests of entrepreneurship competency in engineering education students, PIKEN is one of the applications developed to measure the entrepreneurship index and this can help measure the index of entrepreneurship in engineering education students.

Phase III. Designing a Business Start Up

Furthermore, in this phase after a work team of 2-3 people are formed, the next step is to develop business ideas and design business ideas. In the first phase, we have done an analysis of consumer needs and obtained enough information from the constraints and problems of society that will become a business opportunity for engineering education students. The focus of designing a business start up is directed towards electronic products [35]. In this phase the work team has begun to try to make prototypes and test product reliability, and practice the ability to think critically, and logically. [36]

Phase IV. Formulation of Production-Based Business Plan

After the product is believed to be successful and has great benefits in the community, then the formulation of a production-based business plan means that the business plan made must reflect the projected profit and high selling value of the product that has been made [37].

Phase V. Online Store Collaboration and Evaluation.

In line with making a business plan, an online shop is made in collaboration, both the system or the content to be sold, meaning that an online store system can be made with many stores available therein. All these processes and steps must be periodically evaluated [38] - [40].

The production-based entrepreneurship technology training model is a breakthrough training in engineering education, by transforming from the student center to teacher center, with the training process being only more

theoretically dominant to becoming more dominant in direct practice of all theories, training which so far has only pursued targets without thinking about the outcomes of commercial products . Consider the following illustration of Figure. 3:



Fig. 3. The concept of production-based entrepreneurship technology training, Source: Google Search

V. CONCLUSION

The production-based entrepreneurship technology training model is focused on Engineering education, due to the high unemployment rate for graduates of engineering education. Thus, with the production-based entrepreneurship technology training it is expected that engineering education students can improve their skills while honing and deepening their entrepreneurial abilities [41]. The combination of engineering skills and entrepreneurial skills will result in successful young entrepreneurship. During this training and learning of engineering education only oriented to the demands of a binding curriculum does not give the freedom of Engineering education students to explore work practices carried out [42]. The production-based entrepreneurship technology training model in its design is very much needed by the cooperation of partners, especially the industry, so there are many suggestions and input to produce training models that can be absorbed by the world of work [43].

The limitation of the production-based entrepreneurship technology training model is the very limited number of participants, in order to produce quality training graduates, adequate facilities and infrastructure are needed and students with good academic potential, so that if students with low abilities will become difficult to innovate products to be processed into business plans and online stores.

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