



Bioentrepreneurship Ability Profile of Students in Microbiology Learning

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DOI: <http://dx.doi.org/10.15294/usej.v10i2.43982>

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Article Info

Submitted 12 January 2021

Revised 9 April 2021

Accepted 9 July 2021

Keywords

Microbiology Learning, Bioentrepreneurship

Abstract

Graduates from undergraduate education contributed 6.31% to the unemployment rate. The Higher Education is expected to develop curriculum and learning not only scientifically oriented, but also facilitate life skills for its graduates. This study aims to analyze the profile of students about microbiology learning based on bioentrepreneurship. The research method is descriptive exploratory. The research subjects were 60 students who had taken microbiology courses in the Biology Education Study Program at FPMIPATI, Universitas PGRI Semarang, which consisted of semesters 7, 9, and 11. The instrument was a closed questionnaire with a choice of answers using the Guttman scale. A questionnaire on student perceptions of microbiology learning based on bioentrepreneurship was developed referring to perceptual indicators, namely knowledge and interest in entrepreneurship, knowledge of microbiology, relevance of microbiology concepts, bioentrepreneurship. Indicators developed in 25 questions and validated by experts and valid. The results showed that overall, the average score was 2.17. From each element, the highest average score is the Innovation element (3,4) and the lowest score from organizational creation and growth (1). Based on the data, the bioentrepreneurship profile is still low. Therefore, it is necessary to recommend the development of a learning program oriented towards bioentrepreneurship in microbiology lectures.

How to Cite

Nurwahyunani, A., Wiyanto, W., Rusilowati, A., & Susilaningsih, E. (2021). Bioentrepreneurship Ability Profile of Students in Microbiology Learning. *Unnes Science Education Journal*, 10(2), 97-101.

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p-ISSN 2252-6617

e-ISSN 2502-6232

INTRODUCTION

Education graduates in Indonesia currently contribute to a high unemployment rate. The Central Statistics Agency (BPS) reported that the Open Unemployment Rate (TPT) in Indonesia of February 2018 amounted to 6.87 million people or 5.13%. Undergraduates account for 6.31% of graduates. a bachelor cannot rely on academic abilities (hard skills) alone, but must also have soft skills.

One of the soft skills that a bachelor must have is the spirit of entrepreneurship (Afriadi dan Yuni, 2018). Higher education institutions are expected to develop curriculum and learning that is not only scientifically oriented, but also facilitate life skills for their graduates. Every college graduate is expected to have additional competencies that can support his life skills (Muliadi, 2020). This is a challenge in itself for the Biology Education study program at the Universitas PGRI Semarang (UPGRIS). The commitment is not only to produce many graduates, but also to produce graduates who are competent, able to contribute to social life and able to global challenges. Therefore, university graduates must have minimum competence, professional attitude, be creative, innovative, productive, and adaptive. In connection with the importance of improving the quality of education, students should be encouraged so that they can develop themselves according to their respective potential. The potential that is owned by each person is different. Self-potential related to creativity and innovation is controlled by the right brain. Through this potential, the ability of students, especially those related to entrepreneurship, can be encouraged to become more advanced (Roini, 2016).

The concept of microbiology, such as the topic of using microorganism, can be integrated with entrepreneurial content (Muliadi, 2020). Entrepreneurship can be developed, one of which is through the creation of biological products in applicable lecture materials (Natadiwijaya, *et al.* (2018). Bioentrepreneurship is an educational program designed to facilitate strengthening the knowledge and skills needed for an interested entrepreneur, to the commercialization of products from the use of life sciences (Langer, 2014). Therefore, a study was conducted to analyze students' perceptions about microbiology learning based on bioentrepreneurship.

METHOD

This research is an exploratory descriptive

study (Sugiyono, 2017). This study aims to analyze the profile of students about microbiology learning based on bioentrepreneurship. The subjects involved in this study were 60 students who had taken microbiology courses in the Biology Education Study Program at FPMIPATI, PGRI University Semarang which consisted of 7, 9, and 11 semesters. The research instrument was a closed questionnaire with answer options using the Guttman scale (Muliadi, 2020). A questionnaire on student perceptions of microbiology learning based on bioentrepreneurship was developed referring to perceptual indicators, namely knowledge and interest in entrepreneurship, knowledge of microbiology, relevance of microbiology concepts, bioentrepreneurship. This indicator was developed in 25 questions and validated by experts and declared valid. The research data analysis was conducted using descriptive and inferential statistics. Descriptive analysis is used to describe students' perceptions of learning microbiology based on bioentrepreneurship. The questionnaire was made in the form of choices of SA (strongly agree), A (agree), DA (disagree), and SDA (strongly disagree) with a maximum score of 4.00. Statements about the eight main elements of bioentrepreneurship, which include: 1. The Entrepreneur, is the first most important element in Entrepreneurship. Namely someone who carries out business activities to achieve the expected goals; 2. Innovation, which includes activities to change, replace, revolutionize and introduce new approaches; 3. Forming an organization, meaning that to produce added value to a product or service into something new, there must be a forum / organization as a driving force to realize these goals; 4. Creating value, through Entrepreneurship activities someone will produce new products, new services, new transactions, resources and marketing that they create so that they contribute more value to the community and the market; 5. Profit and non-profit (profit and non-profit), the goal of entrepreneurship is for profit but also for social service agencies; 6. Growth, pursuing the growth of entrepreneurship by always pursuing and seizing opportunities that are available to be grasped so as to give birth to new businesses; 7. Uniqueness, including making new combinations, new approaches that are carried out by trial and error so that they have a uniqueness that is not shared by others; 8. Process, namely a series of actions and decision making that are carried out continuously (Murtini, 2008).

The statement questions will be arranged randomly between positive and negative statements, thus encouraging students to respond ho-

nestly (Hayat *et al.*, 2018).

RESULT AND DISCUSSION

The results of data collection about the bio entrepreneurship profile of students in the microbiology course.

Overall, the student profile is seen from each of the following elements:

Table 1. Average Profile of Students Bioentrepreneurship.

The of bioentrepreneurship	Percentage	Category
The Entrepreneur	2,8	Enough
Inovation	3,4	Good
Organization creation	1	Not good
Creating value	2	less
Profit & non profit	2,8	enough
Growth	1	Not good
Uniqueenes	2	Less
Procces	2	Less
Average	2,17	Less

Based on table 1 the total average score is 2.17 from a maximum score of 4.00. This means that the overall profile of students' bio-entrepreneurship was not good. Conditions in various elements need to be addressed, especially for elements of Organization creation and Growth.

Referring to the profile of each elements based on the average score, table 1 shows that there are two elements with the lowest average score, namely the (3) element of Organization creation and the (6) element of Growth. This fact shows that students do not have the habit of forming bioentrepreneurship organizations. Students do not yet understand the meaning if to produce added value to a product or service into something new, there must be a forum / organization as a driving force to realize these goals and to pursue entrepreneurial growth by always pursuing and seizing opportunities that are available to be achieved so that new businesses are born. According to Meyers and Hurlay (2008) what is meant by bioentrepreneurship education is a program designed to acquire the knowledge, skills and attitudes needed by an entrepreneur who is related to the commercialization of science. It was because during learning, students have practiced activities that train entrepreneurial skills, such as making tempe products that have a selling value and are innovative, creative, how to seize opportunities, practice marketing, dare to take risks, practice financial management, and other entrepreneurial

skills (Sisnodo *et al.*, 2015).

Bioentrepreneurship profile of students in microbiology learning with the highest and lowest scores

The lowest score was found in the elements: (3) Organization creation and (6) Growth, this elements shows that the students still have difficulty interpreting and growing to produce added value for a product or service into something there must be a new organization. Besides that, it was still difficult to catch up and seize the opportunities that are available to be seized, thus giving birth to new businesses

The highest score is the element of innovation This standard has two elements to represent: 1) it effectively fosters creativity and innovation; 2) effective in encouraging the implementation of the knowledge held.

Table 2. Average elements of innovation

The of bioentrepreneurship	Percentage	Category
Effective fostering creativity and innovation	3,3	Good
Effective in encouraging the implementation of the knowledge held.	3,5	Good
Average	3,4	Good

Table 2. illustrates that the average score for the elements of innovation. The categorized from the two aspects of this elements is Good. This shows that students have been able to make innovations related to products created through microbiology lectures.

The experience of students following bioentrepreneurship-based microbiology courses will affect knowledge of entrepreneurship and microbiology and will further influence students' perceptions and attitudes towards the integration of entrepreneurial values (entrepreneurship) in microbiology learning (Muliadi, 2020). A recap of student profiles on bioentrepreneurship-based microbiology learning explains that values are very relevant to be integrated into applicable microbiology concepts / materials. Natadiwijaya, *et al.* (2018) states that entrepreneurship can be developed, one of which is through the creation of biological products in applicable lecture materials. Specific microbiology material on the topic of using microorganism can be integrated with entrepreneurial content. The use of microorganisms such as bacteria can be used to make or modify certain products that have entrepreneurial opportunities, such as making nata de coco.

Integration of entrepreneurial content into the

field of life sciences (Microbiology) is known as bio-entrepreneurship. Bioentrepreneurship education is an educational program designed to teach the knowledge, skills, and attitudes needed for an entrepreneur who is interested in the commercialization of life science products (Langer, 2014). The results shows that bioentrepreneurship can improve students' process skills (Tumisem *et al*, 2015), can improve students' entrepreneurial attitudes in learning environmental knowledge (Mulyaningrum, 2014). Bioentrepreneurship learning is contextual learning that facilitates learning experiences in observing, identifying, assessing, analyzing and utilizing biodiversity to create products that contain economic value. Priyanto (2009) states that the integration of entrepreneurial values in microbiology learning should pay attention to the local potential of each area. Bioentrepreneurship-based microbiology learning can provide learning experiences for prospective teacher students to become academic entrepreneurship who have values such as being independent, creative, risk-taking, action-oriented, leadership, hard work, honest, disciplined, innovative, responsibility, cooperation, unyielding, commitment, realistic, curious, communicative, and strong motivation for success (Kristianti *et al*, 2012; Rosmiati *et al*, 2015). This is in accordance with research on Basic Biology Practicum which is suitable to be developed using the sciencepreneurship approach, namely conventional biotechnology material in the fermentation process of yogurt and tempeh. The implementation of the sciencepreneurship approach provides useful experiences including always thinking positively, working hard and smartly, teamwork, thinking critically, having an unyielding attitude, being creative, proving scientific processes and field facts and growing interest in becoming an entrepreneur (Fawaida *et al*, 2019).

CONCLUSION

Overall, the bioentrepreneurship profile of students in microbiology learning is in the poor category. Likewise with the results of the analysis on each of the elements, only the elements of innovation have received a Good score. And a fair score on the elements of profit & entrepreneurship. This condition is quite attention-grabbing, because the bioentrepreneurship profile is expected to be well embedded in students, so as to be able to equip students with soft skills and facilitate life skills for their graduates. So that with additional competence in the form of bioentrepreneurship can support life skills. These findings can be used as a basis for institutions to develop bioentrepreneurship-based microbiology courses. Therefore, it is necessary to recommend the development of a biology learning program oriented towards bioentrepreneurship in

microbiology lectures.

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