

Learning innovation through biopreneurship to improve the interest of entrepreneurs of madrasah aliyah students based on boarding school

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ABSTRACT

The difficulty of entering the workforce requires the world of education to change the paradigm of thinking students from job-seeking cultures become job creators or entrepreneurs. Islamic boarding schools are educational institutions that can provide learning experiences directly to students or students. Islamic boarding school graduates do not all go to college and work immediately while the desire or interest of students for entrepreneurship is still very low. Islamic boarding schools must be able to equip students or santri by inserting learning activities with entrepreneurship education to equip them with skills. The purpose of this study was to determine the success of the implementation of learning innovations through bioentrepreneurship in increasing interest in entrepreneurship in Islamic boarding schools so as to inspire students to create their own work opportunities with skills in making biotech products in biology. This research is a research development (R & D). The development of learning is oriented towards making biotechnology products by adding entrepreneurial concepts and then experimenting with the experimental class. Data is taken by observation and questionnaire. Data testing techniques using t-paired samples test. The results showed that there was an increase in interest in entrepreneurship from before and after the application of learning with bioentrepreneurship.

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1. INTRODUCTION

Islamic boarding schools have great potential to be educated as entrepreneurs. Some pesantren have developed various businesses in a number of fields ranging from agriculture, livestock, and culinary. One of the pesantren that develops livestock farming is the Al Quran Harsallakum Islamic Boarding School, Bengkulu. This pesantren was chosen in the Hasanah Community-Santri Empowerment Program by BNI Syariah and the Hasanah Titik Foundation. Through the program, Al Quran Harsallakum Islamic Boarding School began developing quail culture since last August 2016 [1].

Based on statistical data from the Directorate General of Islamic Institutions, Ministry of Religion of the Republic of Indonesia in 2016 there were 28.194 Islamic boarding schools spread in both urban and rural areas with 4.290.626 students, and all of them were private [2]. In addition to showing the level of diversity,

orientation of the pesantren leaders and the independence of the kiai, this number reinforces the argument that pesantren are very independent private educational institutions and are actually community-based educational practices such as equipping students to entrepreneurship. Vice President Drs. Jusuf Kalla stated that the santri were early educated to be entrepreneurs or young entrepreneurs to be able to compete in the technological era [3]. Educational institutions must balance the development of science and technology by improving themselves by making learning innovations and adjusting to the needs of the user community [4].

Skills to become an entrepreneur can be achieved through education. Learning activities in schools determine what experience they receive as a means of living in the community after they graduate from school, especially those who go to boarding schools. Many students who have graduated from high school are unemployed because they have no skills. Head of BPS Suhariyanto said that during 2018 high school graduates were the highest unemployment graduates, with a percentage of 7.19% high school graduates, 8.92% Vocational High Schools (SMK), and lower elementary education the figure is 2.67%, then junior high school (SMP) 5.18%, University 6.31%, and Diploma I-III 7.92% [5].

Learning activities can be done through knowledge transfer or by transferring skills in the form of expertise. If the transfer of knowledge is the goal the students will be able to understand the new knowledge they receive from both the teacher and from the experience of the interaction with other students. Transfer of knowledge prioritizes cognitive aspects rather than psychomotor. Cognitive aspects will increase knowledge and shape the mindset of students, while psychomotor is more towards skiing or their ability to realize what they know. Science education has an important role in preparing the nation's children to enter the world of their lives. Science education has a strategic role in preparing quality human resources to face this era of globalization. This potential will be realized if science education is able to produce capable students in their fields and succeed in developing the ability to think logically, think creatively, be able to solve problems, be critical, master technology and be adaptive to the changes and developments of the times [6].

Imbalance between graduation speed and employment causing many educated workers not to get a job. For that reason, college highly encouraged to change the way students think of job seekers become job creators [7] Muhibbin Syah revealed that interest is a tendency and high enthusiasm or a great desire for something [8]. While Susant argues that interest is the tendency of one's soul towards an object, and usually the soul's tendency is accompanied by feelings of pleasure because they feel they have an interest in something that is of interest to them [9]. According to Slameto, interest is a feeling of preferability and a sense of interest in a thing or activity, without anyone asking. Interest is basically the acceptance of a relationship between oneself and something outside of oneself [10].

Subramani & Iyappan said that the purpose of education is not just making a student literate but adds rationale thinking, knowledgeably and self-sufficiency. When there is a willingness to change, there is hope for progress in any field. Creativity can be developed and Innovative teaching and learning benefits both students and teachers [11] And the biggest challenge any teacher faces is capturing the students' attention, and putting across ideas in such a way that it stays with them long after they have left the classroom [12].

Learning in high school / equivalent, such as aliyah madrasas should emphasize the psychomotor aspects of students because by strengthening this aspect students will have a realistic experience with what they understand. Psychomotor aspects will be able to bring students to increase life skills. Based on Loleno and Saptorini (2016) research on chemistry learning through the application of Life Skills-oriented colloidal concepts can improve Chem-entrepreneurship abilities of students, and Chemo-entrepreneurship ability of experimental classes increased by 57% while the control class was 54% [13].

Based on the results of research's Fitri showed the implementation of the bioentrepreneurship approach to biology learning developed includes syllabi, lesson plans, teaching materials, student worksheets and instruments that are equipped with the workings of making instant youghurt and herbal products, making packaging and economic analysis of products, in addition the bioentrepreneurship learning approach can improve life skills and entrepreneurial interests [14]. Every student's potential needs to be developed optimally. Potential associated with entrepreneurship controlled by the right brain which encourages creativity and someone's innovation. Potential empowerment can be done through efforts that are designed or deliberately programmed by the lecturer through learning. Strategy learning that empowers critical and creative thinking abilities and skills, as well as other abilities need to be applied during learning to facilitate students in developing her potential. Such learning can also be designed through contextual learning based on local excellence [15].

Increased interest in student entrepreneurship encourages students to be creative in managing information into products or services, such as knowledge of bio-entrepreneurship, namely knowledge about the application of biological products from scientific research into products that can be marketed into new products that have high selling value. Winkel said that interest is interpreted as the tendency of settled subjects to be interested in a particular field of study or subject and feel happy studying the material [16].

Biology is a natural science that studies about living organisms and their interactions with the environment. Biology is the study of so broad a branch biology is formed to make it easy to learn. Where every branch of biology has the characteristics to be developed as a business opportunity for biology students and biology education. This business opportunity can be developed according to your interests and student creativity and also in accordance with the times [17].

Such as tempeh and tempe nuggets. Tempe is a typical Indonesian food that can be processed into a variety of preparations can be directly fried, in vegetables or even sauteed while tempe nuggets are the development of a variety of food products made from tempeh. Products that have the potential to sell on the market will stimulate students to be interested in making more products. Because that great interest can arise from the success of what they get. They can get a substantial profit if their skills support as enterpreneur. Making these biological products is done in the classroom through entrepreneurship lessons.

The making of biological products is carried out because many biological research results have not been published and have not been mass-produced as scientific products that are very beneficial to society. There are many research results from Indonesian scientists, but only a few have been successfully marketed. Bioentrepreneurship is a bridge that will connect scientists and the results of their research with the commercial world. Through learning bioentrepreneurs at this school, it is expected to be able to encourage madrasah aliyah students in the Darus Sholihin Depok Islamic boarding school to increase students' interest in developing entrepreneurial activities especially through biological products. Learning Innovation through bioentrepreneurship is designed for students who want to learn to identify, create new entrepreneurial opportunities and innovations in biotechnology products or services with a global impact. Takdir states that entrepreneurs are one who shifts economic resources from lower regions and into areas of higher productivity and greater yields [18].

Learning innovation is a novelty in the teaching and learning process wherein learning is emphasized in increasing life skills and entrepreneurship [19]. Life skill based learning because in quality and quantity of education the Indonesian population is not only seen from the results of tests or national exams or even GPA, but when entering the workforce what is needed is skill. This is a challenge for the world of education in preparing the nation's children in facing the AEC. Then entrepreneurship-based learning is a problem of the difficult world of work so the job seeker paradigm must be changed to be a job creator.

Biology Learning Innovation is learning that uses a bioentrepreneurship inquiry learning model where students gain their own experience by practicing making biotechnology products such as skilled making tempe, yogurt, nata de coco, and other products and then makes an analysis of their business so that they can inspire students to become entrepreneurs by the skills he has in making products especially biotechnology products. Learning innovation is novelty in the teaching and learning process wherein the learning is emphasized on increasing life skills and entrepreneurship [20].

Life skill based learning because in quality and quantity of education the Indonesian population is not only seen from the results of tests or national exams or even GPA, but when entering the workforce what is needed is skill. This is a challenge for the world of education in preparing the nation's children in facing the AEC. Then entrepreneurship-based learning is a problem of the difficult world of work so the job seeker paradigm must be changed to be a job creator. Innovative learning strategies can make it easier to achieve learning competence, being able to attract and arouse student motivation in learning [21].

2. RESEARCH METHOD

The development of bioentrepreneurship-oriented learning with temped products and tempeh nuggets was then tested in the experimental class. Data was taken by observation, questionnaire and test. The method of data analysis uses descriptive analysis of the percentage of entrepreneurial interest scores and then analyzed by paired samples test. This research is development research using research and development (R & D) design [22].

This study develops an entrepreneurial learning tool with a bioentrepreneurship approach and then implements the tools that have been developed in the process of learning entrepreneurship in the classroom to increase the entrepreneurial interest of the students of the Islamic Senior High School. This research was carried out, namely in the Madrasah Aliyah Islamic Boarding School Darus Sholihin Sawangan Depok. Population of students in Class XI of Madrasah Aliyah Islamic Boarding School in Darus Sholihin Sawangan Depok as many as 25 students (thirty). Variables in the study are as follows: 1) Independent variable: Entrepreneurship learning with the Bioentrepreneurship approach. 2) The second dependent variable is the entrepreneurial interest of students of the Aliyah Islamic Boarding School in Darus Sholihin Islamic Boarding School.

Data obtained from observations at the time the experiment took place were grouped based on aspects of entrepreneurial interest studied, calculated based on actions taken by each student with a score of 5 (excellent), 4 (Good), 3 (Enough), 2 (Less), 1 (Less), then calculated the frequency of actions taken by students according to existing criteria, then made a percentage of scoring. The answers to each indicator of entrepreneurial interest are adjusted to the standardization of answers determined by the researcher. Questionnaire for student responses, Questionnaire responses of students and teachers were analyzed by calculating the percentage of questionnaire scoring from the statement of positive and negative questionnaires and To find out the magnitude of the increase in entrepreneurial interest, a paired t-test was conducted.

3. RESULTS AND ANALYSIS

The results of research on biology learning innovation with bioenterpreneurship in Aliyah Darus Sholihin Madrasah Sawangan Depok Bedahan before and after treatment obtained the following data. From the results of the descriptive data calculation using SPSS 20, it was found that the interest in entrepreneurship before and after treatment using the bioenterpreneurship learning approach has increased, as shown in Table 1 this can be seen from the increase in the maximum value before and after treatment that is equal to 11 points. Furthermore, the mean value or average response of respondents after treatment is from 120.28 to 128.64. This indicates that the respondents' entrepreneurial interest is in the good category with a standard deviation of 11.024 and 12.44.

Table 1. Descriptive analysis interest in entrepreneurship

		Statistics	
		Before	After
N	Valid	25	25
	Missing	0	0
Mean		120.2800	128.6400
Median		120.0000	130.0000
Std. Deviation		11.24544	12.44280
Variance		126.460	154.823
Minimum		98.00	109.00
Maximum		147.00	152.00

3.1. Test the normality of entrepreneurship interest

To find out whether the sample is from a normally distributed population or not, a normality test is performed using the one sample kolmogorov-Smirnov Test. Based on the results of calculations on the normality test of interest in entrepreneurship, illustrated in Table 2, it is known that the value of Asymp. Sig (2-Tailed) $0.960 > 0.05$ and $0.947 > 0.05$ this means that the interest in entrepreneurship samples originates from a population with normal distribution.

Table 2. Test for the normality of interest in entrepreneurship

		One-Sample Kolmogorov-Smirnov Test		
		Before	After	
N		25	25	
	Normal Parameters ^{a,b}	Mean	120.2800	128.6400
		Std. Deviation	11.24544	12.44280
Most Extreme Differences		Absolute	0.101	0.105
		Positive	0.101	0.105
		Negative	-0.090	-0.091
Kolmogorov-Smirnov Z		0.507	0.524	
Asymp. Sig. (2-tailed)		0.960	0.947	

a. Test distribution is Normal

3.2. Test the homogeneity of interest in entrepreneurship

From the homogeneity test, shown in Table 3, the significance value of the interest in entrepreneurship was obtained based on data before and after the application of bio-entrepreneurship learning at $0.667 > 0.05$, which means that the interest in entrepreneurship before and after the application of bio-entrepreneurship learning has the same or homogeneous variant.

Table 3. Test of Homogeneity in entrepreneurship Interests

Test of homogeneity of variances			
Minat	df1	df2	Sig.
Levene Statistic	1	48	0.667

3.3. Testing of paired sample T-Test

From the Paired Samples Test in Table 4 we can know that the sig value. (2-tailed) is 0.008. This means that the value is smaller than 0.05 ($\alpha = 5\%$). So it can be concluded that there are differences in interest in entrepreneurship before and after the use of bio-entrepreneurship learning methods. This shows that there is an effect of using bioentrepreneurship learning in increasing student entrepreneurship interest.

Table 4. Testing of paired sample T-Test

		Paired Sample Test					t	df	Sig. (2-tailed)
		Paired Difference			95% Confidence Interval of the Difference				
Pair	Before-After	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
1		8.36000	14.45649	2.89130	-14.32734	-2.39266	-2.891	24	0.008

Increased Interest in Entrepreneurship before and after the application of bio-entrepreneurship learning Bioentrepreneurship is a learning approach that integrates biological concepts with entrepreneurship. Based on the results of the study, it was found that bio-entrepreneurship was able to provide a good contribution in the learning process. Likewise, bio-entrepreneurship is able to provide positive results towards an increase in interest in student entrepreneurship. From this study it was found that the average value of interest in entrepreneurship increased from 120.28 to 128.64 before and after the application of the bio-entrepreneurship learning method.

Based on the results of the comparative hypothesis test with the Paired Samples Test get the sig value. (2-tailed) is 0.008 < 0.05 ($\alpha = 5\%$). So it can be concluded that there are differences in interest in entrepreneurship before and after the use of bio-entrepreneurship learning methods. This shows that there is an effect of using bioentrepreneurship learning in increasing student entrepreneurship interest. Kristanti's research, stated that based on the results of field trials using the biopreneurship learning approach, this learning device was effectively used in learning activities because of the completeness of student achievement and learning activities in the two experimental classes > 75%. Students' entrepreneurial interests reached 91% and 94%, and students' entrepreneurial attitudes reached 82% and 92% [23]. Based on these results it can be concluded that bioentrepreneurship-based learning devices are effectively applied in learning activities and can increase students' entrepreneurial interests and attitudes.

Increased interest before and after learning has increased because students before learning the students do not know the learning that is done, but after learning is carried out the students know the learning well, namely with biopreneurship. Because that interest will arise when someone has experienced success or success in doing something. Student Response Regarding the Application of Bioenterreneurship Learning. Before learning the number of students who strongly agreed was 8 people, agreed 15 people and did not agree with 2 people, as illustrated in Figure 1. Students' responses before getting learning are more likely to agree, because students feel curious about the learning they will receive.

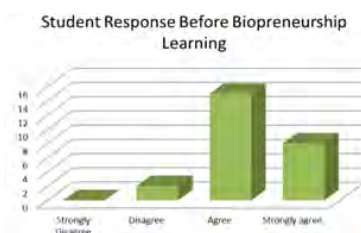


Figure 1. Student response before biopreneurship learning

In the process of implementing bio-entrepreneurship learning, all students were very motivated in following it. It can be seen from the enthusiasm and enthusiasm of students in the implementation of learning. After implementing the learning process, the researcher asks for responses to all students related to the use of bio-entrepreneurship learning. The results of the response after participating in the biopreneurship learning activities experienced an increase, namely from students who strongly agreed to choose 8 people before the activity became 14 people who chose this learning approach and agreed. The results of the study show learning by using an approach bioentrepreneurship through lesson study oriented towards effective community learning on the creativity of student products. This shows that classically, class control obtained an average value of 64.4 which had the criteria of "Quite Creative" whereas the experimental class got an average value of 80 which is in the criterion "Very Creative" [24].

Related to the results above, as well as research on high school students by Aqil and friends who stated the results of the application of learning with bioentrepreneurship can increase entrepreneurial interest and life skills of vocational students [25]. According to research Ersanghono k., Nanik Wijayati [26] which concludes that Chemoentrepreneurship-oriented learning can improve the life skills of chemistry students. [26] This was also done by research Aqil, et al [27] stated that there was an increase in students interest in entrepreneurship and life skills before and after the application of bioentrepreneurship learning [27]. As a result of Prihatiningrum research biopreneurship had a positive effect on improving biology learning achievement, creativity, and entrepreneurial interest. biopreneurship was also suitable for biology learning to increase learning achievement, creativity, and entrepreneurial interest [28] and Bioentrepreneurship learning is a learning process that emphasizes learning by making use of the surrounding environment and equipping students to create valuable products sell and do economic analysis so learning is more meaningful and enjoyable Bioentrepreneurship shows the average student response questionnaire as a whole including good criteria. This proves that the application of learning Bioentrepreneurship received a positive response [29]

Student approval of this learning can be seen from the implementation of learning activities that are so cheerful with serious attention and trying to make products with their own hands, so that they get new experiences and even new skills in making products. The results of Khotimah and friends research with biopreneurship learning on pisces sub material are student activities have increased, there are differences in student learning outcomes that increase significantly between the experimental and control classes and students respond positively to learning bioentrepreneurship [30]. Student response after biopreneurship learning illustrated in Figure 2.

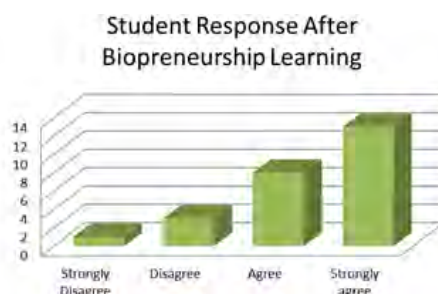


Figure 2. Student response after biopreneurship learning

4. CONCLUSION

From the results of the study it can be concluded that there was an increase in interest in entrepreneurship before and after the application of bioentrepreneurship learning in Aliyah Madrasah Darus Sholihin Depok. Based on the results of the comparative hypothesis test with the Paired Samples Test get the sig value. (2-tailed) is $0.008 < 0.05$ ($\alpha = 5\%$). So it can be concluded that there are differences in interest in entrepreneurship before and after the use of bio-entrepreneurship learning methods. This shows that there is an effect of using bioentrepreneurship learning in increasing student entrepreneurship interest.

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REFERENCES

- [1] Satria Kartika Yudha, "BNI Syariah for Empowering Micro Small and Medium Enterprises (in Bahasa)," *Republika*, Dec 07, 2016. [Online]. Available: <https://republika.co.id/berita/koran/syariah-koran/ohtak110/bni-syariah-memberdayakan-umkm>. [Accessed Mei 07, 2019]
- [2] Muhyidin, "The development of pesantren in indonesia seems in a good condition (in Bahasa)," *Republika*, Nov 30, 2017, [Online]. Available: <https://www.republika.co.id/berita/dunia-islam/islam-nusantara/17/11/30/p088lk396-pertumbuhan-pesantren-di-indonesia-dinilai-menakjubkan>, [Accessed 07 Mei 2019]
- [3] Fauzan, "Jusuf Kalla: Pesantren graduated students should not have an intention to become a government employe (in Bahasa)," *Liputan 6*, Oct 29, 2018. [Online]. Available: <https://www.liputan6.com/news/read/3143991/jusuf-kalla-lulusan-pesantren-jangan-berharap-jadi-pns>. [Accessed Mei 08, 2019].
- [4] Badan Pusat Statistik, " Unemployment rate happens at 3.15%, avarege monthly labor wages at 2.65 millions rupiah (in bahasa)," *Badan Pusat Statistik*, 2018, <https://www.bps.go.id/pressrelease/2018/05/07/1484/februari-2018--tingkat-pengangguran-terbuka--tpt--sebesar-5-13-persen--rata-rata-upah-buruh-per-bulan-sebesar-2-65-juta-rupiah.html>,
- [5] Sodiq, A. "Entrepreneurship through Science and Science Learning on Optimaling Human Resources: Implementation Lessons Learnt at Faculty of Animal Husbandry Universitas Jendral Soedirman (in Bahasa)," *Prosiding Seminar Nasional entrepreneurship*. ISBN:978-602-8047-99-9. 2014.
- [6] Syah, Muhibbin, *Psychology of Learning (in Bahasa)*, Jakarta: Rajawali Pres. 2015.
- [7] Aqil, D. I. "Science Literacy as A Concept of Learning Biology Textbook at School of Thought Journals, Educational Research and Science (in Bahasa)," *Wacana didaktika*, vol. 5, no. 2, Dec 2017. [Online]. Available: <http://journal.uim.ac.id/index.php/wacanadidaktika>
- [8] Susanto, Ahmad. *Learning Theory and Learning Process at Elementary School (in Bahasa)*, Jakarta: Kencana Media Group, 2013.
- [9] Sole and Anggraeni. D. M. "Inovation in Electronic Learning Process and Challenges Faced by Teachers at 21st Century (in Bahasa)," *Jurnal Penelitian dan Pengkajian Ilmu Pendidikan*: e-Saintika e-ISSN 2615-6881, vol. 2, no. 1, pp. 10-18, Dec 2018
- [10] Slameto, *Learning and its Affected Factor (in Bahasa)*, Jakarta: Rineka Cipta.2015.
- [11] Lelono, Wibi Tegar and Saptorini Saptorini, "Skill Improvement of Student's Chemo-Enterpreneurship through Application of Life Skill Oriented Colloid Concepts (in Bahasa)," *Jurnal Inovasi Pendidikan Kimia*, Universitas Negeri Semarang. 2016. [Online]. Available: <https://journal.unnes.ac.id/nju/index.php/JIPK/article/view/4812>
- [12] Fitriah, Eka. "Implementing Bioenterpreneurship on Biology Learning to Increase Life Skills and Student's Interest in Enterpreneurship at Madrasah Aliyah based on Islamic Boarding School In Cirebon (in Bahasa)," *Jurnal Scientiae Educatia*, vol. 2, no. 1. IAIN Syekh Nurjati Cirebon, 2013.
- [13] Roini, Chumidach. "Empowering Student Biology Major's Enterpreneurship Potention through Contextual Learning based Local Wisdom (in Bahasa)," *Prosiding Seminar Nasional Biotik 2016* ISBN: 978-602-18962-9-7, vol. 3, no. 1, 2016.
- [14] P.C. Naga Subramani and V. Iyappan. "Inovative Methods of Teaching and Learning," *Journal of Applied and Advanced Research*. 3 (Suppl. 1) S20-S22. 2018.
- [15] D. Kalyani & K. Rajasekaran. "Innovative Teaching and Learning," *Journal of Applied and Advanced Research*, 3(Suppl. 1) S23-S25. 2018.
- [16] Winkel, *Learn and Learing Proccess (in Bahasa)*, Jakarta: PT. Raja Grafindo.2011.
- [17] Afriadi, R., Yuni, R., and Medan, U. N. "Developing Student Biology Major's Bioenterpreneurship (in bahasa)," *Jurnal Biolokus*, vol. 1, no. 2, pp. 123–127, 2018.
- [18] Takdir., et al., *Enterpreneurship (in Bahasa)*, Wijaya Mahadi Karya. Yogyakarta. 2016.
- [19] Widiasworo, *Learning Inovation Life Skill based and Enterpreneurship based (in Bahasa)*, Yogyakarta: Arruz Media, 2017.
- [20] Dalyono, Bambang, "Inovative Learning Strategy to Achive Learning Competency (in bahasa)," *Prosiding Temu Ilmiah Nasional Guru VIII Universitas Terbuka Convention Center*, Nov 2016.
- [21] Widyastuti and Monika, "Empowering Adolescent Orphanages through The Making of Nuggets in order to Foster Interest in Enterpreneurship (in Bahasa)," *J-Abdimas*, vol. 1, no. 1, pp. 118-125, 2017.
- [22] Sukmadinata, N.S., *Education Research Method (in Bahasa)*, PT Remaja Rosda Karya, Bandung. 2017.
- [23] Kristanti, E. A., et al., "Developing Learning Media Biopreneurship, Manufacturing Food From Soybean Processing Liquid Waste (in Bahasa)," *Journal of Innovative Science Education*, Universitas Negeri Semarang, vol. 1, no. 2, 2012. [Online]. Available: <https://journal.unnes.ac.id/sju/index.php/jise/article/view/633>. 2012.
- [24] Vira agustin sintaresmi, Ieko retno mulyaningrum. "Effectify Bioenterpreneurship Approach towards Student Product Creativity on Waste Material Recycling through Lesson Study Learning Community Oriented (in Bahasa)," *Prosiding Semnas sains & entrepreneurship*, Agu 2017.
- [25] Aqil, D.I. et al., "Increasing Life Skill and Vocational hHigh School Students Interest at Enterpreneurship through Bioenterpreneurship (in Bahasa)," *Jurnal Pemberdayaan Masyarakat Madani*, vol. 3, no. 1, pp. 33 — 47, 2019.
- [26] Ersanghono, K and Nanik Wijayati, K. S. F. " Improving Life Skills in Chemistry-Oriented Students Through STAD Cooperative Learning (in Bahasa)," *Jurnal Penelitian Pendidikan*, vol. 29, pp. 113–120, 2011.
- [27] Aqil, D.I., et al., "Implementing Bioenterpreneurship Learning to Increase Vocational High School Student's Life Skill and Interest at Enterpreneurship (in Bahasa)," *Jurnal Inspirasi Pendidikan*, vol. 9, no. 2. 2019.

- [28] Ratnasari, D.W, Endang, Muspiro, " Implementing Bioenterpreneurship Learning to Increase Student's Learning Outcomes on Sub Subject Gymnosperms of Class X at 1 Ciwaringin Senior High School (in Bahasa)," *scientiae educatia: jurnal sains dan pendidikan sains*, vol. 5, no. 1, pp. 48-60, 2016. [Online]. Available: www.syekhnrjati.ac.id/jurnal/index.php/sceducatia
- [29] Prihatiningrum, P., S. M. Endang, Susilowati, Prasetyo, "Effect of Bioentrepreneurship on Biology Learning Achievement, Creativity, and Entrepreneurial Interest," *Journal of Innovative Science Education*, vol. 9, no. 3, pp. 250 – 259, 2020.
- [30] Khotimah, K., *et al.*, "Implementing Bioenterpreneurship Learning on Pisces Sub Concept to Increase Student of Class X learning Outcomes at 1 Plumbon Senior High School (in Bahasa)," *Scientiae Educatia: Jurnal Sains dan Pendidikan Sains*, IAIN Syekh Nurjati Cirebon, vol. 5, no. 1, pp. 39-47, 2016. [Online]. Available: <https://www.syekhnrjati.ac.id/jurnal/index.php/sceducatia/article/viewFile/978/870>

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