JPPIPA 9(5) (2023)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Problem Based Learning: Implementation of Bioentrepreneurship Learning to Increase Student Interest in Biotechnology Materials

Slamet Santosa[1*], Dewi Puspita Sari[1], Chanafia Yusfi Chotimah[1], Sukamti[2]

[1] Biology Education, Faculty of Teacher Training and Education, Sebelas Maret University, Indonesia.
[2] Sukamti, Biology Education, SMAN 1 Teras Boyolali, Indonesia.

Received: September 27, 2022
Revised: May 19, 2023
Accepted: May 26, 2023
Published: May 31, 2023

Corresponding Author:
Slamet Santosa
slametsantosa@staff.uns.ac.id

DOI: 10.29303/jppipa.v9i5.2198

Abstract: The purpose of this study is to increase the interest in learning students. This research is a Classroom Action Research that is carried out in two cycles. Each cycle has four stages which include planning, implementation, observation, and reflection. The subjects of this study were students of class XII MIPA 3 which totaled 29 students. Data sources are obtained from teachers and learners by observation, interviews, and documentation. The triangulation method is used to validate the data and analyze the data using qualitative descriptive techniques. The results showed that student's interest in learning increased from pre-action to cycle II. Indicators of feelings of pleasure and interest in learning increased by 21.55% from pre-action to cycle II, indicators there was active participation increased by 25.00% from pre-action to cycle II, indicators there was a tendency to pay attention and great concentration power increased by 22.50% from pre-action to cycle II, indicators had positive feelings and a willingness to learn that always increased by 26.74% from pre-action to cycle II. Based on the research that has been carried out, it can be concluded that problem-based bio-entrepreneurship learning can increase the interest in learning students XII MIPA 3 on biotechnology materials.

Keywords: Bioentrepreneurship; Biotechnology; CAR

Introduction

Education in Indonesia has implemented the 2013 Curriculum with the aim of solving problems that are present in the world of education. Permendikbud No. 22 of 2016 states that the learning process is held interactively, inspiringly, fun, challenging, motivating students to participate actively, providing sufficient space for initiative, creativity, and independence according to the interests of talents and physical and psychological development of students in order to create quality students. The 2013 curriculum is expected to be able to change the mindset of education patterns in schools (Rohiat et al., 2017).

The implementation of the 2013 Curriculum based on character and competence is required to include all existing components including components in the education system, including the curriculum, learning plans, learning processes, assessment mechanisms, quality of relationships, learning management, school management, implementation of student self-development, empowerment of infrastructure, financing, and work ethic of all residents and the school environment (Djumali et al., 2018).

Education means an effort with the aim of changing the mindset of human beings in order to be able to solve existing problems (Schroder et al., 2017). This is supported by the statement Haryanti (2017) that education not only requires students to master and understand the material but also has cognitive and social abilities to solve existing problems (Schroder et al., 2017).

Bioentrepreneurship is a branch of biology that integrates biology and business science by involving all aspects of living things according to (Afriadi et al., 2018; Sisnodo, 2015). Bioentrepreneurship also means utilizing local living things to be processed into business

How to Cite:
Santosa, S., Sari, D.P., Chotimah, C.Y., & Sukamti, S. (2023). Problem Based Learning: Implementation of Bioentrepreneurship Learning to Increase Student Interest in Biotechnology Materials. *Jurnal Penelitian Pendidikan IPA*, *9*(5), 2670–2676. https://doi.org/10.29303/jppipa.v9i5.2198

products and then marketed so as to produce a productive economy (Muliadi et al., 2021). Bioentrepreneurship is not only important for the technology economy (Aqil et al., 2019; Ningsih, 2017) and business creation but also much needed for a career in biomedical including academic sciences (Hayati et al., 2021).

Entrepreneurship-based biology learning can provide students with real skills and experience for entrepreneurship by utilizing living things that are around. Entrepreneurship can be developed by creating biological products in biotechnology learning. Learning applied biology such as biotechnology should be taught contextually and applicatively by utilizing existing living things and natural resources wisely (Muliadi et al., 2021).

The application of bioentrepreneurship learning in Biology subjects makes students able to learn the process of processing materials into useful products, selling points, and fostering interest in learning (Pratama et al., 2018). Bioentrepreneurial learning is carried out in a real way by utilizing the surrounding environment and equipping students to process a product so that learning is more meaningful and fun and able to increase student interest in learning (Muliadi et al., 2021).

Students' high interest in learning makes students feel happy following the learning process and are able to direct themselves to follow the learning process well (Ginanjar et al., 2015; Soraya, 2015). Interest has a major influence on learning because student interest can determine the degree of activity, if the learning material being studied does not match student interests, students will not study seriously (Herlina et al., 2020).

High interest in learning students in learning makes students feel happy to follow the learning process and are able to direct themselves to follow the learning process well. Interest has a big influence on learning because the interest of students can determine the degree of activity, if the learning material learned does not match the interests of students, then students will not study seriously (Schroder et al., 2017).

The process of learning biology is not just memorizing principles or theories but rather training students' process skills based on the facts around them. Learning models that involve students actively are needed in learning activities to find or apply their own ideas to utilize local materials (Muliadi et al., 2021).

In learning in this era, the teacher is not the only source of learning for students, in the 2013 Curriculum the teacher also acts as a facilitator and students play an active role in the learning process. The learning process requires the right learning resources so that students can attract interest and can understand the material well (Lin et al., 2016). There are many sources of learning, along with the development of existing technology, students can learn it independently, one of which is by paying attention to the conditions of the surrounding environment.

The PBL model is a model that focuses on certain topics (Bakhri et al., 2017). The purpose of this model is to study content, processability, problem solving, and study real-world problems (Khoiriyah et al., 2018; Pratama et al., 2018). The application of the PBL model is designed with the aim of encouraging students to become researchers, analysts, and innovators. The PBL model can help encourage students to think and work, not just memorize and retell and foster student learning motivation by solving problems around them (Sirait, 2016; Uliyandari et al., 2021).

The selection of material because biotechnology material is difficult for students to understand in theory just because it involves a lot of real life that students must practice. In learning biotechnology, the teacher only conveys existing material by means of lectures and is not yet contextual or solving local biotechnology problems. The addition of the latest biotechnology material, namely the utilization of chicken bone waste and Sargassum sp as shrimp feed, needs to be given to students. This material is used as a PBL learning model because with this learning model students not only learn theory but also solve problems (Herlinda, 2020), but can directly utilize what is around them and can increase student learning interest (Nurhasanah et al., 2016; Odeh, 2021).

Method

Classroom Action Research

This research was conducted in July 2022. The research method used is descriptive qualitative which describes existing data, facts, and circumstances. The beginning of action research is to systematically examine the problem. The results of the study are the basis for formulating actions to overcome existing problems. The main steps taken in this study are determining the focus of the problem, action planning, implementing actions, collecting data (observation), reflection, and follow-up planning.

Population and Samples

The population of this study was all students of SMAN 1 Teras Boyolali class XII MIPA. The research sample was 29 students of class XII MIPA 3 SMAN 1 Teras Boyolali. Sample selection is based on purposive sampling.

Instruments

Instruments from this study include observation sheets, questionnaires of students' learning interests, interviews, and documentation. Observation sheets are used to determine the learning interests of students during biotechnology learning. The questionnaire of

students' learning interests was given to students of class XII MIPA 3 SMAN 1 Teras Boyolali after getting PBL-based bio-entrepreneurship learning to find out students' learning interests in biotechnology materials. Interview instruments are given to teachers and learners to find out their opinions regarding bioentrepreneurship. The documents needed in this study are in the form of documentation at the time of biotechnology learning.

Procedure

The procedures and steps in carrying out the actions in this study used a model developed by Kemmis (1998) in the form of a spiral model. The spiral system of self-reflection begins with plans, actions, observations, and reflections. Observations were carried out to get an initial picture of SMA Negeri 1 Teras Boyolali as a whole and the state of teaching and learning activities in class XII MIPA. The action planning stage in this study was carried out using the Problem Based Learning model. The implementation of the actions taken is the implementation of problem based bioentrepreneuship learning that has been prepared. Observation and evaluation are carried out during learning activities. Reflection is used to correct deficiencies for use in later cycles.

Data Analysis Techniques

Data analysis in this study began from the beginning until the end of data collection. The analysis carried out is in the form of an assessment of all data on research activities that have been carried out in the field. Qualitative analysis techniques refer to analytical models Milles (1984) that are implemented in three sequential components: data reduction, data presentation, and conclusions.

Result and Discussion

The research was carried out at SMA Negeri 1 Teras Boyolali in class XII MIPA 3 which consisted of 29 students. Pre-action data is obtained by conducting interviews with teachers and students who are the subject of the study. Biotechnology learning in class XII MIPA 3 SMA Negeri 1 Teras is carried out by the teacher providing an explanation of the material in the package book and students only listen to the teacher's description. The examples of biotechnology products presented have not been enriched from year to year so students' thoughts on biotechnology are not interesting. The motivation offered in biotechnology learning is also less attractive so students' interest in studying biotechnology material is less.

The results of the interview also showed that practicum activities and discussions are rarely carried out, making biotechnology learning less interesting and students bored due to a lack of physical and psychic involvement. Students very rarely apply and apply biotechnology in real life, as Muliadi et al. (2021) argues. Learners very rarely apply and apply biotechnology in real life. The results of the observation of learners' learning interest in pre-action biotechnology learning are presented in Table 1.

Table 1. Observation Results of Students Interest in Pre-Action Biotechnology Materials

Indicators	Achievements (%)
Happy and interested in learning	67.89
Active participation	54.89
Have tendency to pay attention and large concentration power	52.87
Have a positive feeling and an ever-increasing willingness to learn	50.57
Average	56.56

Based on Table 1, it is known that the percentage of students learning interest in biotechnology material class XII MIPA 3 has an average achievement of 56.56%. The lowest percentage was found in the indicator of having positive feelings and willingness to learn which always increased by 50.57%, while the highest percentage was found in feelings of pleasure and interest in learning at 67.89%. Pre-action achievements show that students' interest in learning is sufficient and needs to be increased. The application of entrepreneurship-based biotechnology by paying attention to problems in the surrounding environment is one way to attract students' interest in learning biotechnology materials. A PBL learning model that orients hands-on experience to learning will make biotechnology learning more meaningful.

Cycle I action consists of four stages, including planning, implementation, observation and evaluation, and reflection. Planning is carried out in collaboration with biology teachers including identifying the problem of students' lack of interest in learning biotechnology and analyzing its causes. The identification carried out results in the determination of alternatives by providing additional examples of the latest biotechnology and entrepreneurship-based biotechnology by paying attention to the surrounding environment (Muliadi et al., 2021).

Observation of students' learning interests is carried out during learning with the help of 2 observers. The percentage of students' learning interest in biotechnology material class XII MIPA 3 SMA Negeri 1 Teras Boyolali with the PBL model in cycle I is presented in Table 2. Table 2 shows that the percentage of student's interest in learning in biotechnology material class XII MIPA 3 cycle I have an average achievement of 65.81%. The lowest percentage found in the indicator there is active participation at 56.32%,

while the highest percentage is found in feelings of interest and enjoyment of learning at 83.62%.

Table 2. Observation Results of Students Interest in Biotechnology Material Cycle I

Indicator	Achievements (%)
Happy and interested in learning	83.62
Active participation	56.32
Have tendency to pay attention and large concentration power	63.51
Have a positive feeling and an ever-increasing willingness to learn	59.77
Average	65.81

The achievement of students' interest in learning in the first cycle has increased by 9.25% from the pre-action achievement. The average interest in learning of students in cycle I of 65.81% shows that student's interest in learning has increased in biotechnology materials for class XII MIPA 3 and is included in the high category (Aulia et al., 2021).

Based on the results of actions in cycle I, findings and suggestions for improving learning in cycle I. Findings obtained in cycle I have not reached the specified target due to several factors. Factors that affect the results of actions in cycle I am used as reflections and used as the basis for planning cycle II.

Cycle II action planning is prepared based on the results of the reflection of the cycle I which includes learning tools and research tools. The implementation of cycle II actions is carried out by applying the Problem Based Learning (PBL) model. The percentage of students' learning interest in biotechnology material class XII MIPA 3 SMA Negeri 1 Teras Boyolali with the PBL model in cycle II is presented in Table 3.

Table 3. Observation Results of Students Interest on Biotechnology Materials

Indicator	Achievements (%)
Happy and interested in learning	89.44
Active participation	79.89
Have tendency to pay attention and large concentration power	75.43
Have a positive feeling and an ever-increasing willingness to learn	77.30
Average	80.52

Table 3 shows that the percentage of student's interest in learning in biotechnology material class XII MIPA 3 has an average achievement of 80.52%. The lowest percentage was found in the indicators, including a tendency to pay attention and large concentration power of 75.43%, while the highest percentage was found in feelings of interest and enjoyment of learning at 89.44%.

The achievement of student learning interest in cycle II has increased by 14.71% from the achievement of the cycle I. The average interest in learning of students in cycle II of 80.52% indicates that students' interest in biotechnology material in class XII MIPA 3 is included in the very high category (Aulia et al., 2021). The achievement of learners' learning interest in each indicator in pre-action, cycle I action, and cycle II action is found in Figure 1.

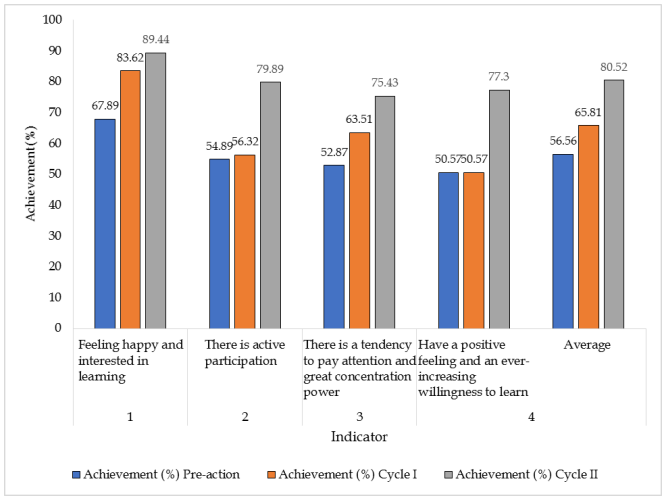

Figure 1. Achievement of student interest in each indicator (Pre-action, Cycle I, and Cycle II)

Figure 1 shows the results of learners' learning interest achievements in each indicator in pre-action, cycle I, and cycle II. Indicators of feelings of pleasure and interest in learning have increased from each cycle. Pre-action has an achievement of 67.89%, cycle I have an achievement of 83.62%, and cycle II has an achievement of 89.44%. Indicators of active participation have increased from each cycle. Pre-action has an achievement of 54.89%, cycle I have an achievement of 56.32%, and cycle II has an achievement of 79.89%.

Indicators have a tendency to pay attention and the power of large concentrations increases with each cycle. Pre-action has an achievement of 52.87%, cycle I have an achievement of 63.51%, and cycle II has an achievement of 75.43%. Indicators have positive feelings and a willingness to learn that is always increasing from each cycle. Pre-action has an achievement of 50.57%, cycle I have an achievement of 59.77%, and cycle II has an achievement of 77.30%. Students who experienced significant continuous improvement from pre-action to cycle II were students with number 28. The total increase from pre-action to cycle II can be seen in Table 4.

Table 4 shows the total increase in the percentage of achievement of indicators of learners' interest in biotechnology learning. The total increase in indicators of feelings of pleasure and interest in learning was 21.55%, indicators there was active participation of 25.00%, indicators there was a tendency to pay attention and great concentration power of 22.56% and indicators had positive feelings and willingness to learn which always increased by 26.74%. Data on the total increase in

the achievement of student interest indicators from pre-action to cycle II shows that all indicators of student interest in learning have increased according to the predetermined target of 20%.

Table 4. Total Percentage Increase in Learning Interest Achievement

Indicator	Pre-action (%)	Cycle I (%)	Cycle II (%)	Total Boost	Target (%)	Information
Happy and interested in learning	67.89	83.62	89.44	21.55	20	Achieved
Active participation	54.89	56.32	79.89	25.00	20	Achieved
Have tendency to pay attention and large concentration power	52.87	63.51	75.43	22.56	20	Achieved
Have a positive feeling and an ever-increasing willingness to learn	50.56	65.81	77.30	26.74	20	Achieved

Students' interest in learning has increased during PBL-based bio-entrepreneurship learning actions. The increase in student interest in learning shows that PBL-based bio-entrepreneurship learning has a positive impact on the learning process (Ernawati et al., 2020).

The results of teacher interviews show that PBL-based bioentrepreneuship learning is very helpful in attracting the attention of students in biotechnology learning. Students are enthusiastic about participating in learning, active in asking questions, and enthusiastic in carrying out shrimp pellet-making practices. The positive impact is obtained from PBL-based bioentrepreneuship learning so that the class becomes livelier because students are very enthusiastic about asking about things about shrimp pellets with chicken bone base and *Sargassum* sp.

The results of student interviews show that PBL-based bioentrepreneuship learning is very interesting because it is related to daily life. The practicum of making shrimp pellets can add insight to students and attract attention because by using ingredients in the surrounding environment that were not thought of before, namely chicken bones, it turns out that it can be used as a product that has a high selling value. The implementation of the shrimp pellet-making practicum makes learning more meaningful and easier to understand. The material delivered vigorously by the teacher makes learning more enjoyable.

The results of observing students' interest in learning in biotechnology material were complemented by data on interest in learning questionnaires which were filled out individually by students, this is in line with the opinion of (Septiani et al., 2020). The learning interest questionnaire consists of five indicators covering 26 questions with details of 16 positive questions and 10 negative questions. The results of the student learning interest questionnaire can be seen in Table 5. Table 5 shows that the average interest in learning learners based on the learning interest questionnaire is 83.05%, while the average student interest in learning carried out by observers has an average of 80.52%.

Table 5. Results of Students Interest Questionnaire on Biotechnology Materials

Indicator	Achievements (%)
Happy and interested in learning	83.62
Active participation	81.90
Have tendency to pay attention and great concentration power	80.89
Have a positive feeling and an ever-increasing willingness to learn	77.9
Convenience while studying	90.95
Average	83.05

Based on the above presentation on PBL-based bio-entrepreneurship learning on students' interest in learning biotechnology materials, it can be concluded that there is an increase in students' interest in learning biotechnology materials through the implementation of PBL-based bio-entrepreneurship learning in class XII MIPA 3 students of SMA Negeri 1 Teras Boyolali for the 2022/2023 academic year.

Conclusion

Based on the research that has been carried out, it can be concluded that problem-based bio-entrepreneurship learning (PBL) can increase the interest in learning students XII MIPA 3 SMA Negeri 1 Teras Boyolali on biotechnology materials. The average results of the observation of students' interest in learning in pre-action were 56.56%, in the first cycle of 65.81%, it increased to 80.52% in cycle II with an excellent category.

Acknowledgments

In writing this scientific article, we thank the Director General of Higher Education of the Ministry of Education and Culture and our supervisors Dr. Slamet Santosa and Dewi Puspita Sari, S.Pd., M.Sc. as well as biology teachers who have provided opportunities to carry out research.

Author Contributions

Slamet Santosa and Dewi Puspita Sari conceptualized the research idea, designed of methodology, analyzed data, management, and coordination responsibility. Chanafia Yusfi Chotimah and Sukamti conducted a research and investigation process, literature review, and provided critical feedback on the manuscript. All authors read and approved the final version of the manuscript.

Funding
This research was independently funded by the researchers involved.

Conflicts of Interest
The authors declare no conflict of interest. The funders had role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of manuscripts; or in the decision to publish the results.

References

Afriadi, R., & Yuni, R. (2018). Pengembangan Jiwa Bioentrepreneur Mahasiswa Biologi. *Jurnal Biolokus*, *1*(2), 123. https://doi.org/10.30821/biolokus.v1i2.353

Aqil, D. I., Hudaya, A., & Arifin, Z. (2019). Penerapan Pembelajaran Bioentrepreneurship Untuk Meningkatkan Life Skills Dan Minat Wirausaha Siswa Smk. *Jurnal Inspirasi Pendidikan*, *9*(2), 95–102. https://doi.org/Https://Doi.Org/10.21831

Aulia, S., Zetriuslita, Z., Amelia, S., & Qudsi, R. (2021). Analisis Minat Belajar Matematika Siswa dalam Menggunakan Aplikasi Scratch pada Materi Trigonometri. *JURING (Journal for Research in Mathematics Learning)*, *4*(3), 205. https://doi.org/10.24014/juring.v4i3.13128

Bakhri, S., & Supriadi. (2017). Peran Problem-Based Learning (PBL) dalam Upaya Peningkatan Higher Order Thinking Skills (HOTS) Siswa. *Seminar Matematika Dan Pendidikan Matematika UNY*, 717–722. Retrieved from http://seminar.uny.ac.id/semnasmatematika/sites/seminar.uny.ac.id.semnasmatematika/files/full/M-104.pdf

Djumali, & Wijayanti, E. (2018). Implementasi Pendidikan Karakter Kurikulum 2013 di SMK Batik 1 Surakarta. *Jurnal Pendidikan Ilmu Sosial*, *28*(1), 31–40. https://doi.org/10.2317/jpis.v28i1.6770

Ernawati, & Syukri, M. (2020). Peningkatan Minat Belajar Siswa Melalui Model PBL Berbasis Pendekatan STEM dalam Pembelajaran Fisika. *Jurnal Pencerahan*, *14*(2). Retrieved from http://jurnalpencerahan.org/index.php/jp/article/view/32

Ginanjar, L. A., & Cholik, M. (2015). Penerapan Model Problem Based Learning Untuk Meningkatkan Minat Dan Prestasi Belajar Siswa Di Kelas Xi Smk Negeri 3 Surabaya. *Jurnal Pendidikan Teknik Mesin UNESA*, *04*(01), 71–77. Retrieved from https://ejournal.unesa.ac.id/index.php/jurnal-pendidikan-teknik-mesin/article/view/12587

Haryanti, Y. D. (2017). Model Problem Based Learning Membangun Kemampuan Berpikir Kritis Siswa Sekolah Dasar. *Jurnal Cakrawala Pendas*, *3*(2), 57–63. https://doi.org/10.31949/jcp.v3i2.596

Hayati, N., & Fitriyah, L. A. (2021). Biotechnopreneurship: Model Pembelajaran Untuk Meningkatkan Hasil Belajar Dan Minat Berwirausaha Mahasiswa. *Biodik*, *7*(01), 62–76. https://doi.org/10.22437/Bio.V7i01.10752

Herlina, M., Syahfitri, J., & Oktariani, Y. (2020). Pengaruh Model Pembelajaran Pbl Menggunakan Media Audio Visual Terhadap Minat Dan Hasil Belajar Biologi. *Jurnal BIOEDUIN : Program Studi Pendidikan Biologi*, *10*(1), 46–53. https://doi.org/10.15575/bioeduin.v10i1.8164

Herlinda. (2020). Pengaruh Model Problem Based Learning (PBL) Terhadap Hasil Belajar, Kemampuan Pemecahan Masalah Fisika Dan Minat Belajar Siswa Pada Materi Fluida Statis Di SMAN 1 Lebong Sakti. *Jurnal Pembelajaran Fisika*, *1*(1), 1–10. https://doi.org/10.33369/ajipf.1.1.%25p

Khoiriyah, A. J., & Husamah, H. (2018). Problem-Based Learning: Creative Thinking Skills, Problem-Solving Skills, And Learning Outcome Of Seventh Grade Students. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, *4*(2), 151–160. https://doi.org/10.22219/Jpbi.V4i2.5804

Lin, S. H., & Huang, Y. C. (2016). Examining Charisma In Relation To Students' Interest In Learning. *Active Learning In Higher Education*, *17*(2), 139–151. https://doi.org/10.1177/1469787416637481

Milles, M. B. (1984). *Qualitative Data Analysis*. Sage Publication.

Muliadi, A., Mirawati, B., Suryati, S., & Dharmawibawa, I. D. (2021). Implementasi Konsep Bioentrepreneurship Berbasis Potensi Lokal Melalui Pelatihan Pembuatan Nata De Cashew. *Sasambo: Jurnal Abdimas (Journal Of Community Service*, *3*(2), 49–56. https://doi.org/10.36312/Sasambo.V3i2.421

Ningsih, R. (2017). Peranan Pendidikan Kewirausahaan Dalam Meningkatkan Motivasi Berwirausaha Bagi Mahasiswa. *Jurnal Peranan Pendidikan Kewirausahaan Dalam Meningkatkan Motivasi Berwirausaha Bagi Mahasiswa*, *2*(3), 60. Retrieved from http://digilib.mercubuana.ac.id/manager/t!@file_artikel_abstrak/Isi_Artikel_287881256862.pdf

Nurhasanah, S., & Sobandi, A. (2016). Minat Belajar sebagai Determinan Hasil Belajar Siswa. *Jurnal Pendidikan Manajemen Perkantoran*, *1*(1), 128–135. https://doi.org/10.17509/jpm.v1i1.3264

Odeh, O. (2021). Pengaruh Penggunaan Model Problem Based Learning Terhadap Minat Belajar Siswa Kelas Vii-B Smpn 1 Karangjaya. *J-KIP (Jurnal Keguruan Dan Ilmu Pendidikan)*, *2*(2), 9. https://doi.org/10.25157/j-kip.v2i2.5204

Pratama, L. D., Lestari, W., & Jailani, J. (2018). Implementasi Pendekatan Saintifik Melalui

Problem Based Learning Terhadap Minat dan Prestasi Belajar Matematika. *JMPM: Jurnal Matematika Dan Pendidikan Matematika*, *3*(1), 11. https://doi.org/10.26594/jmpm.v3i1.1051

Rohiat, S., Amir, H., & Roza Clorawati, A. (2017). Implementasi Kurikulum 2013 Bagi Guru Kimia Di Sma Negeri Sekota Bengkulu. *Jurnal Pendidikan Dan Ilmu Kimia*, *1*(2), 132–135. https://doi.org/10.33369/atp.v1i2.3535

Schroder, H. S., Fisher, M. E., Lin, Y., Lo, S. L., Danovitch, J. H., & Moser, J. S. (2017). Neural evidence for enhanced attention to mistakes among school-aged children with a growth mindset. *Developmental Cognitive Neuroscience*, *24*, 42–50. https://doi.org/10.1016/j.dcn.2017.01.004

Septiani, I., Lesmono, A. D., & Harimukti, A. (2020). Analisis Minat Belajar Siswa Menggunakan Model Problem Based Learning Dengan Pendekatan Stem Pada Materi Vektor Di Kelas X Mipa 3 Sman 2 Jember. *Jurnal Pembelajaran Fisika*, *9*(2), 64. https://doi.org/10.19184/jpf.v9i1.17969

Sirait, E. D. (2016). Pengaruh Minat Belajar Terhadap Prestasi Belajar Matematika. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, *6*(1), 35–43. https://doi.org/10.30998/formatif.v6i1.750

Sisnodo, S. (2015). Pembelajaran Bervisi Bioentrepreneurship Melalui Pembuatan Makanan Hasil Fermentasi Berbahan Dasar Kedelai Lokal. *Biosel: Biology Science and Education*, *4*(2), 85. https://doi.org/10.33477/bs.v4i2.541

Soraya, I. (2015). Faktor-Faktor Yang Mempengaruhi Minat Masyarakat Jakarta Dalam Mengakses Fortal Media Jakarta Smart City. *Jurnal Komunikasi*, *6*(1), 10–23. https://doi.org/10.31294/jkom.v6i1.2458

Uliyandari, M., Candrawati, E., Herawati, A. A., & Latipah, N. (2021). Problem-Based Learning To Improve Concept Understanding And Critical Thinking Ability Of Science Education Undergraduate Students. *Ijorer: International Journal Of Recent Educational Research*, *2*(1), 65–72. https://doi.org/10.46245/Ijorer.V2i1.56