CONFERENCE PROCEEDING

Implementation of Practice-Based Learning Model (PrBL) Using STREAM-Based Approach in Madrasah Aliyah of 2 Model Pekanbaru

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ABSTRACT

Learning in the 21st century prioritizes the development of student learning activities in increasing potential and preparing a quality educated workforce. Industrial revolution 4.0, learning focuses on the ability to adapt to technological developments and updates. In facing these challenges, learning is utilized massively along with learning outcomes by applying the Practice-Based Learning Model Using STREAM based approach (Science, Technology, Religiosity, Engineering, Arts, and Mathematics). This method focuses on problem-solving, collaboration, creativity, communication, and critical thinking skills. Through this approach, students are expectednot only to have intelligence academically but also socially so that able to stimulate optimal development. The research method used is descriptive qualitative with data sources teachers, headmaster, and students in Madrasah Aliyah of 2 model. Data collection techniques are observation, interviews, and documentation. The implications of this research are very beneficial for students' motor development, increasing students' interest in learning, creative problem solving, cognitive development, and social attitudes. This study aims to describe the application of the STREAM approach to student activities and learning outcomes.

Keyword: *Development, Learning Activity, PrBL, STREAM*

INTRODUCTION

21st-century learning should be relevant to the challenges and demands of real life, including the ability to work together, problem-solving skills, self-control, critical thinking skills, mastering technology, and being able to process information and communicate effectively. This is by Law No. 20 of 2003 concerning the purpose of national education, namely developing capabilities and shaping the character and civilization of a dignified nation to educate the nation's life. In the process of implementing learning, students should be able to encourage themselves as individuals and citizens who are faithful, productive, creative, innovative, and able to contribute to the life of society, nation, state, and world civilization.

Focuses on the 21st century generation through changing the national curriculum to a 2013 curriculum based on 21st-century learning (Direktorat Dikdasmen Kemdikbud., 2014). In the 2013 curriculum, the demands on each competency cover 3 domains, namely the realm of knowledge, the realm of attitudes, and the realm of skills. This curriculum also seeks to improve the balance, continuity, and linkage between hard skills and soft skills (Permendikbud No. 103., 2014) So that the learning process carried out can bring up 18 character values, namely: religion, honest, tolerance, discipline, hard work, creative, independent, democratic, curiosity, the spirit of nationalism and nationalism, love for the homeland, respect for achievement, communicative, love peace, love to read, care for the environment, care

about social and responsibility. This value can appear in students if the teacher can explore students by inviting students to be actively involved in learning that is creative, interesting, fun, innovative, and contemporary so that students want to participate and play an active role.

Based on the results of research conducted by (Owen *et al*., 2020). Active learningis learning that can optimize all potential and abilities of students and strive for a more meaningful learning process by integrating scientific concepts, knowledge, and skills in the learning process. Research showed the results of learning activities have 4 indicators including student and teacher interaction, student activeness in learning, student enthusiasm for the learning provided, ability to overcome problems and student active participation during learning (Dimyati & Mudjiono, 2006; Susanti *et al.*, 2017).

Integration of STEAM (Science, Technology, Engineering, Art, and Mathematics) is a learning approach that integrates science, technology, engineering, art, and mathematics into chemistry learning. , fun and foster students' soft skills such as cooperation, tolerance, communication, and empathy. Learning with STEAM integration refers to constructivism learning theory (Yakman, 2012) where students will actively build their knowledge through fun learning experiences. Students will actively create strategies independently for their learning process. This STEAM approach directs students to have skills, namely problem-solving skills, critical thinking skills, and collaboration skills (Messier, 2015).

The chemistry learning process should build understanding to be meaningful to students and involve students actively and creatively as well as developing students' soft skills. Therefore, the STEAM approach was chosen as an approach to build students' understanding of chemistry and explore students' creativity which usually does not appear in learning. With the STEAM approach to chemistry learning, can stimulate students' creativity and soft skills, as has been applied in learning in the 2013 curriculum.

The results of observations of students and the learning process at Madrasah Aliya 2 Pekanbaru Model, oriented to theory and memorizing concepts, students do not do practical work effectively, so they are not allowed to analyze a problem, identity, conclude an action based on problems in daily life. Research shows that the chemistry learning process in schools does not encourage students to play an active role and think critically about problem-solving. Implementation of PrBL in learning so that students play an active role in identifying problem-solving and improve scientific thinking skills (Agustina *et al*., 2020).

Research reveals that linking religious aspects to science-related learning can develop and encourage students to define and relate the relationship between science and life according to the implications (Agustina *et al*., 2017; Natsir 2013). From the human point of view they cannot integrate science and religion, they cannot progress and develop. When only one aspect is developed, there will be an imbalance. Religion is the main of achieving the purpose of science. Aspects of art and mathematics as a major role in improving science learning and developing students' creativity. has not been revealed a STREAM-based approach to learning activities.

The purpose of this study was to identify improving the quality of student learning by using the STREAM-based PrBL learning model on acid-base material in class XI MIA Madrasah Aliyah 2 Pekanbaru Model. Acid-base material is very close to everyday life and requires students to understand concepts and memorization seems unattractive and difficult to understand, the hypothesis in this study combined with

STREAM-based PrBL can improve students' critical thinking skills and creativity in practicum. The application of STREAM-based PrBL can help students to understand and experience the scientific identification process so that students develop students' skills to apply their knowledge, affecting student learning achievement and can motivate learning.

METHODOLOGY

Method and Design Research

The research using a descriptive qualitative which aimed to implementation of practice-based learning model through a stream-based approach towards students learning activities of class XI MIA Madrasah Aliyah 2 Model Pekanbaru. The research design used data collection techniques are observation, interviews, and documentation. This research was conducted in 3 meetings. The implementation of the PrBL model using STREAM-Based approach focuses on acid and base practice that were related to aspects of religion.

RESULTS AND DISCUSSION

Implementation of STREAM approach in students learning activities

The PrBL model is carried out using the STREAM approach where the observation sheet and the evaluation rubric product are made by observing student learning activities. Aspects of student activity in learning include student collaboration in practice, interactive student participation between educators or teachers. The assessment of students' creative products during learning is based on aspects of the PrBLmodel using a STREAM-based approach. The data obtained were then analyzed qualitatively through the steps of data reduction, data presentation, and concluding. Datareduction is obtained from observation and the product scorecard is reduced by summarizing, selecting and focusing the data according to the research objectives. Data presentation is done after data reduction. Data obtained from observation sheets and product evaluation sheets are then presented in the form of narrative tables and descriptions. Finally, the reduced and presented data table is used to draw conclusions into 3 aspects of student activities. The results can be seen in Table 1.

Table 1. Results Observation of Student Activities

No	Class Code	1	2	3	Average	Final
1	XI MIA 1	80	87.5	92.5	88,44	(Good)
2	XI MIA 2	81.5	89.9	94	86.67	(Very well)
3	XI MIA 3	82.5	91.6	96.5	89.48	(VeryGood)
	Average				90.47	(VeryGood)

PrBL is a learning model that invites students to contribute actively both individually and in groups, because through collaboration in groups, students will be involved in the process of investigation and problem solving (Astutidkk, 2019). The PrBL model that will be carried out is with a STREAM-based approach, students do notreceive all knowledge from the teacher, but students who play an active role in seeking information about the material being studied. Learning begins with reading Al-Quran

verses related to the material and associated with life problems Students discuss in groupsto find information that allows them to offer solutions to the problems they face. Duringthe discussion process, students are given laptops as study aids to learning more about the solutions they offer (Azizah *et al*., 2020).

The role of teachers and technology during the learning process can improve students' social attitudes. This can be proven by the activeness of students in discussions, starting from the session to express opinions and ideas about the material to be discussedand the practice that will be done, the enthusiasm of students in learning continues to increase and this is evident from the results of table 1 above which shows that the overallactivity the PrBL model using the STREAM-based approach in three classes of Madrasah Aliyah Negeri 2 Model of the Pekanbaru achieved a score of up to 88.44 (Azizah *et al*., 2020).

PrBL creative product using STREAM-based approach

The process of realizing students' creative product designs can be observed basedon the elements in the STREAM aspect contained in the PrBL stage model. The first aspect concerns students' scientific knowledge about acids and bases, especially the manufacture of vinegar and soap in scientific activities.

a) b)

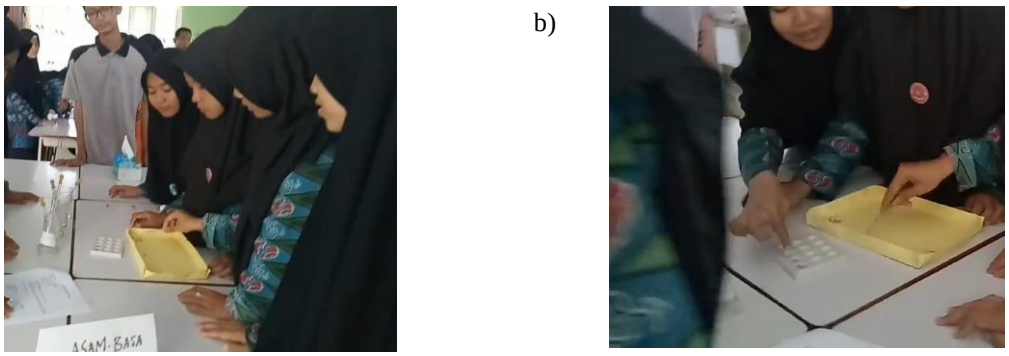


Figure 1. Science Aspects in Vinegar and Soap (a) manufacturing products (b)

Science is a systematic thought process in which knowledge is taken based on existing theories, laws, and facts to find solutions to the problems at hand (Tabiin, 2020). In this aspect, the students classes of Madrasah Aliyah Negeri 2 Model Pekanbaru, especially class XI MIA 1-3, showed good teamwork to create solutions to the problems given, and of course, the teacher explained the material first. The PrBL model with a STREAM-based approach identifies problems by discussing, arguing with each other to overcome the problems given.(Azizah *et al*., 2020) then In the next step, students validate the data and information by connecting to the Internet related to acid-base practices, especially vinegar and soap making which is shown in Figure 2.

a) b)

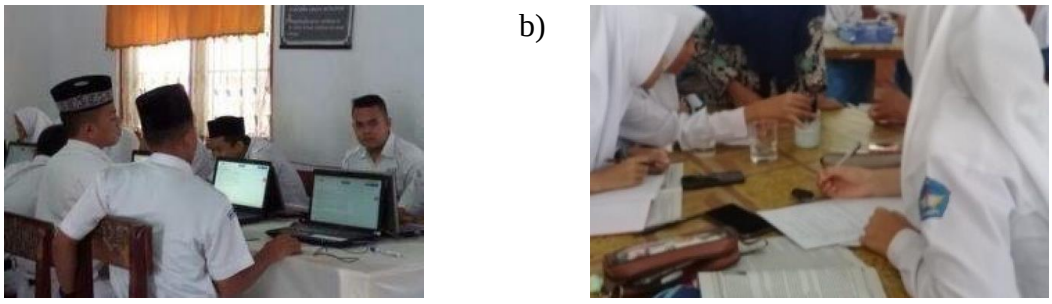
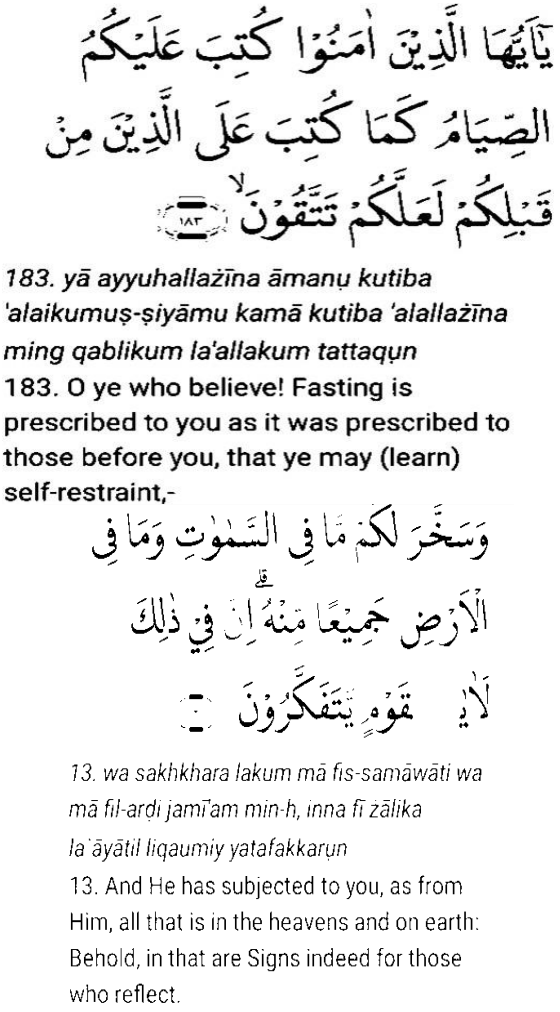


Figure 2. Aspects Technology of Acid and Base Practice

Regarding technology, technology is a tool or intermediary in facilitating the learning process, with the help of technology such as the internet it makes it easier for students to understand chemical concepts and can relate them to everyday life and make each group or student more creative and easier to complete. problems especially in the acid-base practice of making vinegar and soap.

In addition to being given the freedom to explore acid-base materials, especially vinegar and soap making through the STREAM approach, it also has a religious aspect in it so that students can connect the material studied with Islamic values in everyday life. An example of this aspect of Religiosity can be proven in Figure 3.


يَٰٓأَيُّهَا ٱلَّذِينَ ءَامَنُوا۟ كُتِبَ عَلَيْكُمُ
ٱلصِّيَامُ كَمَا كُتِبَ عَلَى ٱلَّذِينَ مِن
قَبْلِكُمْ لَعَلَّكُمْ تَتَّقُونَ ١٨٣

183. yā ayyuhallażīna āmanụ kutiba 'alaikumuṣ-ṣiyāmu kamā kutiba 'alallażīna ming qablikum la'allakum tattaqụn

183. O ye who believe! Fasting is prescribed to you as it was prescribed to those before you, that ye may (learn) self-restraint,-

وَسَخَّرَ لَكُم مَّا فِى ٱلسَّمَٰوَٰتِ وَمَا فِى
ٱلْأَرْضِ جَمِيعًا مِّنْهُ ۚ إِنَّ فِى ذَٰلِكَ
لَءَايَٰتٍ لِّقَوْمٍ يَتَفَكَّرُونَ ١٣

13. wa sakhkhara lakum mā fis-samāwāti wa mā fil-arḍi jamī'am min-h, inna fī żālika la'āyātil liqaumiy yatafakkarụn

13. And He has subjected to you, as from Him, all that is in the heavens and on earth: Behold, in that are Signs indeed for those who reflect.

Figure 3. Aspects of Religion: Link Learning With Islam

In the aspect of religion, this acid and base material is very broad in scope, there are a lot of objects and living things that contain acids and bases, one example that we can take is in the human body, the mechanism of the acid-base system. It occurs in the blood, When our blood is too acidic, the body will try to release alkaline fluids into the blood to neutralize the pH. Likewise, if our blood becomes too alkaline, the body will release acidic fluids to neutralize the pH, even in the Qur'an also recommends that we fast so that our bodies remain stable and are not too acidic or alkaline. With this PrBL applied is to inform students that acids and bases are very closely related to daily life and with Islamic values, in

this aspect, it also makes students more active in discussing acid- base issues as a whole and also discusses the relationship between acid-base materials. language with Islamic values. This is in line with research that explained that addition of religious element has a positive influences on learning activities and students' mastery concepts (Khoiri *et al.*, 2017).

The attitude that students must have is not only mastering science but also mastering Religiosity and being good at linking the two and implementing it in everyday life. The next step is to manufacture acetic acid products that have been planned for each group which is related to the engineering aspect. This engineering process is shown in Figure 4 below.

a) b)

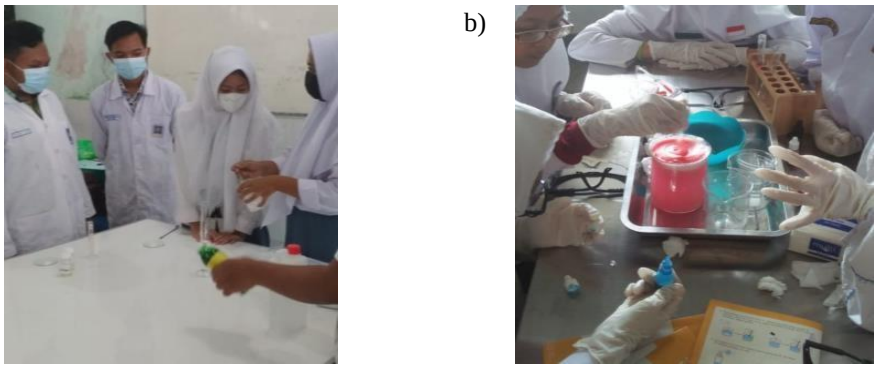


Figure 4. Engineering Aspects on the practice of making vinegar (a) and soap (b)

The engineering aspect is also a technique to help solve student problems in the learning process. The engineering process is a creative mindset in solving an existing problem. This engineering process still requires a scientific and systematic mindset of students and is assisted with new technology to make it easier for students to understand the learning problems they face, students who have difficulty understanding chemical concepts, especially acid-base materials and cannot relate them to everyday life. because when the learning process is memorizing, with this engineering process it is changed to a practice-based learning process to make it easier to understand and get an in-depth picture of problems in learning (Tabiin, 2020).

The next PrBL step in the implementation of this engineering is to supervise students and the practice process, the mistakes that occur in the practice process of making vinegar and soap make the teacher's role important to encourage students to be more active in discussing and supporting the practice process and helping students play an important role, helping to correct mistakes during the process of making vinegar and soap. Students also analyze and present the data that has been completed so that students can find pictures of stories related to acid-base material to produce more appropriate solutions (Azizah *et al*., 2020). Then the next stage is the process of applying the art of PrBL through a STREAM-based approach to be able to make students more thorough and enthusiastic in the learning process. This can be seen in Figure 5.

Figure 5. Aspects of Art students makes mind mapping related to learning materials

On this Aspect, The PrBL model carried out using a STREAM-based approach is able to improve practice progress and can provide a clear picture of the results that will be obtained later. By making mind mapping related to acid-base material, especially the process of making vinegar and soap, it can make students more creative and make it easier for students to understand the procedure for making vinegar and soap. In the process of making mind mapping, students also relate aspects in STREAM (Science, Technology, Religiosity, art and mathematics). The next step is the mathematical aspect, which can be seen in Figure 6.

a) b)

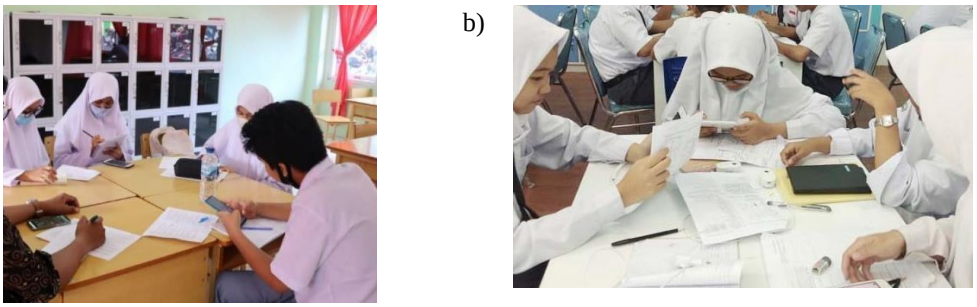


Figure 6. Aspects of Mathematics students measure the pH of Vinegar (a) and Soap (b)

In the mathematical aspect, Step gives enthusiasm to students to calculate the pH of vinegar and soap. Vinegar or acetic acid is a chemical compound of organic acids to adds a sour taste and aroma to food. Vinegar acid has a chemical formula CH_3COOH (Scharf & Malerich, 2010) while soap has a chemical formula and the reaction for determining the pH of bases.

$$CH_3H_5(OOCR)_3 + 3NaOH \rightarrow 3NaOOCR + C_3H_5(OH)_3$$

The pH range of vinegar is 1-6 because vinegar is acidic and will not be more than 7 while the pH value of soap has a range of 7 and above because soap is alkaline. acid-base they made through the PrBL model with a STREAM-based approach. After calculating the pH, each group draws conclusions generated by students during the learning process.

CONCLUSION

The results showed the implementation of PrBL Learning Model usisng STREAM Based approach could improve students creativity, critical thinking skills, problem solving on the acid-base concept in class XI MIA of Madrasah Aliyah 2 Model in Pekanbaru.The application of PrBL using STREAM-based approach has a significant

effect on student learning activities, this application also increases student creativity and arouses students to continue to be activein learning. The addition of elements of art and Religiosity can also improve students in designing products and solving problems properly and appropriately. With the addition of religious aspects associated with the verses of the Qur'an, it makes it easier for studentsto apply them in everyday life and it is easier to present students' ways of thinking to find solutions to any discussions or problems they face.

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REFERENCE

Agustina, R., Huda, I., & Nurmaliah, C. (2020). Implementasi pembelajaran STEM pada materi sistem reproduksi tumbuhan dan hewan terhadap kemampuan berpikir ilmiah peserta didik SMP. Jurnal Pendidikan Sains Indonesia (Indonesian Journal of Science Education), 8(2), 241-256.

Azizah, W. A., Sarwi, S., & Ellianawati, E. (2020). Implementation of Project-Based Learning Model (PjBL) Using STREAM-Based Approach in Elementary Schools. Journal of Primary Education, 9(3), 238-247.

Messier, N. (2018, December 27). The How's and Why's of Going 'Full STEAM Ahead' In Your Classroom. EdSurge. Retrieved September 1, 2021, from https://www.edsurge.com/news/2015-05-18-the-how-s-and-why-s-of-going-full-steam-ahead-in-your-classroom

Owens, D. C., Sadler, T. D., Barlow, A. T., & Smith-Walters, C. (2020). Student motivation from and resistance to active learning rooted in essential science practices. Research in Science Education, 50(1), 253-277.

Fogarty, R. J., & Pete, B. M. (2009). How to Integrate the Curricula (Third ed.). Corwin.

Scharf, W., & Malerich, C. (2010). Determination of acetic acid content of vinegar. New York, USA: Natural Sciences, 10010.

Idayatun, S. (2020). Teaching and Learning in Industrial Era 4.0. Ibriez: Jurnal Kependidikan Dasar Islam Berbasis Sains, 5(2), 157-168.

Tabiin, A. (2020). Implementation of STEAM Method (Science, Technology, Engineering, Arts And Mathematics) for Early Childhood Developing in Kindergarten Mutiara Paradise Pekalongan. Early Childhood Research Journal (ECRJ), 2(2), 36-49.

Yakman, G., & Lee, H. (2012). Exploring the exemplary STEAM education in the US as a practical educational framework for Korea. Journal of the korean Association for Science Education, 32(6), 1072-1086.