



Implementation of problem-based learning model in learning biology in the equality program

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Abstract

Realizing the importance of learning, SKBN Surabaya tries to design a learning process that can meet the learning needs of students, especially the SKBN Surabaya Package C equivalency program, which consists of various ages. One learning model that provides opportunities for students to have the experience of discovering a concept and increasing their understanding and requires students to be more active in learning is the PBL (Problem-Based Learning) model. This study aimed to describe implementing the problem-based learning (PBL) model in learning biology in the package C equivalency program at SKBN Surabaya. This research used a qualitative descriptive approach. Data was collected by interviewing biology tutors and randomly selected students and observing during the learning process. The subjects used were all package C class X students, totaling 11 students. The data analysis model used included data collection, data condensation, data presentation, and conclusion/verification. The results showed that students were actively involved using the problem-based learning model during the learning process. In its application, the tutor has followed the five phases in the problem-based learning model: orienting students to the problem, organizing students, guiding individual and group investigations, developing and presenting results, and analyzing and evaluating the problem-solving process. This study provides specific insights into the effectiveness of Problem-Based Learning (PBL) in enhancing student engagement and understanding in biology, a subject that requires conceptual and practical comprehension.

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INTRODUCTION

Education is an essential factor for the growth of individuals and society. Education makes someone who does not know to know and also makes someone who is not educated into someone who is educated (Ernawati et al., 2022). The government has guaranteed education for all Indonesians, as stated in Article 31, paragraph 1 of the 1945 Constitution, which reads, "Every citizen has the right to education." Education is one way for humans to improve their lives. The Indonesian government classifies three educational pathways as written in Law Number 20 of 2003-Chapter VI article 13 paragraph (1); education is classified into three parts: informal education, formal education, and non-formal education. As one of the applications of lifelong learning, non-formal education is an educational path outside the formal path that functions as a substitute, supplement, or complement to formal education programs for the community (Nursamsu & Mulyono, 2021).

Non-formal education programs are different from formal education in that anyone can participate, regardless of age (Mursalim, M., & Tech, M. I., 2019). Since non-formal education can be provided to people of all ages, including those who cannot access formal education, it increases the opportunity for everyone who cannot access formal education to get a proper education. Life skills education, early childhood education, youth education, women's empowerment education, literacy education, skills education and vocational training, and equivalency education are seven broad categories that distinguish non-formal education from formal education (Romlah, S., 2020).

Sanggar Kegiatan Belajar is one of the non-formal education units, which is a forum for various learning activities the community needs to be tailored to their needs as provisions in living life with a community-based education approach. In its implementation, non-formal education institutions have an essential role in learning citizens, namely preparing themselves and providing provisions to continue their role in the form of knowledge, attitudes, and skills so that they are ready to enter community life (Shomedran et al., 2020). One of the impacts of information and communication technology advances in education is a teacher paradigm shift. A more interactive classroom is needed due to changes in student characteristics, forms of learning materials, learning interaction patterns, and new orientations in the twenty-first century (Yumita et al., 2021).

Since the emergence of the COVID-19 pandemic caused by the coronavirus in early 2020, the world of education has undergone drastic changes. The pandemic has forced schools worldwide, especially in Indonesia, to adopt online learning to respond to social restrictions and lockdowns. During distance learning, of course, many things must be addressed and evaluated in the learning process, both in its implementation and the quality of student learning outcomes.

The problem of low learning outcomes of Package C students in class X SKBN Surabaya is more or less due to the low interest in learning of students and the application of a less innovative learning model from the teacher who has not applied the approach method in learning and in the process the teacher only explains the theory by lecturing, tends to use one-way communication. Using inappropriate learning models can cause boredom, lack of understanding of the material, and monotony. Efforts to identify and determine effective learning methods that answer the demands of learning are critical issues that are challenging for educational institutions and teachers to date. (Betakore & Boiliu, 2022). Therefore, students need more motivation to learn, especially in biology subjects, because it will be easily understood with direct practice. Based on observations, researchers found that tutors still use one-way learning (Riyanto et al., 2022).

The decline in interest in learning is of particular concern to SKBN Surabaya, considering that interest has a significant influence in encouraging package C learning citizens to learn. Realizing the importance of learning, SKBN Surabaya tries to design a learning process that can meet the learning needs of learning citizens, especially the Package C equivalency program, SKBN Surabaya Package C learning citizens of various ages. To overcome these learning problems, SKBN Surabaya designed a learning innovation to improve students' thinking skills. One learning model that provides opportunities for students to have the experience of discovering a concept and increasing students understanding and

requires students to be more active in learning is the PBL (Problem-Based Learning) model (Pratiwi, dkk. 2019). PBL states that with the PBL learning model, students can gain problem-solving skills and improve their thinking skills (Masrinah et al., 2019). Problem-Based Learning (PBL) is a learning model that focuses on solving authentic and complex problems at the center of the learning process (Ali, 2019). This model encourages students to think critically, analyze situations, collaborate with peers, and integrate pre-existing knowledge with new information to find the best solution to a problem (Akbar et al., 2023).

According to Huda (Simatupang & Ritonga, 2023), there are several steps in the PBL model, which include: (1) The teacher explains the learning objectives and logistics required, motivating students to engage in the chosen problem-solving activity; (2) The teacher helps students define and organize learning tasks related to the problem (setting topics, tasks, schedules, etc.); (3) The teacher encourages students to gather appropriate information, experiment for explanation and problem-solving, and hypothesis gathering and problem-solving; (4) The teacher assists students in planning and preparing appropriate work, such as reports, and helps them share their work with others; (5) The teacher helps students to reflect on or evaluate their investigation and the processes they use.

One critical aspect of PBL is increasing students' interest in learning. Learning interest has a significant role in the learning process. Learners who have a high interest in learning tend to be more active, enthusiastic, and diligent in participating in learning. Therefore, integrating the PBL model by considering students' learning interests can maximize their potential in understanding the subject matter (Murtihapsari et al., 2022). Previous research conducted by Desiana Iek has shown that PBL can increase students' interest in learning by creating an exciting and relevant learning environment. In addition, PBL can also stimulate students' ability to solve problems, improve social skills, and form a critical and creative mindset (Iek et al., 2023). Based on the explanation above, this research aims to describe implementing the problem-based learning model in learning biology in the package C equivalency program at SKBN Surabaya

METHODS

This research uses a qualitative method with a descriptive approach. Qualitative research focuses on the phenomena experienced by research participants, such as behavior, perceptions, motivations, actions, and others (Maulidiningsih & Ayu, 2023). This study aims to describe how the problem-based learning model is used to teach students in biology subjects related to virus material. This study will describe the actual situation when it is carried out and evaluate the object based on that situation (Jayusman & Shavab, 2020).

The subjects used in this study were all package C class X students, which amounted to 11 students. Data collection techniques were carried out using interviews with biology tutors and several randomly selected students and observations made during the learning process. Data analysis techniques include data collecting, data reduction, data display, and conclusion drawing. Data analysis techniques use triangulation techniques by combining data obtained from interviews and observations so that the information obtained can be trusted (Sidiq & Miftachul Choiri, 2019). The data obtained from informants, primarily pupils of class X package C SKBN Surabaya, will be meticulously recorded in this study. The recording findings will then be summarised and focused on the relevant things, so that the data reduction results present a clear picture to ease making conclusions. Following the data reduction process, the data can be displayed in the form of concise descriptions, charts, flowcharts, and other visual representations. The given data will subsequently be used to form conclusions and confirmed (Abdussamad, 2021). Later conclusions and verification will be offered in the form of narrative text in this study, which will explain the implementation of the problem-based learning model in learning biology equity education for package C SKBN Surabaya.

RESULTS AND DISCUSSION

Based on research in the form of data from interviews, documentation, and observations that researchers on biology subject tutors in class X of the SKBN Surabaya package C pursuit have conducted. Then, the researcher obtained the research results related to analyzing the implementation of the Problem-Based Learning model at SKBN Surabaya.

Lesson Planning

In the learning planning, tutors prepare the selected materials and learning tools. Based on the results of interviews conducted, to apply the problem-based learning model, tutors need to prepare lesson plans (education unit, learning theme, time allocation, competency standards, learning objectives, learning activities), then compile them, and choose problem-based learning as the learning model. In practice, tutors choose virus material, which will be applied using the problem-based learning model by preparing Learner Worksheets (LKPD). LKPD is a guide for students to learn a concept so that students can solve a problem (Khikmiyah, 2021). Tutors use problem-based learning-based LKPD in biology subjects with the material Identifying the characteristics of viruses and virus structures.

Learning Process

Based on observations made by researchers, in implementing the problem-based learning model, tutors start by preparing the class, taking attendance, praying, providing motivation, and then providing material and conveying learning objectives to students, helping students form groups of 3-5 people. After that, the tutor gives LKPD to students and directs students to read and carry out learning according to the LKPD. Tutors ask learners to discuss and study the problems contained in the video.



Source: <https://youtu.be/0dAoCfgAOw8?si=P2dFCndq0T1YSbUq>

Figure 1. Video stimulus about the coronavirus problem in Indonesia

After that, the tutor asks students to formulate and convey questions about the problem cases they have been asked to work on. The tutor's role in problem-based learning is to guide students in studying problems individually and in groups. Then, after each group has successfully answered the problem according to the problem in the video, the tutor mentions the group number as a representative of each group to be able to convey the results of the discussion according to the problem given. Each group that is not present must observe and provide responses or questions.

Evaluation

In this stage, tutors and students draw conclusions about the material that has been learned. Tutors review the material that has been delivered and motivate students to dig deeper into the material. Tutors conduct an assessment in this material on students' activeness, both in making reports

on the results of discussions, actively asking questions, working on LKPD correctly, and in the presence of students.



Figure 2. The work of each group's report on virus material

An interview was conducted with one of the students to explore students' responses to implementing problem-based learning models in biology at SKBN Surabaya. From the interview, it was found that using the problem-based learning model was a new thing for them, so they were very interested in participating in the learning. Using problem-based learning models with groups also increases their motivation. It helps them understand the virus material, the characteristics of the virus, and things that must be done as a prevention effort. In terms of time, each group can quickly understand the problems in the video and make a report on the results of the discussion in a short time.

According to Yelland, Cope, and Kalantzis (Andi Auliya Hakim & Alfariy Totalia, 2016), Problem-based learning (PBL) is an instructional approach that prioritizes student engagement and centers on the process of addressing authentic and ambiguous problems as a means of learning. The technique employed is constructivist, prioritizing the needs and interests of the students. It emphasizes developing critical thinking skills, effective communication, and collaborative abilities. Furthermore, it necessitates the consideration of diverse viewpoints in the process of reflection. The Problem-Based Learning (PBL) model encompasses several vital aspects.

Firstly, it involves the formulation of questions or problems as a means of initiating the learning process. Secondly, it emphasizes exploring interdisciplinary connections, fostering a holistic understanding of the subject. Thirdly, PBL encourages authentic inquiry, promoting the application of knowledge in real-world contexts. Additionally, the model emphasizes creating tangible products or works showcased or shown. Lastly, PBL strongly emphasizes collaboration and cooperative learning, facilitating the exchange of ideas and the development of teamwork skills (Masrinah et al., 2019).

Based on the results above, some of the steps that have been applied follow the syntax of the problem-based learning model (Hotimah, 2020).

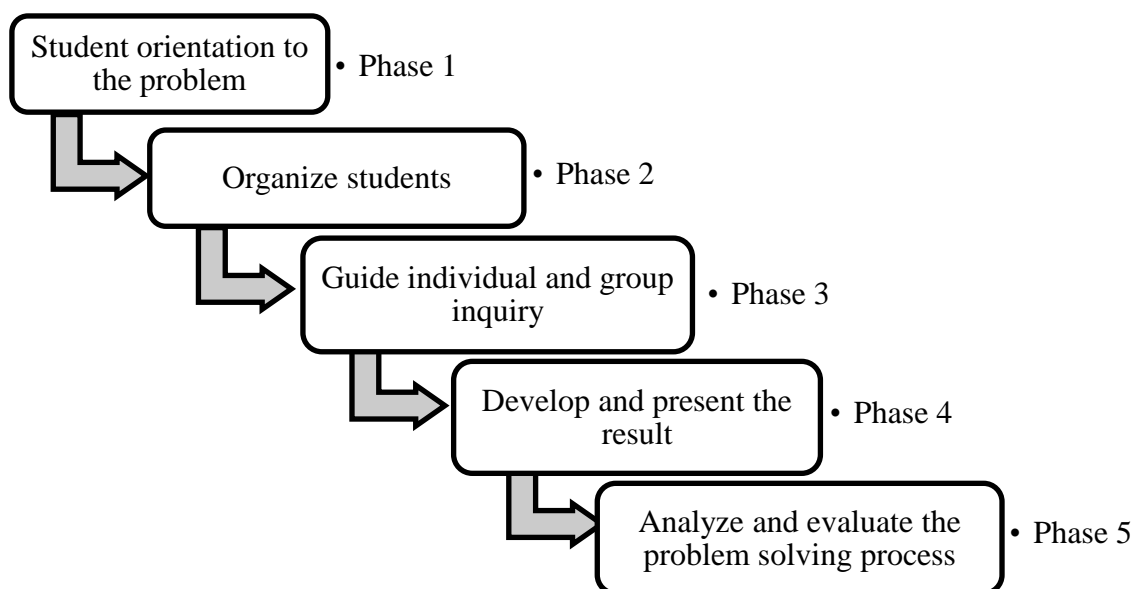


Figure 3. the syntax of the problem-based learning model

The structure of a trigger within the Problem Based Learning approach entails the presentation of a problem or issue derived from a real-life scenario that is commonly encountered in day-to-day experiences. The distinguishing characteristic of the Problem Based Learning (PBL) method, which sets it apart from other learning approaches, is the nature of the problem or trigger provided. The initial stage of the learning process involves the analysis and examination of the trigger or problem at hand. Triggers are initially provided to students at the commencement of the learning process, thereafter examined and deliberated over inside group settings. Triggers serve as stimuli for learners to engage with and explore various learning issues that are encapsulated within triggers or problems. Learners are anticipated to possess the ability to initiate problem-solving by employing specific approaches and following specified stages. This enables them to acquire a diverse range of theoretical and practical information (Betakore & Boiliu, 2022).

In the first phase, orienting learners to the problem, tutors act to explain the learning objectives, explain the logistics needed, and motivate learners to engage in problem-solving activities (Nurdin & Adriantoni, 2016). This is following the findings, and tutors use LKPD in which there are essential competencies, namely: 3.4 Analyze the structure, replication, and role of viruses in life, and 4.4 Conduct a campaign about the dangers of viruses in life, especially the dangers of AIDS, based on the level of virulence. In addition to essential competencies, there are also learning objectives; namely, students can analyze the structure, replication, and role of viruses in life with a combination of PBL (problem-based learning) and time token learning models, discussion methods, and questions and answers, to develop communication skills, collaboration, critical thinking, and problem-solving, as well as creative and innovative according to the demands of the 21st century. They can develop an attitude of responsibility, conscientiousness, and devotion to God.

In the second phase, with the indicator of organizing students to learn, the tutor acts to help students define and organize learning tasks related to the problem, in addition to improving thinking and problem-solving skills (Nurdin & Adriantoni, 2016). PBL also encourages cooperation in completing a given task. By the results above, the tutor starts the learning activities by forming a group of 3-5 people. Tutors must screen and assess each group's work to maintain both groups' performance during learning. Once learners have been assigned a problem and have formed their learning groups,

tutors and learners decide on a clear subtopic. In this biology lesson, it is about the characteristics of viruses.

In the third phase, guiding independent and group investigations, tutors encourage learners to gather relevant information, conduct experiments to obtain explanations, and solve problems (Nurdin & Adriantoni, 2016). Tutors employing the Problem-Based Learning approach are advised to let students direct their learning rather than micromanaging their every move. No longer are classes centered around a teacher giving a monologue from the outset until the final bell rings. A teacher adopting the PBL approach to education must possess a wide range of skills to effectively carry out his duties at each level of the instructional procedure. A teacher's responsibilities in a PBL classroom include serving as a role model, coach, and restricted resource (Hotimah, 2020).

Tutors ensure learners seek information from various sources, not only in books. This stage has been carried out by the results above, and the tutor uses YouTube as a source of information supported by questions related to coronavirus. Educators help learners gather as much information as possible from various sources. (Permata Sari et al., 2022). With critical and creative thinking skills, the PBL model can optimize students' thinking skills through a group work process so that students can simultaneously improve, hone, and test their thinking skills (Ernawati et al., 2022). Learners will build critical thinking by analyzing ideas based on the order in which they will be accepted and considering alternatives when working on a report (Suradika et al., 2023).

In the fourth phase, developing and presenting the work, the tutor assists learners in planning and preparing appropriate work, such as reports, and helps them to share the task with their friends (Nurdin & Adriantoni, 2016). The next stage is to display a work product. In this study, each group will present through PowerPoint media the results of the problem-solving report that has been prepared. Critical-thinking learners will deduce and analyze other groups' deductions, with different thoughts on other groups' problem-solving (Suradika et al., 2023). In the fifth phase, analyzing and evaluating the problem-solving process, tutors and learners act as evaluators, helping students reflect on or evaluate each group's investigation and the process used to solve the problem (Nurdin & Adriantoni, 2016). Tutors ask learners to recall all activities and thoughts during the problem-solving process. In this stage, learners will think critically by defining the problem and choosing criteria to solve it. Creative learners seek more profound meaning to the solution or problem to refine a concept or product (Suradika et al., 2023).

The five phases that must be taken in PBL model learning can improve various competencies in students. Learning that begins with activities to analyze problems/triggers raised in real life may help students connect theoretical knowledge with what happens in real life. Students are also taught how to apply what they learn in class to real-world challenges. This result is in line with research conducted by (Betakore & Boiliu, 2022) that learning that begins with analyzing real-life problems/triggers can help learners strengthen their capacity to connect theoretical information with what happens in real life. In the many phases of learning activities utilizing the Problem-Based Learning approach, students must be present and actively engaged in the learning process in order to derive meaningful benefits. Alternatively, superficial knowledge, often known as surface learning, may occur. On the other hand, if learners are actively engaged and participate in all aspects of the learning activities, they will acquire diverse knowledge from multiple sources and develop a range of skills and self-competencies (Betakore & Boiliu, 2022).

Based on the data in the field shows that using the Problem-Based Learning method makes students more independent in learning, able to work in groups, and educated in critical and creative thinking to study problems and produce alternative answers. Students are also taught to be active learners because learning activities require them to do so. This is in line with the findings in the research (Marzuki & Basariah, 2017) in the implementation stage, the learning model trains learners to manage time and convey their thoughts according to agreed guidelines throughout the learning.

. Research conducted by (Saguni, 2013) showed that implementing PBL in the Learning Planning course at the Faculty of Tarbiyah UIN Makassar yielded positive results and increased

problem-solving skills. The increase can be shown by increasing the ability to think critically, learn independently, and actively seek information through libraries and the internet to solve challenging situations. Findings in research conducted by (Pramana, et al., 2020) the PBL model developed in the three biology education courses was generally rated very well (Fakruddin et al., 2023).

PBL can be successful if tutors prepare thoroughly. Good preparation takes time, but it is critical to the success of PBL. However, some tutors believe adopting PBL is ineffective because of the time-consuming preparation. PBL implementation will yield the best outcomes if all of the learning tools are carefully planned. Unfortunately, the development of good learning tools takes an extended period (Iek et al., 2023). The Problem Based Learning (PBL) model offers several benefits that foster students' motivation to develop problem-solving skills, construct knowledge through learning activities, engage in problem-focused learning, utilize high-quality sources, evaluate their own learning activities and outcomes, and enhance their ability to engage in scientific communication during discussion activities (Nikmah & Shofwan, 2023). The drawbacks associated with the subject Based Learning (PBL) approach are characterized by a lack of intention or confidence in the perceived difficulty of the subject under investigation, resulting in student reluctance to engage with it. The Problem Based Learning (PBL) model offers several advantages. Firstly, it provides students with the opportunity to engage in problem-solving activities, thereby cultivating their problem-solving skills. Secondly, PBL encourages social cohesion through collaborative discussions with peers, fostering a sense of solidarity among students. Additionally, PBL facilitates a closer relationship between teachers and students, promoting a more familiar and interactive learning environment. Lastly, PBL promotes the application of experimental approaches, as students are presented with problems that require practical solutions (Magdalena et al., 2022).

CONCLUSION

Implementing the problem-based learning model in learning biology in the package C equivalency program at SKBN Surabaya received a positive response from students. Tutors have implemented steps that are by the application of the problem-based learning model. Tutors and students collaborate well, resulting in each group's final report as power points. The problem-based learning model can increase students' activeness during learning. Learners feel motivated to learn during the application of problem-based learning.

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