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## AN ATTEMPT TO IMPROVE STUDENTS' HEALTH LITERACY SKILLS WITH BLOODYPEDIA BASED ON PROBLEM-BASED LEARNING ON CIRCULATORY SYSTEM MATTERS

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### Abstract

Health literacy is the capacity to obtain, process, and comprehend fundamental health information and health services that facilitate the formulation of informed health decisions. The objective of this study is to enhance students' health literacy abilities by employing problem-based learning media on circulatory system content. The Classroom Action Research method, employing a cyclic research model comprising two cycles with four stages—namely, planning, action, observation, and reflection—is expected to facilitate the improvement of health literacy skills among class XI students. The CAR methodology employs problem-based learning, which is conducted with 36 students. The data collection method employs test scores or scores on pre- and post-test health literacy questionnaires containing 10 questions, which will be compared on average as a reference for improving students' health literacy. The findings of this study indicate that there was an increase in health literacy skills, with a value of 13.86% in Cycle I and 13.96% in Cycle II. In conclusion, the results of this action research demonstrate that the problem-based learning model with Bloodypedia media is an effective method for improving the health literacy skills of grade XI students on the material of the human circulatory system.

**Keywords:** Bloodypedia, health literacy, problem-based learning

### INTRODUCTION

Efforts to enhance the quality of education are inextricably linked to the calibre of teaching and learning activities conducted within the classroom. The quality of education can be gauged by the extent to which students can absorb the subject matter. Consequently, classroom learning activities are essential components of the educational process, which are designed to facilitate the improvement of educational conditions (Rosiah et al., 2019).

The Problem-Based Learning (PBL) learning model is found upon the recognition of students' backgrounds, expectations, and interests. The PBL model is more conducive to motivation than the traditional teaching model, encouraging students to work harder. In general, students engage in more study time when learning with the PBL model compared to the traditional model. Student participation is significantly diminished in conventional learning, where students lack the opportunity to contribute to the formulation of problems (Graaf, 2003; Almulla, 2020).

The application of health literacy in education was first implemented in developed countries in the 1960s and 1970s, as evidenced by a study conducted by Glanz (1997). The objective was to enhance students' perceptions of health literacy. The application of health literacy in Indonesia is still at a neutral or sufficient level (Nurhaeni, 2022). Therefore, it is necessary to apply health literacy in school learning (Gentilucci, 2004). This is because education in schools can catalyze enhancing students' perceptions of reproductive health through the implementation of health literacy (Nutbeam, 2000).

The concept of health literacy encompasses four abilities: the ability to search for, find, and obtain health information; the level of understanding in processing accessed health information; the level of analytical ability, while filtering and analyzing health information that has been accessed; and the ability to communicate and utilize the information obtained to make health decisions

(Montaño & Kasprzyk, 2008; Nutbeam, 2008; Sorensen et al., 2012). Efforts to enhance health literacy among high school students can be achieved through the incorporation of biology learning, particularly in the eleventh grade, where the curriculum encompasses the physiology of the human body, including diseases and healthcare (Faidah et al., 2020; Khairina et al., 2022).

Through initial observations, students have never utilized teaching materials, particularly those about the circulatory system in the form of Google Sites (Madarik & Puadi, 2023). There is a delay in the distribution of biology support books for the independent curriculum to students. This undoubtedly impairs students' comprehension of the subject matter and subsequently, their motivation to learn. Consequently, it is imperative to innovate and utilise engaging teaching materials that facilitate the delivery of subject matter, including biology. One of the key areas of study is the circulatory system. In addition, some concepts are difficult to understand due to the use of difficult and unfamiliar vocabulary, which makes it difficult for students to visualize what they read (Suryanda, *et al.*, 2021). To foster students' interest in listening to the subject matter, it is necessary to utilize teaching materials to enhance health literacy.

Teaching materials can be defined as any form of information, material, tool, or text utilized by educators or instructors to facilitate the delivery of instructional and learning activities (Nur Haliza et al., 2023). Teaching materials are tools that can be utilized by students and educators to facilitate and enhance the learning process (Fausih & T, 2015). Considering these definitions, teaching materials may be considered tools that contain information utilized by teachers and students in the context of teaching and learning activities. The role of learning media in achieving learning objectives and facilitating the conveyance of messages and subject matter content by educators is important (Wati, 2016).

Consequently, it is imperative to conduct Classroom Action Research (CAR), which aims to enhance the quality of learning in class XI, in conjunction with the design of facilities and learning resources, the implementation of teaching and learning strategies, and the development of learning models that can achieve educational objectives. The Problem-Based Learning (PBL) learning model, which employs Google Sites-based learning media, has been found to enhance student engagement in the learning process, thereby improving health literacy.

## RESEARCH METHOD

This research employed classroom action research (CAR) (Machali, 2022), which was conducted on 36 students of class XI at SMAN 54 Jakarta. The research proceeded through four stages: planning, action, observation, and reflection. In the initial phase, the actions to be undertaken were delineated. The design of Google Sites, the loading of circulatory system material onto Google Sites, and the development of lesson plans in the classroom were all initiated at the outset of the project. The action stage involved the development of learning media using Google Sites. The observation stage is conducted in the classroom by utilizing Google Sites to teach the circulation system. This process is conducted in two cycles. The final stage is the reflection stage, during which the results of the students' posttests and pretests are analyzed to ascertain the extent to which the desired outcomes have been achieved.

The selection of research subjects is based on the rationale that the application of students' health literacy to the subject matter of the Human Circulation System is not optimal. Therefore, efforts are being made to develop problem-based learning media, "Bloodypedia," to improve students' health literacy. CAR is employed to enhance rational stability by deepening students' understanding when actions are taken to improve learning conditions and practices (Purohman, 2011). The research was conducted on September 29, 2023, in Cycle I, and on October 6, 2023, in Cycle II. The learning outcomes employed include pre-test and post-test instruments, as well as observation of student activity. The research will be terminated based on the results of the data analysis, which will be conducted by comparing the data on the student learning achievement results in each cycle. The success indicator is that the average student post-test score will be at least 70. If this is not achieved, the research will be discontinued, as it has reached the Minimum Completeness Criteria (MCC).

## RESULT AND DISCUSSION

### Research Findings

The implementation of research efforts to improve health literacy skills with Problem-Based Learning-based Bloodypedia learning media in learning the circulatory system is effective. This is evidenced by an increase in student learning outcomes using this method in each cycle, as discussed in the research methodology. The following graph illustrates the learning outcomes obtained in each cycle.

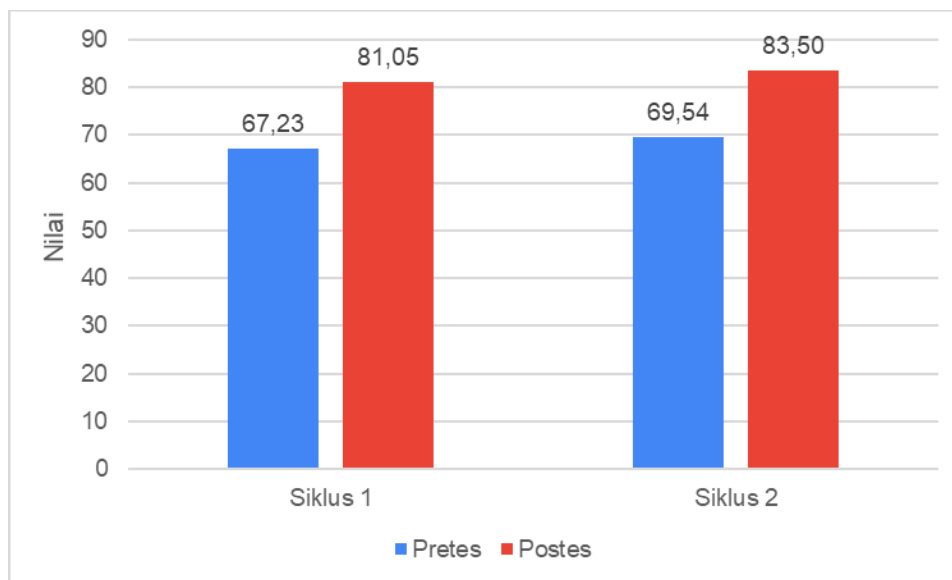


Diagram 1. Chart of Pretest and Posttest of Health Literacy

The research was conducted in two cycles, during which pretest and posttest data were collected on each occasion. The results of the data collection were highly encouraging. The data indicated that there was an increase in pretest and posttest scores related to health literacy on circulatory system material conducted on 36 students in class XI in each cycle. Figure 1 illustrates that in Cycle 1, the posttest results were higher than the pretest scores. The Cycle 1 pretest results yielded an average of 67.23, which increased to 81.05 when the pretest was conducted. Furthermore, the results of the pretest and posttest in Cycle 2 demonstrated a similar pattern, with the average pretest result of 69.54 rising to 83.50 when the posttest was conducted. The average pretest and posttest results increased from 74.14 in the first cycle to 76.52. These results demonstrate the efficacy of the problem-based learning (PBL) approach to teaching the human circulatory system, as evidenced by the post-test scores of  $\geq 70$ .

### Research Data Analysis

The data on the results of student health literacy related to the human circulatory system obtained from pretest and posttest activities can be seen in the graph above. Before the commencement of the study, students are required to complete a pretest comprising 10 questions. Following the introduction of the subject matter, students are again required to complete a posttest comprising 10 questions. In the initial cycle, there was a discernible enhancement in students' health literacy following the integration of human circulatory system material with health literacy. The results demonstrated an increase in student knowledge before and after learning. The average pretest result was 67.23, while the average post-test result was 81.05. This is because students remain uncertain and encounter difficulties in utilizing Bloodypedia as the provided learning medium. As stated by Majid (2013), learning difficulties represent one of the impediments to students' efforts in attaining learning objectives. Consequently, considering the findings of the initial cycle of reflection, the instructor implemented enhancements to the learning process in the second cycle.

The second cycle of learning the material on the circulation system, as outlined in the subsequent subchapter, was conducted one week after the first cycle. In the second cycle, a pretest-

posttest question set of 10 questions was also administered before and after the material was presented. The results of the pretest and posttest indicated an improvement in health literacy scores before and after the administration of the integrated Human Circulation System material, with the pretest average score of 69.54 and the posttest average score of 83.50.

In both cycles, two meetings revealed an increase in pretest and posttest results. However, in the second cycle, it can be observed that the second cycle pretest results are lower than the first cycle posttest results. Indeed, the content delivered in the initial cycle was largely similar. The increase in health literacy pretest and posttest results from Cycle I was 13.82%, while in Cycle II it was 13.96%. This outcome can be attributed to the fact that students demonstrated effective learning and comprehension of the material presented. The same conclusion was reached by Novitasari et al. (2015), who found that PBL has several advantages, including facilitating memory retention and enhancing comprehension of instructional content, fostering focus on pertinent knowledge, promoting critical thinking, developing teamwork, leadership, and social skills, strengthening learning abilities, and aligning with the realities of student life. The observed increase in health literacy across each cycle and the corresponding changes in the graph above can be explained and complemented by the conditions outlined below.

#### 1. The classroom

One challenge frequently encountered in the context of high school biology education is the lack of incorporation of innovative learning models by teachers. Conventional models, such as lectures, question and answer sessions, and assignments, remain the dominant approach to teaching, with minimal variation in the learning process. Students are not allowed to engage with the material instantly. This approach to learning biology in high school has the potential to impede students' comprehension of the subject matter, leading to feelings of boredom and negatively impacting their learning activities. Consequently, it may result in suboptimal learning outcomes.

The implementation of effective and enjoyable learning is carried out by applying problem-based learning. The Problem-Based Learning model allows students to gain experience in dealing with realistic problems. It emphasizes the use of communication, cooperation, and existing resources to formulate ideas and develop reasoning skills regarding health literacy in everyday life. This is achieved using problem-based bloodypedia on the material of the human circulatory system, which increases learning activeness in the classroom. This is consistent with the assertion made by Maharani & Kristin (2017), who posit that learning activeness is physical or mental activeness in the process of learning and teaching activities, to achieve the success of the teaching and learning process.

#### 2. Interview with Students

##### a) Cycle I

The implementation of actions in Cycle I proceeded satisfactorily. During the learning process, there was a notable degree of interaction between students and between students and teachers in the classroom. This is evidenced by the numerous questions that arise from students expressing their opinions and inquiring about material that is not understood. Furthermore, the core activity stage, which was abbreviated as 5M (Observing, Questioning, Collecting Data, Associating, Communicating), also demonstrated the effectiveness of the approach.

Some students have difficulty using Bloodypedia to learn the circulatory system. They ask their mothers for assistance, as evidenced by the following statements: "Mom, how do you do this?" (Participant B, Class A) and "Mom, what part should we choose?" (Participant C, Class A). (Participant C, Class A). (Participant A, Class A) inquired, "What part should we choose?" (Participant B, Class A) inquired, "Is this the appropriate approach?" (Participant C, Class A). The instructor effectively elucidated the methodology for utilizing Bloodypedia, as the students had no prior experience with Google Sites in the context of learning.

Students can comprehend the learning features of Bloodypedia, as evidenced by their completion of a pretest before the commencement of learning activities. During the learning activities, learners utilize the resources available on Bloodypedia. It is expected that learners will utilize the features of Bloodypedia during learning activities. The results of the learning that has

been done in Cycle I indicate that the research objectives have been achieved, although not to the fullest extent. This is due to the considerable gap between students in their health literacy skills. (Liu, 2020).

#### b) Cycle II

In general, the implementation of actions in Cycle II proceeded in a satisfactory manner intending to enhance and refine the obstacles encountered in Cycle I. The number of questions that arose from students after completing the health literacy pretest demonstrated the interaction between students and students in the classroom and the interaction between students and teachers during the learning process. The core activity stage, which is abbreviated as 5M (Observing, Questioning, Collecting Data, Associating, Communicating), allows students who may not fully comprehend a concept to express their opinions and ask questions of the teacher if they encounter difficulties. This demonstrates a two-way interaction between teachers and students, which is beneficial during the learning process.

In addition, students have begun to utilize Bloodypedia as a learning tool for the circulatory system, inquiring about its use in class. One student, Participant D, stated, "Today we have a pretest on Bloodypedia." Another, Participant E, commented, "We understand more about heart health." A third, Participant F, expressed her satisfaction with her posttest score, stating, "My posttest score is higher, right?" (Participant F, Class A). Teachers find it more straightforward to condition the class by using Bloodypedia, as students are already familiar with the features of Bloodypedia.

Students are accustomed to linking subject matter with health literacy in everyday life. This allows students to develop a new habit, namely linking with health literacy in everyday life in the next material. The findings of this study align with those of Maharani and Kristin (2017), who posit that learning outcomes are changes in student behaviour after the completion of lessons. These outcomes are attributed to the learning environment that is intentionally created by the teacher through the learning model selected and employed in a lesson. Additionally, the findings of Candrakusuma and Faridha (2020) align with the present study's results, indicating that students' comprehension of health literacy indirectly influences their capacity to apply it in responding to a health-related issue. A high level of health literacy will enable students to gain extensive knowledge of the health sector, including healthy living behaviours, an understanding of various diseases and their symptoms, and an awareness of personal health. This will enable them to take action to prevent the contraction of diseases.

## CONCLUSION

The results of research and discussion on improving health literacy through the problem-based learning (PBL) model, using problem-based Bloodypedia in class XI students, indicate that the PBL model can enhance students' critical thinking skills in learning biology in class XI. This is evidenced by the process of learning activities, in which students engage in critical thinking about health literacy in everyday life concerning the material of the human circulatory system. The PBL learning model has been demonstrated to enhance students' health literacy in the context of learning biology in class XI. This is evidenced by the increase in the average score obtained in each cycle. This research project aims to enhance health literacy using problem-based Bloodypedia on the material of the circulatory system of class XI in high school. It is anticipated that this approach will cultivate a culture of research and improve the quality of learning in health literacy.

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