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IMPROVING STUDENT LEARNING OUTCOMES THROUGH PROBLEM BASED LEARNING WITH THE ASSISTANCE OF INFOGRAPHICS ON HUMAN DIGESTIVE SYSTEM MATERIALS

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Abstract

Through the use of infographics and a problem-based learning approach, this research hopes to increase student understanding and engagement. This research was attended by eighteen female and sixteen male students in class VIII-B of SMP Negeri 1 Purwoasri for the 2023/2024 academic year. The Classroom Action Research (PTK) used is PTK with two learning cycles. There are four phases in an action research course: preparation, implementation, evaluation. Cognitive outcome tests and student learning response questionnaires were used to collect findings. The results of research using problem-based learning assisted by infographics achieved a percentage of completeness of cognitive learning outcomes from the pre-cycle of 26%, cycle I of 56%, and cycle II of 82%. The findings on the application of learning were also positive, namely 74.8 percent of cycle I students rated it as moderate, and 80.6 percent rated it as high. These findings suggest that combining problem-based learning with infographics for scientific education can improve learning outcomes and student responses.

Keywords: Problem Based Learning, Learning Outcomes, Student Responses

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INTRODUCTION

According to Noeraida and Saraswati (2016), Natural Sciences (IPA) is a systematic exploration of nature. This involves not only the acquisition of knowledge in the form of principles, concepts, and facts, but also the process of discovery. Carin (1993) describes science as a product that includes various elements such as principles, facts, concepts, laws and theories. Therefore, IPA is not just a collection of knowledge or memorized facts. Rather, it is an active process that involves the use of the mind to learn and understand natural phenomena that may not yet be fully understood. To help students acquire and hone four essential 21st century competencies Communication, Collaboration, Criticism, and Creativity.

The learning model is implemented using a student-centered teaching approach. Model *Problem Based Learning* (PBL) has been widely accepted as a method for promoting student-centered education while empowering students. According to Suhemin (2014), Critical thinking, problem solving, and conceptual understanding are the pillars of this methodology, and are taught to students in the context of real world challenges. (Aris & Hindun, 2021). This approach is in line with the views of Donalds Woods (2000), who argues that PBL is not only an effective learning environment for acquiring knowledge, but also for fostering problem solving, teamwork and communication skills (Amir, 2016). Furthermore, in line with Lynda Wee's (2002) perspective, the PBL approach supports the development of self-regulation, metacognitive thinking, collaboration, and information gathering skills (Amir, 2016). Thus, this alignment also reflects the advantages of the PBL model, where students are encouraged to learn how to solve real-world problems. Active learning allows students to construct their own knowledge (Rerung et al., 2017).

The importance of choosing the right learning model cannot be separated from its ability to foster a conducive learning environment. A lively and engaging learning environment has the potential to increase student motivation, active participation, and independent learning of subject matter. According to Syarifah (2022), choosing the right model, method or approach not only makes it easier for teachers to deliver material effectively but also helps students understand the lesson better. In addition, this allows teachers to overcome various learning challenges, such as low motivation and unsatisfactory learning outcomes.

Student learning can also be significantly influenced by the use of various forms of educational media. Student achievement may be influenced by the student's level of intrinsic drive to learn. With the right teaching materials, PBL may be more interesting and useful for students. Media plays an important role as an intermediary in supporting the learning process. Nurul (2019) notes that learning media not only facilitates communication of educational content from educators to students, but also stimulates student interest and motivation. In addition, the use of learning media encourages students to be more interactive and proactive in their pursuits deeper learning (Pramono et al., 2022).

Incorporating media into the learning process is a crucial element for educational success. Utilizing these tools makes understanding material and concepts more accessible and understandable. The ultimate goal of using media in the classroom is to maximize learning efficiency. In addition, media has a significant impact on students' cognitive processes and competencies. Based on the explanation given, it can be concluded that incorporating media into teaching is highly recommended. This is because it facilitates the process of conveying information to students during class thereby optimizing the learning experience (Kurniawati et al., 2022). Infographics are a type of visual learning media that can be used to demonstrate content effectively. Kurniawati et al. (2022) conducted research which found that teaching students in class V theme topics using infographic media provided greater learning outcomes than traditional teaching methods.

After observing the implementation of learning in class, it was seen that students were less enthusiastic about science subjects. The teaching methods used are mostly lecture-based or rely heavily on verbal communication, causing monotony and decreased student engagement. As a result, student activity in the learning process is greatly reduced. The teacher's questions are usually only answered by a small number of students, while the majority just pay attention. After carrying out the pre-research test, it was discovered that many students got scores below the KKM (<75), namely 74% or 25 students, while only 9 students or 26% got scores above the KKM (≥ 75). This is further strengthened by interviews with science teachers, which prove the fact that most students lack motivation and understanding of key concepts in the subject matter. In addition, questionnaires given to students show that they prefer learning that is interesting, fun, interactive and visual. These findings are very important for the author in developing a student-centered teaching approach.

The PBL model is a learning methodology that places the focus squarely on the learner and emphasizes collaborative problem solving. Class XI students' cognitive learning outcomes in physics subjects were proven to increase with PBL (64% in cycle 1 and 85% in cycle II) proposed by Rerung, Sinon, and Widyaningsih (2017). Additional

studies reported by Aris and Hindun (2021) show that PBL can improve learning outcomes, with pre-cycle results of 54.5%, cycle I results of 74.75%, and cycle II results of 80.15%. On the theme of learning outcomes for Indonesian language material, Yusita et al. (2021) found that the PBL paradigm was the most successful. Researchers conducted research on the use of problem-based learning combined with infographics to improve learning outcomes and student engagement in class VIII as stated in the description above.

METHOD

Types of research

Classroom Action Research, also known as CAR, uses a specific type of research methodology. This methodology includes four different stages, which include planning, implementation or action, observation, and reflection.

Research Targets

For this research, 34 students in class VIII-B of SMP Negeri 1 Purwoasri, Kediri Regency were observed in the second semester of the 2023/2024 academic year. Eighteen female and sixteen male students participated in this study.

Data Collection Technique

Students' responses to written knowledge tests and questionnaires were used to collect data. RPPs, LKPD, exam assessments, observation sheets, and student response surveys are all used to collect data. In addition, in each learning cycle, student response data is obtained through questionnaires. Cognitive learning outcomes are determined through the implementation of written knowledge tests. This assessment is carried out before learning begins (pretest) and after learning is completed (posttest) (Arikunto, 2013). This research was carried out in 2 cycles. Students' cognitive learning outcomes obtained from the posttest at the end of each learning cycle have increased. The following is the research design that will be carried out

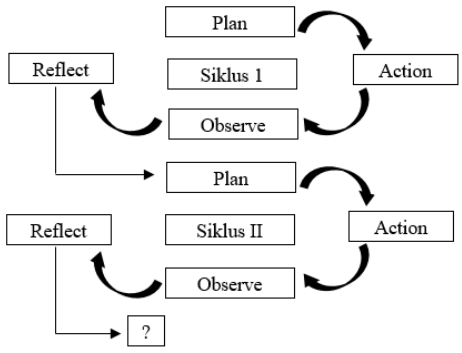

Figure 1. The class action research cycle

Data analysis

The success indicator of this research is that students' cognitive learning results meet the requirements for the completeness criteria, namely 75. Based on the information presented in Table 1, the cognitive learning results at the pre-research stage show that a total of nine students have successfully fulfilled the KKM requirements. Data analysis was obtained from improving pre-research learning outcomes, cycle 1 and cycle 2.

RESULTS AND DISCUSSION

Obtaining student learning outcomes is possible by conducting a pretest during the pre-cycle (before learning) and posttest (after learning) at the end of learning in each cycle. In this regard, a comparison of the results of applying the PBL model has been carried out using infographics.

Table 1. Student cognitive learning outcomes

Aspect	Learning cycle			Pre research to cycle II
	Pre research	Cycle I	Cycle II	
The highest score	75	85	90	15
Lowest value	50	50	60	10
Average value	60	73	80	20
It's done	9	19	28	19
Not finished	25	15	6	19

Based on the information presented in Table 1, the cognitive learning results at the pre-research stage show that a total of nine students have successfully fulfilled the KKM requirements. There was an increase of 19 students who submitted their work in cycle I. Cognitive learning outcomes increased along with the increase in the number of students who completed assignments to 28 in cycle II. The proportion of desired learning objectives that have been achieved by each student is shown graphically below.

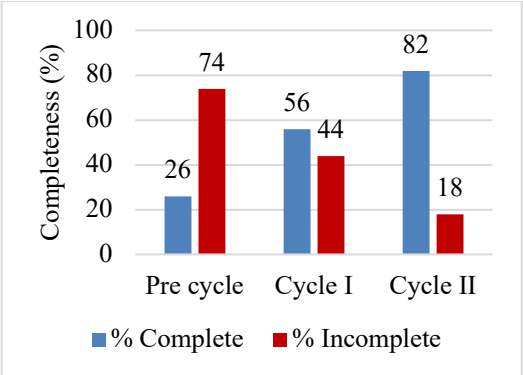

Figure 2. Completeness of students' cognitive learning outcomes

Based on the data presented in Figure 2, proportion of students who completed pre cycle is

only 26% or 9 students. However, this percentage is increasing steadily significant to 56% or 19 students in the cycle 1, which then continued to increase to 82% or 28 students in cycle II, exceeded the KKM score. Problem-based learning methodology use visual aids such as infographics proven to improve students' cognitive learning outcomes significantly. This research was carried out in two cycles, each cycle consisting of planning, implementation of plans, analysis of results, and process reflection.

Table 2. The results of students' responses to learning

Aspect	Cycle	
	Cycle 1	**Cycle II**
Attention	74.10%	81.50%
Relevance	75.00%	80.00%
Confidence	75.00%	81.00%
Satisfaction	75.10%	80.20%
Average	**74.80%**	**80.68%**

Table 2 provides evidence that in cycle I, students' answers obtained an average value of 74.80% and is in the medium range. On cycle II the average student response was 80.68% is in the high performance category is an improvement from cycle I in terms of receptiveness to learning.

Cycle I

First cycle of the planning process involves selecting learning resources in accordance with the learning objectives intended. Then based on learning results selected, formulate learning objectives. Some activities take place in stages planning, including 1) creation of infographics to educate the system digestion and giving participants LKS in example of material and media preparation will be used in research. Level of implementation of learning activities consists of an opening, main body, and closing. There are several

preparation of plans learning/learning implementation plan (RPP) in accordance with the contents and procedures of PBL. 2) main actions, such as: Class opens with prayers and greetings from the instructor. Instructor record student attendance and ask questions recent activities. The instructor lightens the mood by giving applause to attract students' attention, and then give them a test early to see where the cognitive abilities are they. As part of the experience education, students are given apperception consists of questions that thought-provoking that focuses on ordinary events in everyday life. The instructor explains the learning objectives and Benefits of studying the digestive system man. The class is divided into small groups.

The fundamental actions of the program follows the format and structure of the PBL. The initial steps are focused on problem orientation, where students are given instructions which refers to general problems found in everyday life. Guidance this is specifically related to the system digestion of the human body and is presented in LKPD. Students will enter the second phase by organizing themselves to learn. At this stage, they will form groups and together search for information. Furthermore, The third phase involves guided inquiry groups, where students will discuss to resolve problems in the Sheet Their respective Student Work (LKPD). Throughout the course of the research, instructor will provide assistance to good students individually or in small groups. On In the final round, students presented their results his work and discuss in groups, take turns, and provide input and ideas to other groups. The fifth level involves problem solving and assessment. At this point, Students will benefit from explanations instructor and revised ideas. Step next is the group reflection led by lecturers and students. Reflection results these are often recorded on paper and stuck on reflection tree as a form of visualization of process of evaluation and problem solving that has been carried out done.

Several things happened during the activity closing: 1) Instructor and students develop conclusions about what is have studied, 2) Students complete the assessment post-learning and learning response questionnaires to measure progress; 3) Students pay attention to the whole class and read the assignment them before continuing. 4) Instructor say closing pleasantries and prayers before go home. At the peer observation stage, students are actively involved in learning activities. In answering the teacher's trigger questions, they showed involvement by daring to express their opinions and also daring to ask questions. Most students participate actively in group discussions, but some are too shy to speak. Students are able to convey discussion conclusions effectively to the entire class. The average value of cognitive learning outcomes in cycle 1 is 73.38, which is below the KKM threshold of 75.

After completing learning cycle 1, it is time to reflect on what has been learned and how effective the learning was. The findings of this assessment can be used to refine future educational structures. There are students who do not participate in class, there are those who still have difficulty speaking, and there are also those who still do not fully understand the topic after going through the first cycle of learning. By considering several explanations regarding the obstacles that arise in cycle 1, it is necessary to plan the next steps, including: 1) Higher teacher involvement is needed

in creating a pleasant classroom atmosphere, including increasing the intensity of motivation for students, 2) Students get more help and attention from teachers., 3) Teachers must go further in their efforts to review and clarify concepts.

Cycle II

The second stage of the planning process is deciding what to research in connection with the project objectives. Furthermore, develop a set of learning objectives based on the results you select. A number of events that occurred at the preparatory stage: On Problem Based Education, 1) Teachers Create Learning Plan and Implementation Plan Learning (RPP) Based on Concepts and PBL Procedure. Creation of educational resources such as disease and disorder infographics digestion and making LKPD is example of Step 2 in the development process educational materials and media. Third, prepare testing or measurement tools before starting data collection.

Action and implementation stages learning activities have many similarities with Cycle I, mainly consisting of three parts: introduction, core activities, and closing. During preliminary activities, teacher usually greet students and lead prayer, taking attendance, facilitating solvers freezing, presenting apperception with real world questions, and communicate goals and benefits learning. The core activities follow the model PBL, which includes student orientation to problems, organization group investigation, discussion guidance, presentation of results, as well as resolution and evaluation problem. Finally, the lesson ends with draw conclusions, provide feedback, and reflection. Examples of learning materials that following this format is educational content about disorders of the human digestive system. The instructor prepares students for the meeting next and inspire them to Study. The final exam and prayer ended the event.

Student participation is measured by Teacher observation includes students' willingness to answer teacher introductory questions, completion of LKPD, expressing one's own ideas and questions, participation in small group discussions, and public presentation of the group's findings.

Table 1 displays the mean percentages cycle II cognitive learning objectives achieved. Students who get a KKM score of 75 to above has successfully completed the task. This matter has met the indicator requirements success.

Discussion

At SMPN 1 Purwoasri, class VIII-B students who use PBL supported by infographics get positive results. Where is the marker the success of cognitive learning outcomes has been met Minimum KKM requirement. Learning process discontinued after cycle II due to findings.

In general, cognitive development someone is positively correlated with the ability to think abstractly and organized. This is supported by Meriyati's observations on in 2015 that junior high school students aged 11/12-18 years is at the formal operational stage cognitive development. In this phase, children can reason logically and abstractly. Therefore, very important for educators to have Comprehensive understanding of the stages cognitive, psychomotor and affective development his students. This knowledge will make it possible they create a learning process meaning that is in line with the stage developments mentioned above (Meriyati, 2015).

PBL is a learning model centered on students using real world issues as a framework for development essential knowledge, concepts, and critical thinking as well as problem solving skills. PBL rooted in cognitive theory, especially theory constructivist learning, which states that students can develop abilities engaged thinking and problem solving active in discovery, transfer, and implementation existing knowledge (Hermansyah, 2020). By taking advantage of learning problem-based, education becomes focused on students, when they are involved in the process learning. This approach is encouraging active participation from students, resulting in results a deeper educational experience. Based on research conducted by State et al. in 2021, findings shows that students are already proficient in it problem solving based on material learning given. Further, research shows that participation and student involvement in the learning process as well shows improvement. Learning model Problem-based involves students taking active role in resolving various challenge. This approach ensures that students gain hands-on experience while learning and that they are involved in the process learning. This model is also encouraging constructivist learning, which helps improve students' memory and encourage student-centered educational approach. Utilization of problem-based learning models (PBL) has been shown to have the potential to improve outcomes student learning. This model requires students to have an intrinsic interest in the subject science, which in turn tends resulting in increased skills, achievements, and overall learning outcomes. Study the latest done by Aris and Hindun (2021) supports this statement because shows that the utilization of the approach Problem-based learning indeed can be improve student learning outcomes.

PBL has benefits inspire children to think for themselves and collaborate effectively. Additionally, approach this provides equal responsibility to all group members to achieve common goal, and required cooperation effective

in facing challenges to achieve results the optimal can be achieved (Iwan et al., 2018). Other research results support its use PBL learning method shows increased learning outcomes and intensity of student discussions (Sagisna et al., 2022).

The use of learning media Interesting is thought to increase effectiveness learning model. Use of models effective learning can improve understanding of the concepts that will have an impact on student learning outcomes. This matter proven by research conducted by (Triyadi et al., 2024) there is an influence of application PBL with the help of media Spin Wheel on comprehension ability student concepts and positive student responses towards learning.

According to Wahyuningtyas and Sulasmono (2020), New forms of media and Innovative approaches to education have been emerged as a result of advances in science knowledge and technology. Media selection interesting helps attract students' attention and spark their interest in the subject matter taught, so that it has a positive impact on student psychology (Kurniawati et al., 2022). Findings another by Hayati et al. (2020) shows that PBL can increase student engagement, provide a friendly classroom environment, and encourage instructors to take an active role as a facilitator of student learning.

In learning system material human digestion, infographic media can be an effective tool. This is caused by the need for visualization of the digestive organs which must be clearly understood. Meriyati (2015) stated that at junior high school age, aspects Students' cognitive development develops with the ability to think symbolically and the ability to understand concepts meaningfully. Infographics don't just present an image visual, but also equipped with videos and questions in the form of a QR code, adding dimension interactive in learning. Use of infographics in learning of the human digestive system as well has been proven to be effective in increasing yields learning, as research shows Kurniawati et al. (2022).

Students practice and work more the same while using infographics to implementing PBL. The process includes discussing and help each other find the answers events in the real world. Pramono et al. (2017) found that the use of paradigms PBL equipped with infographics that make an impact which is profitable for development students' interpersonal skills. Besides that, this kind of education encourages relationships constructive students and educational outcomes which is of higher quality. Active involvement of students in PBL with infographics creates enthusiasm for learning high levels, avoiding boredom, and improve Pramono et al. (2022) emphasize that the use of infographic media can improve understanding of the material. Infographics have the ability to visualize image in a format that replaces tables or explanations that are too long and complicated (Hikmah & Hayudinna, 2022). Senjaya's Opinion et al. (2019) that infographics with presentation creatively relevant information and images interesting and easy to remember, supported by data learning observations that show that students are more engaged and interested when utilizing infographic media.

Table 2 displays responses to student survey that suggested infographics as learning media can improve student engagement and retention of course content. Moment utilizing infographic media, students are more engaged, positive, and motivated. Infographics with QR codes that lead to practice quizzes and movies is another great way to create students interested in learning. These results are consistent with the findings Khomaria et al. (2017), who found that infographics can be used as a teaching tool to arouse students' curiosity and engagement with the subject matter. Student achievement in a subject is greatly influenced by their level of interest in learning the subject.

CONCLUSIONS AND SUGGESTIONS

Conclusion

This explanation leads to the conclusion that the use of infographics as part of a PBL approach can improve students' cognitive learning outcomes and answers. The proportion of cognitive learning objectives achieved before, during, and after each learning cycle increased significantly from 26% to 56% to 82%. Students' positive responses also increased, namely from 74.8 percent in the medium category in cycle I to 80.6 percent in the high category in cycle II.

Suggestion

The results of this study suggest that educators will benefit from the freedom to choose teaching strategies and materials that take into account the unique needs of their students. Apart from that, good time management in implementing a learning model is also the key to success, so that the learning process can take place according to plan and on time.

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