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# Application of Information Search Strategies to Improve Biology Learning Outcomes

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**ABSTRACT**

*This research is a Classroom Action Research (CAR) aimed at improving learning outcomes in biology for Grade VIII students at SMP Ittihad Makassar. The research activities were conducted in two cycles, with each cycle consisting of three meetings and four stages, namely: planning, implementation of actions, observation, and reflection. Data collection techniques were carried out through observation and end-of-cycle tests. Meanwhile, the data analysis techniques used were descriptive and quantitative, supplemented with frequency tables and percentages. Based on the research results and all the discussions and analyses that have been carried out, it can be concluded that the application of the Information Search Strategy can improve the biology learning outcomes of Grade VIII students at SMP Ittihad Makassar. where in cycle 1 the average was 66.25% with a mastery percentage of 52% and in cycle II the average was 71.25% with a mastery percentage of 92%.*



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## INTRODUCTION

Education is a manifestation of the dynamics of human culture, which is constantly evolving in line with the needs of individuals and society. In the national context, education is seen as a strategic instrument for shaping the complete Indonesian human being. The Republic of Indonesia Law Number 20 of 2003 concerning the National Education System states that education is a conscious and planned effort to create a learning environment and learning process so that students actively develop their potential, including religious spiritual strength, self-control, personality, intelligence, noble character, and the skills needed for themselves, society, nation, and state (Trianto, 2010). This definition positions education not only as a process of knowledge transfer but also as a means of character development and life skills acquisition.

In line with this view, Carter emphasized that education in its broadest sense encompasses a structured system of knowledge and teaching, including pedagogical principles, learning strategies, student guidance, and the supervisory function in the teaching and learning process. Therefore, every curriculum development and learning practice must align with the national education goals. The educational process, designed and implemented systematically, is expected to develop students' potential so they can grow into individuals who are faithful, pious, of noble character, healthy, knowledgeable, capable, and responsible. Achieving these goals is highly dependent on the quality of the learning process taking place in the classroom.

The learning process is essentially a communication and educational interaction between teachers and students (Hasbullah, 2003). Learning doesn't happen instantly but rather through continuous experience and practice, leading to changes in an individual's behavior, perception, and way of thinking. Henry E. asserts that learning is a long-term process that leads to changes in an individual's response to various stimuli (Syaiful Sagala, 2009). Meanwhile, Dick and Carey viewed learning as a process aimed at helping learners achieve specific skills in a measurable way. Therefore, selecting the appropriate learning strategy is a crucial factor in bridging learning objectives with the expected learning outcomes.

Teachers are required to be able to determine and implement learning strategies that are appropriate for the characteristics of the students, the teaching materials, and the learning environment. We believe that using the right strategies enhances the effectiveness and efficiency of learning. Benny A. (2009) states that developing effective learning models is one of the main competencies of teachers in achieving educational goals in schools. Well-designed learning models can create a fun learning atmosphere, increase student learning motivation, and encourage active student participation in the learning process.

However, the reality on the ground shows that teaching and learning activities still face various obstacles. Many junior high school teachers tend to use conventional teaching methods repeatedly, such as lectures and question-and-answer sessions, without varying their strategies. This condition has the potential to cause learning fatigue in students and impact their low learning outcomes. In the 8th-grade biology subject, particularly the circulatory system material, students often experience difficulties due to the large number of scientific terms and abstract concepts they need to understand (Sanjaya, 2008). Consequently, students' engagement and comprehension of the content diminish.

Based on data from daily quizzes and interviews with biology teachers at SMP Ittihad Makassar, it was found that the learning outcomes of eighth-grade students regarding the circulatory

system had not yet reached the established learning objectives. This low learning outcome is caused by the use of less varied learning strategies and insufficient active student involvement. Therefore, we must strive to enhance learning by implementing active learning strategies that foster students' active participation and independent learning. One alternative that can be implemented is the Information Search Strategy, which emphasizes students' independent and collaborative information-seeking activities to build a more meaningful understanding of concepts.

## METHOD

This research uses the Classroom Action Research (CAR) approach, which aims to continuously improve the quality of the learning process and outcomes through reflective actions in the classroom. The CAR model used refers to the concept of a reflective spiral, which includes four main stages: planning, action, observation, and reflection, repeated in each cycle (Kemmis & McTaggart, 2014; Arikunto, 2015). The research was conducted for one month at SMP Ittihad Makassar, Makassar City, during the current semester of the relevant academic year.

The research subjects are 25 students from class VIII of SMP Ittihad Makassar, consisting of 13 male students and 12 female students. The subjects were selected purposively, considering the characteristics of the class, which indicated low learning focus and behavioral variation among students during the learning process. The research focus encompasses three main aspects: input factors (student attendance and readiness to participate in learning), process factors (teacher-student interaction and the suitability of applying the information search strategy to student characteristics), and output factors (student learning outcomes after implementing the learning strategy) (Sanjaya, 2016).

The research procedure was carried out in two cycles, with each cycle systematically following the stages of Classroom Action Research (CAR). During the planning stage, the researcher identified learning problems, reviewed the science (biology) curriculum and syllabus, and developed learning materials, including lesson plans (RPP), test instruments, and observation sheets. The implementation phase of the action was carried out by applying the information search strategy within the scientific approach, where students actively learned through group work with individual responsibility, seeking information from various sources such as books, modules, student worksheets, the internet, libraries, and laboratories. The students' work was then presented and discussed as a class to reinforce their understanding of the concepts (Hamalik, 2017).

The observation and evaluation stages are carried out simultaneously with the implementation of the action to observe student learning activities and the feasibility of the learning using the prepared observation sheet. In addition, learning outcome data were obtained through written tests consisting of 10 essay questions administered at the end of each cycle. Next, the reflection stage is carried out by analyzing the results of observations and tests to identify constraints and formulate learning improvements for the next cycle. Cycle II was implemented as a form of improvement over Cycle I based on the reflection results obtained (Kemmis & McTaggart, 2014).

Research data was collected through observation, tests, and documentation techniques, then analyzed using qualitative and quantitative descriptive analysis. Qualitative analysis was used to describe students' activities and attitudes during learning, while quantitative analysis was performed by calculating average scores and learning completion percentages using the percentage formula. To determine students' standards for Cycle I and Cycle II, the formula (Arikunto, 2008) was used.

$$P = \frac{F}{N} \times 100\%$$

The success indicators for the research were determined based on the learning completion standards, namely, students are considered individually complete if they score a minimum of 70 and class-wide complete if at least 85% of the students achieve learning completion (Depdiknas, 2007)..

## RESULT AND DISCUSSION

A. Research Findings

This research is Classroom Action Research (CAR), conducted in two cycles, each including the planning, action implementation, observation, and reflection stages. The research aims to improve the learning outcomes of eighth-grade students at SMP Ittihad Makassar regarding the human circulatory system through the application of the scientific approach with the information search strategy. Data analysis was conducted descriptively and quantitatively to describe changes in student activity and learning outcomes in each cycle.

1. Research Results for Cycle I
   a. Student Learning Activities

      The observation results for Cycle I show that student learning activities are still in the moderate to low category. Regarding attention to learning, 16 students were recorded in the first meeting, increasing to 18 students in the second meeting. Activities such as working on practice questions and the accuracy of answers are still limited, as is student involvement in group discussions and presenting the results of the discussions. Generally, students' collaborative and participatory activities have not been optimal, reflecting their initial adaptation to the learning strategies implemented.

   b. Student Learning Outcomes

      The results of the first cycle evaluation of 25 students showed the highest score of 90 and the lowest score of 50, with a class average of 66.25%. The distribution of learning outcome categories indicated that most students were in the low to medium range. Classical learning mastery in the first cycle only reached 48%, while 52% of students had not yet met the Minimum Mastery Criteria (KKM). Thus, learning in cycle I, I did not meet the success indicators, so it needs to be continued to cycle II.

2. Research Results of Cycle II
   a. Student Learning Activity

      In Cycle II, there was a significant increase in all indicators of learning activity. The number of students paying attention in class increased to 23–24 students in each meeting. Activities such as solving problems, the accuracy of answers, cooperation in group discussions, and the ability to present discussion results also showed consistent improvement. This indicates that students are becoming increasingly familiar with and actively involved in applying the information search strategy.

   b. Student Learning Outcomes

      The evaluation of learning outcomes in Cycle II showed a significant increase in scores. The highest score reached 100, the lowest score increased to 60, and the class average was 71.25%. The distribution of learning outcome categories showed that the majority of students were in

the high and very high categories, with no students in the very low category. Classical learning mastery increased to 92%, with 8% of students still needing to master the material. Thus, the learning success indicators have been achieved in cycle II.

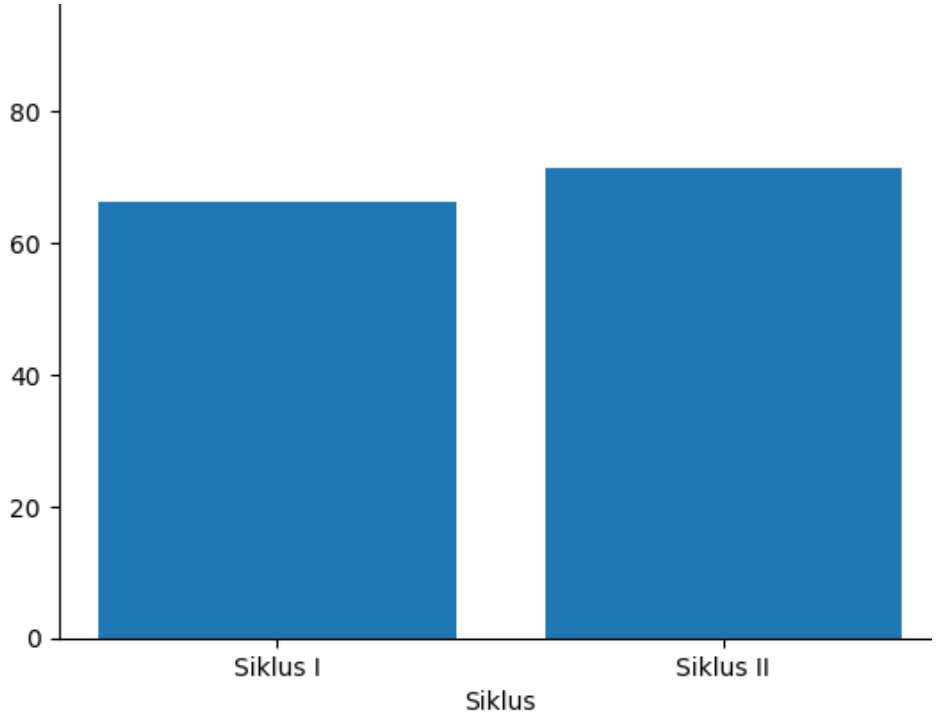


Figure 1. Average Learning Outcomes for Cycle I and Cycle II

3. Comparison of Cycle I and Cycle II Results

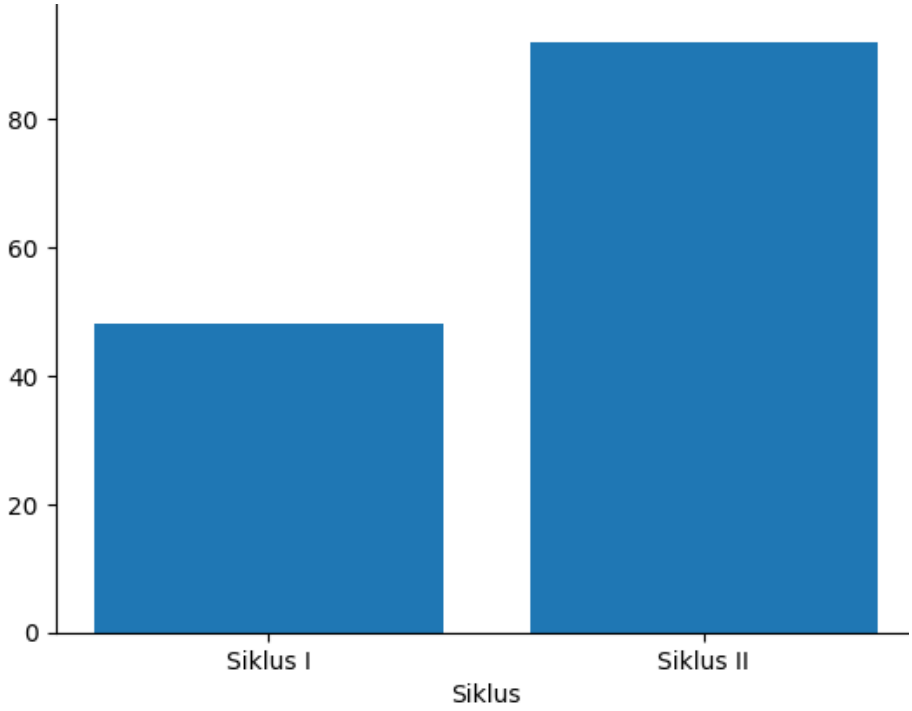


Figure 2. Classical Learning Completion Cycle I and Cycle II

The comparison of research results between cycles shows an improvement in both student activity and learning outcomes. The average learning outcomes increased from 66.25% in Cycle I to 71.25% in Cycle II (Figure 1). The percentage of students who mastered classical learning went up from 48% to 92% (Figure 2). Additionally, there was a shift in learning outcome categories from a dominance of low categories in Cycle I to high and very high categories in Cycle II. This confirms the effectiveness of the information search strategy in improving the quality of learning.

**B. Discussion**

This discussion focuses on analyzing the improvement of student learning outcomes through the implementation of the Information Search Strategy, conducted over two learning cycles. The analysis is comprehensive, considering changes in student learning behavior, learning achievement, and pedagogical factors influencing the effectiveness of the strategy. The research findings indicate that the implementation of the Information Search Strategy is able to improve the quality of the learning process and has a significant impact on student learning outcomes, which is consistent with the findings of various recent studies over the past five years.

1. Analysis of Learning Outcomes in Cycle I

Reflection on the implementation of learning activities in Cycle I served as an important foundation for planning improvements in Cycle II. Several aspects were identified as requiring enhancement, including the clarity of explanations regarding the steps of the Information Search Strategy, the strengthening of students' learning motivation, the intensity of teacher guidance during the learning process, and the creation of a more conducive classroom management environment. In Cycle II, the teacher not only explained the procedures of information searching in a more detailed and systematic manner but also provided clear and concrete examples of how to locate, select, and utilize relevant information related to the learning material. These efforts helped students better understand the learning expectations and the active role they were required to play throughout the learning process.

The implementation results in Cycle II demonstrated significant improvements in both the learning process and student outcomes. Qualitatively, noticeable progress was observed in students' learning enthusiasm, attention, activeness, and confidence. Students began to develop the habit of asking questions, participating actively in group discussions, and showing greater enthusiasm in completing information-seeking tasks. Importantly, no students were found to be completely passive during the learning activities, indicating that the learning process had become more student-centered and participatory.

Furthermore, the improvement in the quality of interaction between teachers and students contributed positively to the success of Cycle II. The teacher assumed the role of a facilitator by consistently providing guidance, feedback, and positive reinforcement. This approach encouraged students to feel more confident in expressing their ideas and presenting the results of their information searches. With more structured classroom management and a supportive learning atmosphere, students were able to focus better and engage more effectively in the information search process.

Quantitatively, student learning outcomes in Cycle II showed a very significant increase. A total of 92% of students achieved scores above the Minimum Mastery Criterion (KKM), while only a small proportion of students fell into the medium (4%) and low (8%) categories. Although a few students had not yet achieved optimal results, the class as a whole met the criteria for mastery

learning. These findings indicate that the Information Search Strategy is effective in improving learning outcomes when implemented consistently and supported by adequate teacher guidance.

The improved learning outcomes in Cycle II are consistent with recent studies suggesting that learning strategies emphasizing information seeking and problem solving can enhance students' conceptual understanding and critical thinking skills (Ali et al., 2025; Anello, 2016). Through this strategy, students actively construct their own knowledge by utilizing various learning resources, rather than relying solely on information delivered by the teacher.

In addition, the Information Search Strategy has been shown to promote students' learning independence and sense of responsibility. Direct involvement in the information-seeking process encourages students to manage their time effectively, collaborate with peers, and critically evaluate the information they obtain. This finding aligns with the research of Meilani & Faradiba (2019), which emphasizes that inquiry-based learning and information search strategies contribute positively to the development of 21st-century learning skills, including critical thinking, collaboration, and information literacy. Consequently, this strategy not only improves academic achievement but also supports the development of essential competencies required for lifelong learning.

2. Improvements and Learning Outcomes in Cycle II

Entering Cycle II, the teacher made a series of improvements based on the reflection results from Cycle I. These improvements included providing more detailed explanations of the steps in the Information Search Strategy, strengthening students' learning motivation, increasing the intensity of guidance, and creating a more conducive classroom management environment. Teachers also give students clear examples of how to find and use information, which helps them understand what is expected of them in terms of learning.

The implementation results in Cycle II showed significant changes in both the process and learning outcomes. Qualitatively, there was an improvement in students' aspects of learning enthusiasm, attention, activity, and courage. Students are starting to get used to asking questions, actively participating in discussions, and showing enthusiasm for completing information-seeking tasks. No more students were found to be completely passive during the learning process. Quantitatively, student learning outcomes in Cycle II showed a very significant improvement. A total of 92% of students successfully achieved scores above the minimum passing grade (KKM), while only a small percentage of students were in the average (4%) and low (8%) categories. Although there are still students who have not achieved optimal results, the class as a whole has met the criteria for mastery. This finding indicates that the information search strategy is effective in improving learning outcomes when applied consistently and accompanied by adequate guidance.

The better learning results in Cycle II match recent studies showing that learning strategies focused on finding information and solving problems can help students understand concepts better and think critically (Ali et al., 2025; Anello, 2016). This strategy lets students actively build their knowledge by using different learning resources instead of just getting information from the teacher.

Additionally, the Information Search Strategy has also been proven to enhance students' learning independence and responsibility. When students are directly involved in the information-seeking process, they are encouraged to manage their time, collaborate with peers, and evaluate the information they obtain. This aligns with the research findings by Meilani & Faradiba (2019), which

state that inquiry-based learning and information search contribute positively to the development of 21st-century learning skills.

3. Comparison of Results from Cycle I and Cycle II

The comparison of learning outcomes between Cycle I and Cycle II demonstrates a consistent and statistically meaningful improvement, indicating the effectiveness of the implemented instructional intervention. In Cycle I, the average student achievement score reached 66.25, with a classical mastery level of only 52%. This means that just 12 out of 25 students were able to meet the predetermined minimum passing grade. These results suggest that, although the Information Search Strategy had begun to influence student engagement, its implementation in the first cycle had not yet been optimal. Several constraints were identified, including students' limited familiarity with independent information-seeking activities and insufficient guidance in organizing and synthesizing the information they obtained.

Following a reflective evaluation of Cycle I, improvements were systematically applied in Cycle II, particularly in refining learning instructions, optimizing group collaboration, and providing clearer scaffolding during the information search process. As a result, student learning outcomes showed a substantial increase. The average score rose to 71.25, while classical mastery dramatically improved to 92%, with 23 students achieving proficiency. This significant progression underscores the importance of reflective practice and continuous improvement in classroom action research, as emphasized by Arikunto (2007), who asserts that reflection serves as a critical foundation for enhancing instructional quality and achieving optimal learning objectives.

From a pedagogical standpoint, the observed improvement can be interpreted through the lens of constructivist learning theory. Constructivism posits that learners actively construct knowledge by integrating new information with their prior experiences and cognitive structures (Fosnot, 2019). The Information Search Strategy inherently aligns with this theoretical framework, as it positions students as active participants who are responsible for seeking, analyzing, and reconstructing information rather than passively receiving content from the teacher. Through this process, students engage in higher-order thinking activities such as comparing sources, evaluating relevance, and synthesizing ideas, which contribute to deeper conceptual understanding.

Moreover, the strategy promotes learner autonomy and responsibility, which are essential components of meaningful learning. When students are encouraged to independently search for information, they develop not only cognitive competence but also affective attributes such as curiosity, motivation, and confidence. These affective gains, in turn, positively influence learning persistence and engagement. In addition, the collaborative elements embedded in the strategy support the development of psychomotor and social skills, particularly in organizing information, presenting findings, and engaging in academic discussions.

The findings of this study are consistent with recent empirical research conducted within the last five years. Studies by Sari et al. (2020) and Nugroho and Lestari (2024) report that active learning strategies centered on information-seeking activities significantly outperform conventional teacher-centered approaches in improving student learning outcomes. These studies highlight improvements not only in cognitive achievement but also across affective and psychomotor domains, reinforcing the holistic impact of such strategies. Therefore, the results of this research further strengthen the empirical evidence that the Information Search Strategy is an effective pedagogical approach for

enhancing comprehensive student learning outcomes when implemented through reflective and well-structured instructional cycles.

4. Implications for Learning

Based on the discussion, it can be concluded that the Information Search Strategy has significant implications for contemporary learning practices, particularly in fostering higher levels of student activity, learning interest, and academic achievement. This strategy positions students as active seekers and processors of information rather than passive recipients of knowledge. By engaging learners in searching, selecting, and evaluating information from various sources, the learning process becomes more meaningful and student-centered. As a result, students are encouraged to participate more actively in classroom activities, develop curiosity toward the subject matter, and demonstrate improved understanding of learning content.

The effective implementation of the Information Search Strategy, however, requires careful consideration from teachers. Educators must take into account students' readiness, including their prior knowledge, cognitive abilities, and familiarity with independent learning tasks. Learning materials also play a critical role; topics that are exploratory in nature and open to investigation are particularly well suited to this strategy. Furthermore, the availability and accessibility of learning resources—such as textbooks, digital media, and online information must be ensured so that students can conduct searches efficiently and responsibly. Without adequate resources, the potential benefits of this strategy may not be fully realized.

Another essential aspect highlighted in this discussion is the importance of intensive teacher guidance, especially during the initial stages of implementation. Since the Information Search Strategy demands a shift from teacher-centered to student-centered learning, students may initially experience difficulties in managing information, identifying credible sources, or synthesizing findings. Through structured guidance, modeling, and continuous feedback, teachers can support students in developing effective search techniques and critical evaluation skills. Gradually, this guidance can be reduced as students become more confident and independent in their learning processes.

In a broader perspective, the Information Search Strategy is not merely an alternative instructional method but a highly relevant approach for addressing the demands of 21st-century education. Modern learning environments require students to master information literacy, critical thinking, problem-solving, and self-directed learning skills. By integrating this strategy into classroom practices, teachers help prepare students to navigate an information-rich world, make informed decisions, and engage in lifelong learning. Therefore, the Information Search Strategy contributes not only to improved learning outcomes but also to the development of essential competencies needed for academic success and future challenges.

## CONCLUSION

Based on the research and analysis that has been conducted, it can be concluded that the implementation of the information search strategy has proven effective in improving the biology learning outcomes of eighth-grade students at SMP Ittihad Makassar. This increase is demonstrated by the rise in students' average learning outcomes from 66.25 in Cycle I with a completion rate of 52% to 71 in Cycle II with a completion percentage reaching 92%. This finding indicates that the

information search strategy is able to encourage students' active involvement in the learning process through independent information search and processing activities, thus optimizing their understanding of biological concepts. Thus, this strategy not only contributes to improving students' cognitive achievements but also has the potential to support the creation of more active, innovative, and meaningful learning in line with the demands of 21st-century education.

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