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The Effectiveness of Learning Cycle 7E Model Assisted by Educational Games on Students' Science Learning Outcomes

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ABSTRACT

This study aims to investigate the effectiveness of implementing the Learning Cycle 7E model assisted by educational games in improving the learning outcomes of class XI F students at SMA Negeri 2 Palu. The research method applied is Classroom Action Research (CAR), which was conducted in two cycles with a total of 36 student participants. Each cycle consisted of four stages: planning, implementation, observation, and reflection. The material in the first cycle focused on "structure, function, and hormones in the human reproductive system," while the second cycle discussed "menstruation, fertilization, gestation, and disorders of the human reproductive system." Data collection was carried out through learning achievement test instruments in the form of pretests and posttests, and the data were analyzed using the percentage of learning mastery. The results revealed that in the first cycle, student mastery increased from 22% (pretest) to 89% (posttest). In the second cycle, the mastery level rose from 17% to 92%. These findings indicate that the implementation of the Learning Cycle 7E model is effective in science learning and has a significant impact on improving student achievement. Overall, it can be categorized as producing a very high level of mastery, proving the potential of integrating the Learning Cycle 7E with educational games in classroom practice.

INTRODUCTION

Based on the results of observations and interviews with biology teachers at SMA Negeri 2 Palu, classroom instruction tends to be teacher-centered, while students remain passive during the learning process and show relatively low interest. The limited use of varied teaching models and media has an impact on student achievement. The lack of student engagement with the subject matter results in diverse learning outcomes, where some students only meet the minimum standard, and several others fail to reach the KKTP (Criteria for Achieving Learning Objectives) of 75 in Biology. Therefore, teachers need to select and implement appropriate learning models that can create more engaging learning situations. Education is essentially a process of interaction between teachers and students to build meaningful learning experiences (Batania et al., 2025). Within the field of education, a learning model is understood as a framework or guideline that assists educators in designing learning experiences both inside and outside the classroom, as well as in developing teaching materials (Sari et al., 2023). Its purpose is to structure the curriculum, content, and instructional processes. One relevant model is the Learning Cycle 7E, which consists of a sequence of stages designed to support student understanding: Elicit (activating prior knowledge), Engage (stimulating interest and aligning perceptions), Explore (conducting investigations), Explain (clarifying concepts), Elaborate (applying knowledge), Evaluate (assessing understanding), and Extend (expanding concepts) (Winda et al., 2023).

According to a study conducted by Yuberti et al., (2019), the Learning Cycle 7E model has been proven effective in improving student achievement and enhancing critical thinking skills. Similarly, Noviardila & Nur (2021) and Holilah et al., (2020) reported significant improvements in student performance, particularly when compared to conventional teaching methods. Moreover, this model has also been shown to strengthen students' critical thinking abilities, as demonstrated by the findings of StaviniBELIA (2022). These results align with Bambulu et al., (2022) view that active, student-centered learning methods—such as the Learning Cycle 7E—can have a positive impact on learning outcomes. Meanwhile, learning itself is understood as a dynamic interaction between teachers and students, either directly or through various methods and media (Winda et al., 2023).

Instructional media function as essential tools that facilitate interaction and understanding between teachers and students, thereby supporting the learning process (Wulandari et al., 2023). One medium that has become increasingly popular is educational games. Many schools in Indonesia are now equipped with adequate technological facilities to help students develop their potential (Launin et al., 2022). According to Dotutinggi et al. (2023), educational games integrate elements such as sound, images, video, and animation, all of which contribute to making information easier for learners to retain. In particular, animations in educational games have been shown to enhance students' memory. Hendrawan and Marlina (2022) reported that the majority of students—approximately 86%—agree that using educational games as a learning medium makes it easier for them to understand the subject matter. Rohmatin (2023) defines educational games as web-based applications that capture students' attention and motivate them to learn. These applications serve not only as learning resources and media but also as engaging assessment tools for students. Meanwhile, Walidah et al. (2022) emphasized that the use of educational games aims to measure the extent of their influence in improving students' learning outcomes and interest.

Many students struggle with low motivation and learning difficulties, which negatively affect their performance (Ananda et al., 2020). A key challenge in today's education is the dominance of teacher-centered approaches, often leading to limited enthusiasm and shallow understanding (Aprianingsih et al., 2020). To address this, learning models and media must be aligned with the subject matter. Teaching challenges arise not only from insufficient mastery of content but also from a lack of variety in methods, media, and strategies (Yandi et al., 2023), which creates monotonous classrooms and weakens outcomes. Learning outcomes are essential indicators of student success in meeting instructional goals (Setiyawan, 2020). They represent competencies gained through school activities and are usually assessed through tests to evaluate both individual and group achievement (Citra & Rosy, 2020). In essence, learning outcomes serve as benchmarks of the knowledge and skills students acquire during the learning process.

Based on the description above, previous research still lacks research regarding the effectiveness of the 7E learning cycle model assisted by educational games on students' biology learning outcomes. So this research will focus on the effectiveness of the 7E Learning Cycle Model assisted by educational games to improve the learning outcomes of class XI F students at SMA Negeri 2 Palu.

METHOD

This study employed the Classroom Action Research (CAR) method, a type of research in which the teacher or researcher directly implements an intervention in the classroom. The process follows the model developed by Kurt Lewin, which consists of four main steps: planning, acting, observing, and reflecting (Rivaldo et al., 2023). The research cycle is carried out repeatedly within a single loop.

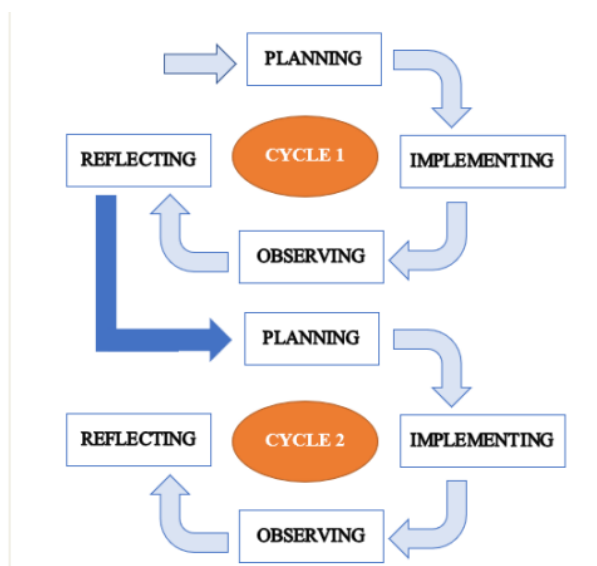


Fig 1. Classroom Action Research Model with Two Cycles
(Source: Dewi et al., 2022 in Slameto, 2015)

This study was carried out by designing and implementing learning activities using educational games for Grade XI F students at SMA Negeri 2 Palu. Observations were conducted to assess the improvement of students' learning outcomes during the biology learning process. The findings from these observations were then used as the basis for planning the next research cycle. The intervention was conducted in two cycles, with each cycle consisting of two meetings. The research subjects were 36 students from Grade XI F at SMA Negeri 2 Palu, and the study took place from April to May 2025. Data collection was conducted through learning achievement tests, namely a pretest and posttest, which were used to measure the learning outcomes of the students. The collected data were then analyzed to determine the percentage of students who successfully achieved the learning target, which was based on individual mastery if their scores reached the Minimum Mastery Criteria (KKM) of 75, as set by the school. The calculation was performed using the following formula

$$KB = \frac{T}{T_t} \times 100\% \text{ (Panjaitan, 2020)}$$

Explanation:

KB = Learning Mastery

T = Total score obtained by the student

Tt = Maximum total score

A class is considered to have achieved mastery (classical completeness) if more than 75% of the students reach the Minimum Mastery Criteria (KKM) set by the school, which is 75. The calculation is carried out using the following formula:

$$P = \frac{\sum \text{completed student}}{\sum \text{student}} \times 100\% \text{ (Panjaitan et al., 2020).}$$

Explanation:

P = Percentage of Learning Mastery

Σ students achieving mastery = Number of students who have successfully met the learning criteria

Σ students = Total number of students

The assessment scale for evaluating student learning achievement, which can be used by teachers, is presented by Panjaitan et al. (2020) and shown in Table 1.

Table 1. Criteria for Student Learning Achievement Levels (%)

No	Value Range	Criteria
1	90%-100%	Very high
2	80%-89%	High
3	65%-79%	Moderate
4	55%-64%	Low
5	0%-54%	Very Low

RESULTS AND DISCUSSIONS

RESULTS

This study was carried out with optimal efforts to improve students' learning outcomes. The Classroom Action Research was conducted in two cycles, each consisting of two learning sessions. In the first meeting, a pretest was administered, while in the second meeting, a posttest was given. In Cycle 1, the material covered focused on the structure, functions, and hormones of the human reproductive system. The results of the pretest and posttest can be found in Table 2.

Table 2. Individual and Classical Mastery Pretest and Posttest Cycle 1

Deskripsi	Number of Student (Pretest)	Percentage (Pretest)	Number of Student (Posttest)	Percentage (Posttest)
Mastery	8	22%	32	89%
Not mastery	28	78%	4	11%

In Cycle 2, the material covered included menstruation, fertilization, gestation, and disorders of the human reproductive system, which served as a continuation of the content from Cycle 1. The results of the pretest and posttest can be found in Table 3.

Table 3. Individual and Classical Mastery Pretest and Posttest Cycle 2

Deskripsi	Number of Student (Pretest)	Percentage (Pretest)	Number of Student (Posttest)	Percentage (Posttest)
Mastery	6	17%	33	92%
Not mastery	30	83%	3	8%

DISCUSSIONS

Based on Table 2 in Cycle 1, it can be seen that there were differences in the learning outcomes of Class XI F students. In the pretest, only 8 students achieved the KKTP (Criteria for Achieving Learning Objectives) of 75, compared to 28 students who did not meet the standard. This indicates that, in terms of classical mastery, the students' level of achievement was categorized as very low. The overall mastery rate from the pretest was 22%. In the posttest, there was an improvement in students' understanding of the material taught using the Learning Cycle 7E model supported by educational games. This is evident from the individual mastery results, where 32 students successfully reached the KKTP, while only 4 students did not. The classical mastery rate increased to 89%, which is categorized as high. These results demonstrate that Class XI F students at SMA Negeri 2 Palu successfully learned the material on Structure, Function, and Hormones in the Human Reproductive System during the biology lessons.

In Table 3 of Cycle 2, the pretest and posttest results showed a pattern similar to Cycle 1, with differences in the learning outcomes of Class XI F students. During the pretest, only 6 students scored above the KKTP (Criteria for Achieving Learning Objectives), while 30 students did not meet the standard. The classical mastery level after the pretest was 17%, categorized as very low. After implementing the Learning Cycle 7E model supported by educational games, student achievement improved. A total of 33 students achieved the KKTP, while only 3 students remained below the standard. The classical mastery rate increased to 92%, which falls into the very high category. This indicates that Class XI F students at SMA Negeri 2 Palu successfully learned the material on Menstruation, Fertilization, Gestation, and Disorders of the Human Reproductive System in biology lessons.

These findings are consistent with the study by Noviardila & Nur (2021), who reported significant improvements in student scores after applying the Learning Cycle 7E model. Similarly, Walidah et al. (2022) highlighted that the use of educational games has a strong influence on enhancing both learning outcomes and student interest. The findings of this study are also consistent with research by Bambulu et al. (2022), which found that each stage of the 7E Learning Cycle model plays a significant role in improving student learning outcomes. The model guides students from recalling prior knowledge (Elicit) and sparking their curiosity (Engage), to conducting experiments (Explore), explaining the concepts they discover through discussion (Explain), and applying them through problem-solving (Elaborate). The cycle concludes with an Evaluate phase to assess understanding and an Extend phase, where students apply the concepts to real-world situations.

The Learning Cycle 7E model supported by educational games has been proven effective in improving the learning outcomes of Class XI F students at SMA Negeri 2 Palu. It enables students to recall subject matter more easily, motivates them to be more active, fosters curiosity, trains them to express their opinions, and enhances critical thinking skills. This is proven from the research results, that the percentage of completion increases with each cycle. Furthermore, the Learning Cycle 7E is considered one of the effective instructional models, as its seven stages help students develop a solid understanding of scientific concepts, particularly in science learning.

CONCLUSION AND SUGGESTION

Based on the study's findings, the implementation of the 7E Learning Cycle model with educational games in Class XI F at SMAN 2 Palu was proven to be effective at enhancing student learning outcomes. This is supported by the classical mastery results, which reached a high criterion of 89% in Cycle 1 and a very high criterion of 92% in Cycle 2. Teachers can effectively apply this model in the learning process as it has been shown to be conducive to learning and capable of improving students' problem-solving skills. Furthermore, it enhances their cognitive abilities by emphasizing a deep, core understanding through the extension of concepts. This study faced certain limitations, particularly in terms of time and energy, as the school research schedule often overlapped with university coursework, requiring extra effort and careful time management from the researcher. For future studies, it is suggested to focus on a single type of educational game that can be utilized by students, both those with and without access to gadgets. It is the author's hope that this article may serve as a valuable reference source.

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