JURNAL TARBIYAH

E-ISSN : 2597-4270 | P-ISSN : 0854-2627
Volume 30, Number 1, June 2023, pp. 1-12

USE OF EDUCANDY IN IMPROVING SCIENCE LEARNING OUTCOMES IN ELEMENTARY SCHOOLS

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DOI : http://dx.doi.org/10.30829/tar.v30i1.2519

ARTICLE INFO

Article History
Received : May 12, 2023
Revised : June 24, 2023
Accepted : June 30, 2023

Keywords
Research anxiety,
Thesis writing anxiety,
Mixed-methods study

ABSTRACT

This research is based on the low percentage of science learning outcomes in elementary schools. The aim of this study is to improve students' understanding of science concepts and learning outcomes in grade V in elementary school Medan City. This will be achieved through the application of an ICT-based drill and practice learning model using the Classroom Action Research method, specifically John Elliot's PTK model. The data collection techniques, including tests and non-tests (observation and documentation), were conducted in two cycles. The final result showed an average completeness percentage of 90%, This study shows that the implementation of an appropriately applied and structured ICT-based drill and practice learning model can improve the learning outcomes of grade V elementary school students, The findings also demonstrate an improvement in students' concept understanding and learning outcomes when applying an ICT-based drill and practice learning model.

Introduction

The advancement of information and communication technology has a significant influence on various aspects of human life, especially in the field of education. Technology-based education has become crucial in the digital era, where the main component is human beings who are capable of creating new values through technological development. The current advancement of Industry 4.0 and Society 5.0 technology enables us to utilize modern science-based knowledge, such as IoT, AI, and robotics, to fulfill human needs, aiming for a more comfortable and effective way of living. In a national survey conducted in the United States, less than 50% of teachers were found to frequently apply technology during teaching, while technology was more commonly used to accomplish administrative tasks. Teachers and aspiring educators are challenged to integrate technology into their teaching practices (Liu, 2016).

Educational technology is not a homogeneous 'intervention', but rather a diverse range of modalities, tools, and strategies for learning. Therefore, its effectiveness depends on how well the technology assists teachers and students in achieving their desired learning objectives (Ross et al., 2020). Despite the lingering skepticism about the use of ICT for learning, the emergence of technology-based learning concepts in education depicts a learning environment where the interaction between students, learning materials, peers, or infrastructure is mediated through information technology (Janson et al., 2020)

The research by Julie A. Gray and Melanie DiLoreto reveals "*Students' perceived learning outcomes and student satisfaction have been studied in the past* (Gray & Diloreto, 2016)*"*. Referring to the study, various factors can influence students' perceptions of learning outcomes and satisfaction with their educational experience. Understanding these factors can assist educators and academics in identifying ways to improve learning and student motivation in both *online and traditional learning environments.* Various factors have an impact on perceived positive learning outcomes in different contexts and learning environments. While this study differs from previous research in that it is important to examine students' perceptions of learning, students consider interaction, motivation, learning content, and the role of educators as the main determinants of positive learning outcomes. Positive learning outcomes also have an impact on student satisfaction (Baber, 2020).

The use of technology in educational settings is associated with many social, economic, and pedagogical benefits. The author explains that the use of technology has significant value in enhancing communication and collaboration between students and teachers, and in the reform of teaching and learning (Karaca, 2011). The pedagogical objective of learning outcomes is important. It is designed to provide a clear indication of the learning goals that educators want to achieve with the learners. By doing so, they empower the learners, as equipped with the knowledge of the learning objectives, students can map their own learning towards those objectives. This is a potential development that allows outcome-based educators to be more "student-centered" and different from previous models where educational goals are often considered hidden and mostly based on what is taught by educators (Scott, 2011).

Effective learning can maximize the knowledge and time used to study course materials. Thus, learning objectives such as understanding concepts, achieving good grades, and advancing to the next level can be achieved within the targeted time. The learning process involves interaction between the teacher and the students. The learning design created by teachers aims to improve the quality of student learning. Therefore, the learning design must be

effective so that the course material studied by students can enter long-term memory (Tarsidi et al., 2017).

The use of models in learning must follow certain principles and be tailored to the students' conditions. The aim of the learning process is for students to achieve the expected competencies. To achieve the learning objectives, the learning process needs to be systematically designed.

The use of drill methods can significantly improve skills and achieve desired results. The drill method is a teaching method to facilitate children's understanding of the depth of the subject matter. Learning the material should start from the easy, slightly difficult, to the truly difficult. The Drill and Practice learning model is a teaching method in which its application is done repeatedly to produce skills, and there is a need to remember mathematically (Khoirunisa et al., 2021). The learning outcomes state that learning outcomes are changes that occur in individuals who are learning, not only changes related to knowledge but also to shape skills and self-esteem in the learner. Learning outcomes are the result of a person's learning process. Learning outcomes are related to changes in the individual who is learning. The forms of changes as learning outcomes are changes in knowledge, understanding, attitudes, behavior, skills, and abilities (Yohaidah, 2021).

The research by Imma Rachayu, Septian Jauhariansyah, and Erlinda Juwita explains the benefits of the drill and practice method in effectively enhancing students' learning activities and engagement, as evidenced by indicators such as focus, activity, asking questions, providing answers, criticism, generating ideas, and productivity during the learning phase (Khoirunisa et al., 2021).

The study on the technology-based Drill and Practice learning model has been previously researched by scholars who have examined it from the literature aspect of Technology-Based Learning Drill and Practice Model (Khoirunisa et al., 2021), The Development of Interactive Web-Based Learning Media on Database Material Using the Drill and Practice Learning Method (Yulida & R. Ati Sukmawati, 2021), Analysis of Fundamental Technology-based Teaching Methods (Janson et al., 2020), The learning system that utilizes artificial intelligence technology, Mesarovician Abstract Learning Systems (Cody, 2021).

Observing the above literature review, a gap has been identified as a form of novelty and *gap analysis* in this research compared to previous studies. The *gap analysis* includes (1) the difference in research methods used, where previously no one has conducted research using the classroom action research method, and (2) the ecosystem material in science learning has not

been previously researched with reference to the implementation of the Drill and Practice learning model based on *educandy*, (3) *Blended learning* with technology-based *outdoor learning* using *educandy*, (4) The implementation of Drill and Practice learning model based on Educandy in elementary schools in Medan City. Based on this, the researcher conducted further analysis, which is summarized in the title, "The implementation of the Drill and Practice Learning Model based on ICT to improve the learning outcomes of Science in Islamic and Elementary Schools".

Educandy is a relevant topic of discussion in the context of outdoor learning and science education because: It is an online tool that can be used to create interactive educational games and activities that can be adapted for outdoor learning environments. It enables personalized learning experiences that meet the needs and interests of individual students, which can help engage students and improve learning outcomes. Educandy provides real-time feedback, which can help students identify areas that require improvement and stay motivated in their learning. It is a technology-based tool that can be used to enhance traditional classroom teaching and make science education more engaging and interactive. Educandy is a cost-effective and easily accessible tool that can be used by teachers and students to create and share educational content. Overall, Educandy can be a useful tool to enhance science education in outdoor learning environments and improve learning outcomes for students.

This study will implement a drill and practice learning model based on ICT to enhance the learning outcomes of elementary school students in science by utilizing technology appropriately, and providing a better learning experience for the learners. Through this research, it is hoped that it can provide scientific information related to the application of drill and practice learning models based on Information and Communication Technology (ICT) to improve the learning outcomes of Science for elementary school students (MI/SD), and add to the scientific knowledge about the integration of knowledge in the elementary school level. What sets this research apart from previous studies is the utilization of a novel approach that has not been explored before. This research has a greater impact in the field, leading to discoveries, innovations, and new applications.

Research Methodology

This study was conducted in one of the elementary schools in Medan city, on fifth-grade students during the even semester of the academic year 2022/2023. The subjects of this study were 21 fifth-grade students in Medan city, consisting of 8 male students and 13 female

students. This study used the *Classroom Action Research* design with John Elliot's PTK model with the following scheme:

Figure 1. John Elliot Classroom Action Research Model.

The data collection techniques used were through Tests and Non-Tests (Observation and Documentation). Test technique is a set of questions that must be answered, questions that must be selected/responded to, or tasks that must be performed by test participants with the aim of measuring a certain aspect of the test participants (Endang Purwanti, 2008). Observation is the act of observing behavior in a particular situation (Nana Sudjana, 2008). Documentation is the process of collecting data on things or variables in the form of field notes, transcripts, books, newspapers, magazines, inscriptions, meeting minutes, agendas, and so on (Arikunto, 2006).

The data analysis technique used is a combination of qualitative and quantitative analysis. Qualitative analysis is an analysis based on the obtained data, which is then developed into a hypothesis using various data collection techniques (data triangulation). Meanwhile, quantitative analysis uses statistical methods (Sugiyono, 2008). The quantitative data on the improvement of learning outcomes are presented using percentage formulas in accordance with the criteria of success (Zaenal, 2009).

Results

The results of the Classroom Action Research through the outdoor learning model based on educandy drill and practice using Information and Communication Technology (ICT) obtained from the tests and non-tests conducted in two cycles, with each cycle having one meeting for two hours of class time. The results showed an improvement in the understanding

and learning outcomes of fifth-grade students in an elementary school in Medan city. The test results were obtained from observations during the learning process and evaluations conducted at the end of each meeting in each cycle to assess and measure students' improved understanding. The qualitative data obtained was in the form of observations during the learning process, which consisted of observing students' activities presented in qualitative descriptive form. The test results obtained in each evaluation were in quantitative form. The following are the learning outcomes of fifth-grade students in an elementary school in Medan city through the outdoor learning model based on educandy drill and practice.

The first stage before conducting the research process is to carry out an initial observation with the aim of understanding the actual conditions in one of the elementary schools in Medan city.

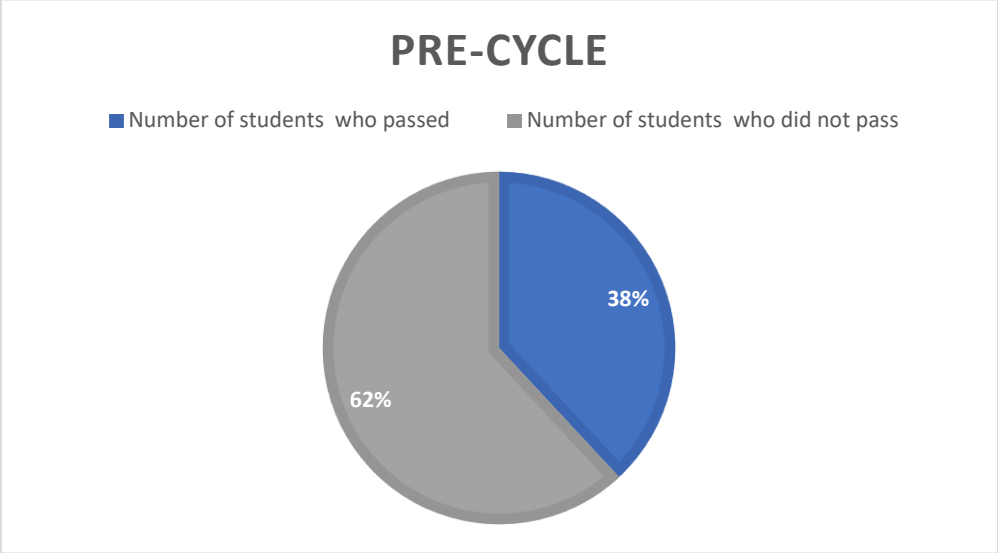

Figure 2. Pie Chart of Student Mastery Percentage

The observation activity in the pre-cycle was carried out on the activities of the teacher and students. The observation was conducted during the learning process until it was completed. The result obtained was a low percentage of mastery of science subject learning outcomes for grade V students at one of the primary schools in Medan, which was only 19%, With these findings, the researcher conducted analysis and planning, which was then implemented in the learning process through the drill and practice learning model based on ICT.

The observation results of student activities in cycle I show that students have already demonstrated a positive attitude towards the learning process in cycle I, such as paying attention to the teacher when explaining the learning material and performing learning activities well.

After conducting learning improvement activities in cycle I, the evaluation results have shown an increase with a completion percentage of 38%. Below is the pie chart depicting the percentage of student completion:

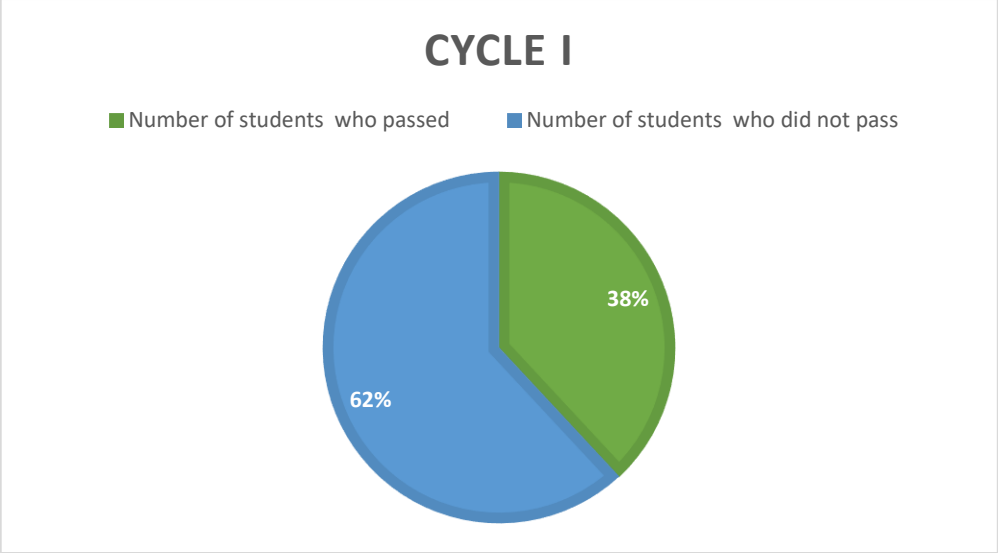

Figure 3. Pie Chart of Students' Completion Percentage

After obtaining the results in cycle I, the researcher felt that there was still room for further improvement in achieving learning outcomes in cycle I. With these findings, the researcher conducted an analysis and re-planning while monitoring its impact and evaluating the learning process by continuing the action steps in cycle II.

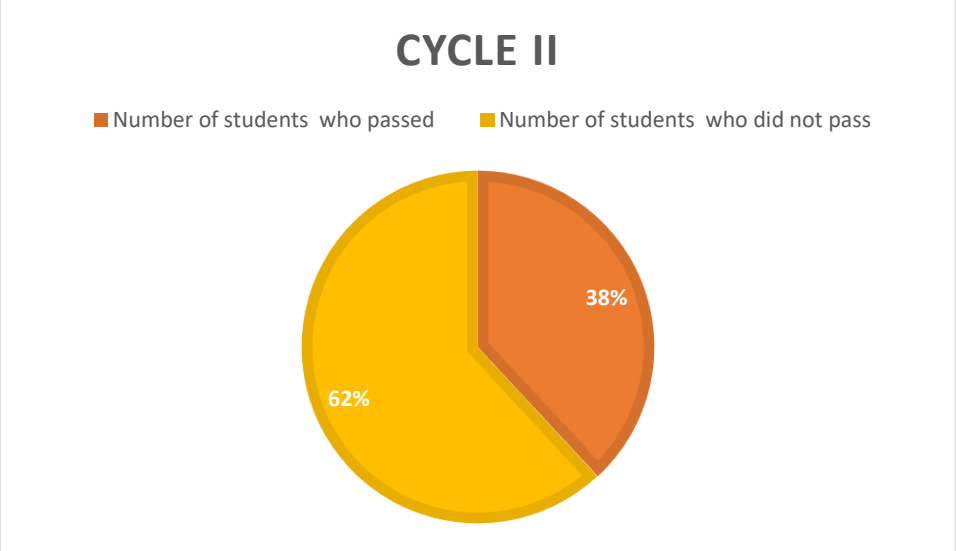

Figure 4. Pie Chart of Students' Completion Percentage

Based on the pie chart, there has been a significant increase in the percentage of student learning outcomes completion rate in Grade 5 elementary school in Medan city, reaching 90% after conducting the action and evaluation. This indicates an improvement in student learning outcomes using the outdoor learning model based on Educandy with drill and practice, particularly in science subjects on the topic of Ecosystems in Grade 5 elementary school in Medan city. As the majority of students achieved a score above the Minimum Mastery Criteria (KKM), based on these results, the researcher decided to conclude the cycle, and the outdoor learning model based on Educandy was successfully applied and able to improve students' concept comprehension and learning outcomes. The results of the pre-cycle, cycle I, and cycle II on student learning outcomes can be seen in the following figure:

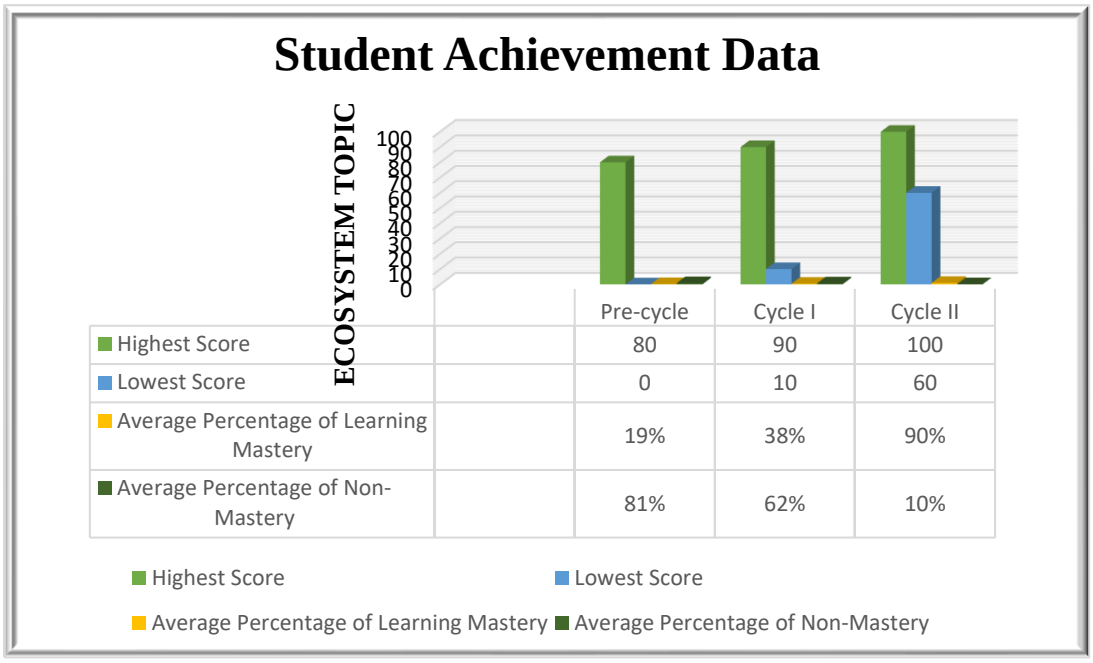

Figure 5. Student Learning Outcome Data

Discussion

The improvement in students' concept comprehension and learning outcomes can be determined through observations and tests at the end of each cycle meeting. Based on the results of the research, students' concept comprehension and learning outcomes can be known from the test results at the end of each meeting.

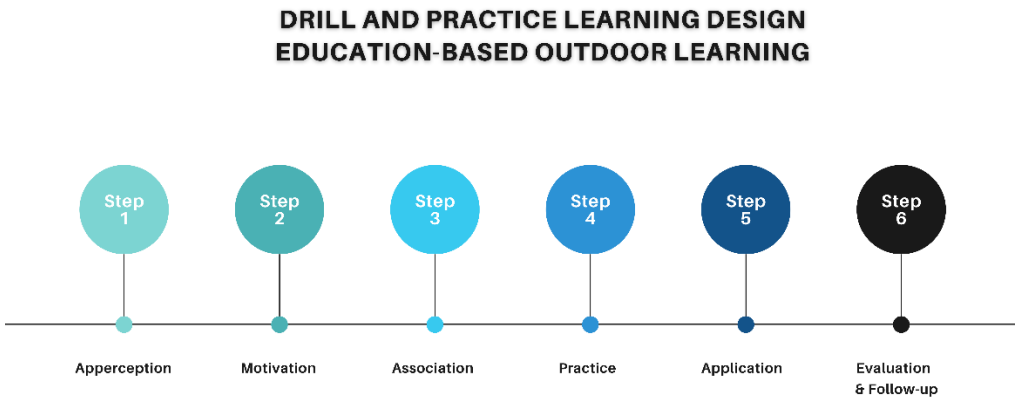

Figure 6. Design of Drill and Practice Learning Model Based on Information and Communication Technology (ICT)

The instructional activity design with the outdoor learning model based on Educandy had a positive impact on improving the understanding and learning outcomes of fifth grade students. Through this learning design, repeated practice made the students' understanding broader, which made them ready to use their skills and acquire motoric and mental abilities, thus forming agility and speed in accordance with what they learned in the implementation of the learning process. This gives the students confidence and equips them with special skills that can be useful in implementing them in their daily lives.

Based on the results obtained during the research implementation, which consisted of two consecutive cycles, it is known that the implementation of the drill and practice learning model based on Information and Communication Technology (ICT) applied properly and structured can improve the learning outcomes of the 5th grade students of elementary school in Medan City. This can be seen that the use of outdoor learning model based on educandy, the students' understanding continues to increase from cycle I to cycle II. With the increasing students' understanding, of course, it is also in line with the increase in mastery learning scores. This, of course, cannot be separated from the role of the teacher who continues to improve the ability to optimize the use of the outdoor learning model based on educandy.

This research is in line with a study titled "The Effect of Using Learning Videos on Students' Understanding of Science Concepts". The results of that study showed that the use of learning videos had an effect on students' understanding of science concepts (Esti Mulyati,

2022). This research is also in line with a study that has been conducted titled "The Difference of the Effect of Learning Using Interactive Multimedia Model of Drills and Practice and Simulation Model on the Learning Outcomes of Digital Simulation Subjects in SMK N 2 Sawahlunto" (Desri Adita et al., 2015). The study shows that there is a difference in learning outcomes between the implementation of the drills and practice model and the simulation model. The learning outcomes of students using the drills and practice model are better compared to those using the simulation model.

The results of this study are supported by the opinion of Geisert and Futrell, who stated that through the drills and practice model, certain habits will be instilled in students in the form of exercises. With continuous practice, it will become a habit. Furthermore, it can also increase the speed, accuracy, and perfection in performing something, and can also be used as a way to review material that has been presented. Applying the drills and practice learning model is expected to provide a more concrete learning experience through the provision of exercises aimed at testing students' performance and abilities, by measuring the speed of students in completing the given practice problems (Rusman,2013). The difference between this research and previous research is that this research uses a new approach that has never been explored before, this research has a greater impact on the field, leading to new discoveries, innovations and applications.

Conclusion

The implementation of the educandy-based outdoor learning model carried out in the 5th grade of elementary schools in Medan City can improve students' understanding of concepts and increase their learning outcomes in science subjects, particularly on the topic of Ecosystem in the 5th grade of elementary schools in Medan City. This can be seen from the average percentage of learning mastery of 21 students during the pre-cycle which was 19%, followed by 38% in cycle I, and 90% in cycle II. Considering these results, the researcher decided to end the cycle, indicating that the outdoor learning model based on educandy has been successfully implemented and able to improve students' understanding of concepts and increase their learning outcomes

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