

## Implementation of Guided Inquiry Model in Human Movement System Learning to Improve Students' Science Literacy Skills

<sup>1</sup>Rezeki Sri Agustina

<sup>1</sup>Postgraduate Biology Education Study Program, State University of Medan  
Jl. William Iskandar Ps. V, KenanganBaru, Deli Serdang, Sumatera Utara, Indonesia

\* rezekisriagustina85@gmail.com

### **Abstrak**

*Penelitian ini bertujuan mengetahui pengaruh penerapan model inkuiri terbimbing terhadap kemampuan literasi sains siswa kelas XI SMA. Penelitian dilakukan di SMA Negeri 1 Aek Natas dengan sampel sebanyak 2 kelas yang ditentukan dengan teknik cluster random sampling, yaitu kelas eksperimen sebanyak 35 siswa dan kelas kontrol sebanyak 34 siswa. Data penelitian dikumpulkan menggunakan instrumen tes yang terdiri dari tes kemampuan literasi sains (5 soal bentuk esai). Data dianalisis menggunakan pendekatan independent sample t-test dengan bantuan program SPSS. Hasil penelitian menunjukkan bahwa: penerapan model inkuiri terbimbing berbantuan aplikasi kodular berpengaruh terhadap kemampuan literasi sains siswa ( $p=0,013$ ).*

*Kata Kunci : Penerapan, Model Inkuiri Terbimbing, Kemampuan Literasi Sains.*

### **Abstract**

This study aims to determine the effect of the application of a guided inquiry model on the scientific literacy skills of grade XI high school students. The study was conducted at SMA Negeri 1 Aek Natas with a sample of 2 classes determined by cluster random sampling technique, namely the experimental class of 35 students and the control class of 34 students. Research data were collected using a test instrument consisting of a scientific literacy ability test (5 essay questions). Data were analyzed using an independent sample t-test approach with the help of the SPSS program. The results of the study showed that: the application of a guided inquiry model assisted by the Kodular application had an effect on students' scientific literacy skills ( $p = 0.013$ ).

**Keywords:** Implementation, guided inquiry model, scientific literacy skills, codular.

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## 1. INTRODUCTION

HOTS-oriented learning encompasses three aspects: knowledge transfer, critical and creative thinking, and problem-solving (Siahaan et al., 2021; Harun et al., 2023). Critical thinking can be defined as a person's effort to verify the accuracy of information using evidence, logic, and awareness of bias. Critical thinking skills facilitate students' ability to think complexly and systematically to find solutions to problems. Biology, as a branch of science, plays a crucial role in the development of various skills, such as problem-solving, collaboration, communication, critical thinking, literacy, creativity, and creative thinking, developed through learning and research to address various societal issues (Silaen & Sipahutar, 2022). Through biology learning, students are expected to develop strong and optimal scientific literacy skills.

When it comes to enhancing pupils' thinking abilities, learning models are an extremely important factor. A learning model that instructors can adopt to train and acquaint students with scientific literacy is the guided inquiry learning model. This model refers to the practice of exploring problems using scientific methods in order to uncover explanations. Instructors can implement this approach to accomplish both of these goals. According to Ningtias and Soraya (2022), the function of the teacher in this approach is to act as a guide and facilitator, thereby enabling pupils to have the freedom to explore their capabilities to the fullest extent possible. It has been demonstrated in a number of earlier studies that the guided inquiry learning model has the potential to enhance students' scientific literacy skills (Erdani et al., 2020; Nasir et al., 2023) and student learning motivation (Wartini, 2021), which ultimately results in improved or superior learning outcomes and achievement (Amijaya et al., 2018; Lestari et al., 2023). As stated by Nasir et al. (2023), the implementation of the guided inquiry learning model results in improvements in scientific literacy. These improvements involve not only the scientific process but also the content and context of the scientific inquiry.

Students may also benefit from selecting and utilizing relevant learning resources in addition to learning models, which can assist them in comprehending the topic. According to Sintiani et al. (2020) and Tarigan et al. (2023), effective learning media provides students with the ability to visualize abstract and complicated concepts in more tangible and straightforward ways, hence making it simpler for them to construct knowledge or knowledge in general. Media for learning helps pupils increase their performance as well as their memory. Furthermore, according to Purba et al. (2019), new learning resources have the potential to encourage contextual investigations among students, which in turn can foster critical thinking and enhance academic accomplishment. The development of learning media that may be utilized to enhance the quality of learning can be made possible by utilizing the advancements in information and technology (IT) that have occurred in the digital era. The use of information technology-based learning media, often known as multimedia, even makes it possible to conduct learning processes without there being any face-to-face interaction between the instructors and the students. The use of multimedia in the field of biology has evolved into an instrument that is absolutely necessary for educators (Tarigan et al., 2023).

One of the products of improvements in information technology that can be exploited in the field of education is web-based applications like Kodular. According to Ferdiansyah et al. (2022), Kodular is a web-based application development platform that enables users to create learning media with Android-based mobile applications (on smartphones) without the need for traditional programming. This significantly contributes to the development of students' creative dimensions, as stated by Wahyuni et al. (2023). Kodular can also be used as a good alternative in the process of designing and developing digital teaching materials (Safitri & Hayuhantika, 2023; Hasibuan et al., 2022). This methodology has been demonstrated to improve learning activities (Hendriawan et al., 2023) and,

as a result, enhance critical thinking skills (Rismayanti et al., 2022) and scientific literacy (Rizqiyani et al., 2022), which ultimately leads to improved learning outcomes for students (Purnama et al., 2023).

The implementation of the Kodular application-assisted guided inquiry model in biology learning on the human locomotor system in grade XI high school has not been the subject of any research as of yet. The goal of this research is to increase students' critical thinking abilities and scientific literacy. In light of this, the purpose of this study is to investigate the impact that the implementation of a guided inquiry model, with the assistance of the Kodular application, has on the enhancement of students' critical thinking abilities and scientific literacy in the context of learning biology on the subject matter of the human locomotor system in the eleventh grade of high school.

## 2. RESEARCH METHODS

SMA Negeri 1 Aek Natas, which can be found at Jalan Linsum Bandar Durian in the Aek Natas District of the North Labuhanbatu Regency, was the location where this research was carried out. The investigation was carried out during the even semester of the 2024/2025 academic year, beginning in January 2025 and continuing for a total of two months, beginning in February 2025. Both the academic calendar and the biology learning schedule at SMA Negeri 1 Aek Natas were taken into consideration while adjusting the timing for the research. For the purpose of this study, the population consisted of all 207 students who were enrolled in class XI at SMA Negeri 1 Aek Natas during the academic year 2024/2025. These students were divided into six distinct classes. Due to the fact that the classes that were used as research samples were classes that had been formed in the past without any changes being made to the existing class situation and conditions, this research utilized an approach that was considered to be nearly experimental. This study was carried out by employing a guided inquiry approach that was supported by a kodular application (experiment), in contrast to direct learning that was supported by PowerPoint slide media (control). There were two types of variables that were used in this investigation: independent variables and dependent variables. In this study, the independent variables consist of the application of a guided inquiry model with the assistance of the Kodular application (experiment) and direct learning with the assistance of PowerPoint presentations (control). The dependent variable, on the other hand, is the scientific literacy of the students.

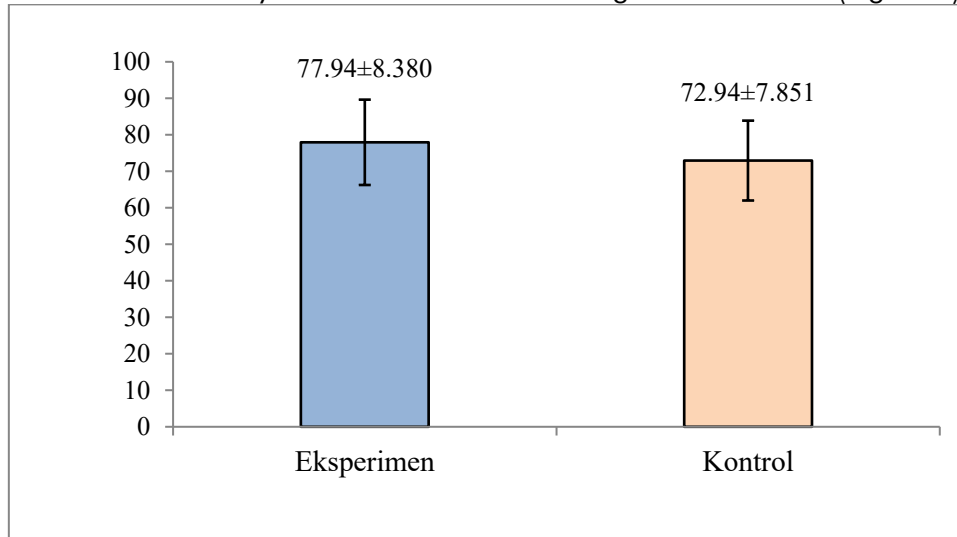
## 3. RESULTS AND DISCUSSION

This research is a quasi-experimental research that aims to analyze the effect of the application of a guided inquiry model assisted by the Kodular application on students' scientific literacy abilities in learning about the human motor system.

### ***The Effect of the Guided Inquiry Model Assisted by the Kodular Application on Students' Scientific Literacy Abilities***

The scientific literacy skills of students in the experimental class, after being taught using the guided inquiry model assisted by the Kodular application, obtained an average post-test score of  $77.94 \pm 8.380$ ; and the data were declared to have a normal distribution with a KS-Test value of 0.817 and a sig. value of  $0.516 > 0.05$  (Appendix 22). Meanwhile, the KLS of students in the control class, after being taught using the direct learning model assisted by PowerPoint slides, obtained an average post-test score of  $72.94 \pm 7.851$ ; and the data were declared to have a normal distribution with a KS-Test value of 0.964 and a sig. value of  $0.310 > 0.05$  (Appendix 22). Furthermore, the results of the homogeneity test for the KLS post-test data for both classes obtained a Levene's Test score of 0.549 with a sig. value.  $0.461 > 0.05$  (Appendix 22) which means that the variance of the KLS post-test data

between the two classes is declared homogeneous (meets the homogeneity criteria) or both classes come from a homogeneous (same) population. Based on the KLS post-test data, it shows that the average KLS post-test score of the experimental class is higher or greater than that of the control class with a difference in the average KLS post-test of the two classes of 5.0 ( $77.94 - 72.94 = 5.0$ ). This result is also proven by statistical testing on the KLS post-test data of the two classes and obtained  $t_{count} > t_{table}$ , namely  $2.557 > 1.665$  with a Sig. value of  $0.013 < 0.05$  (Appendix 22); which means that there is a significant difference in the average KLS post-test between the experimental class and the control class so that it can be concluded that the application of the guided inquiry model assisted by the kodular application has a significant effect on students' scientific literacy abilities in learning the human movement system of class XI of SMA Negeri 1 Aek Natas (Figure 1).



**Figure 1. Mean ± SD of Students' Scientific Literacy Skills in the Experimental and Control Classes After Treatment ( $t = 2.557$  and Significant  $0.013 < 0.05$ )**

### Discussion

The findings of this study, which pertain to the scientific literacy skills of students in both the experimental and control classes, indicate that the scientific literacy skills of students in the experimental class, following the implementation of the guided inquiry model with the Kodular application, were found to be higher ( $77.94 \pm 8.380$ ) compared to the students in the control class who implemented the direct learning model with the assistance of PowerPoint slides ( $72.94 \pm 7.851$ ). The findings of this study suggest that the utilization of the guided inquiry model in conjunction with the Kodular application has a more favourable impact on the scientific literacy abilities of students in comparison to the direct learning model that is implemented with the assistance of PowerPoint slides. Statistical testing results, with a probability value (sig.) of 0.013, which is less than the threshold of 0.05, provide additional support and evidence for this discovery. The application of the guided inquiry model with the Kodular application has a significant effect on students' scientific literacy skills when they are learning about the human locomotor system in grade XI of SMA Negeri 1 Aek Natas, according to these findings, which also provide an answer to the research problem formulation or objective. A number of earlier studies, including those carried out by Erdani et al. (2020), Kuswanto et al. (2021), Nasir et al. (2023), and Khoirudin et al. (2024), have also proved the impact that guided inquiry models have on the scientific literacy abilities of students.

It is vital for students to acquire scientific literacy skills in order to acquire knowledge about the human locomotor system. These abilities not only assist students in memorizing data, but they also assist students in comprehending topics in greater detail, connecting science with technology, and finding

solutions to problems that are associated with the health and disorders of the human locomotor system. The acquisition of scientific literacy also provides students with scientific knowledge (such as anatomy and the function of bones and muscles), scientific process skills (such as observing, classifying, and drawing conclusions), and scientific attitudes (such as critical thinking, thoroughness, and objectivity) that are pertinent to the subject matter. Therefore, in order to educate and develop students' scientific literacy abilities in the context of learning about the human locomotor system, appropriate and novel learning models are required. One of these models is the implementation of a guided inquiry learning model that is supported by the Kodular application.

Students can be encouraged to actively seek out and investigate problems related to the human locomotor system through the use of the guided inquiry model, which can also assist them in developing their scientific literacy skills. These skills include the ability to apply scientific knowledge to the resolution of real-world problems, to draw conclusions based on evidence, and to make decisions based on that evidence. Students have the opportunity to apply their scientific understanding of the locomotor system that they have gained through the guided inquiry methodology in order to comprehend the significance of physical activity and injury prevention, as well as effectively convey this information to other individuals.

With the help of the guided inquiry approach, students are supposed to be directed through the process of finding concepts through the use of investigative activities. Students are challenged to learn how to interpret and analyze events that are occurring in their surroundings through the use of discovery learning activities. These activities are not for the purpose of just memorizing information or getting the correct answer; rather, they are for the purpose of exploring and discovering solutions to issues. According to Khairatunnisa et al. (2024), the guided inquiry model is an excellent method for assisting students in the development of their literacy abilities because it places an emphasis on the process of active student involvement in the process of discovering answers to existing problems through exploration, experimentation, and documenting information. Students are encouraged to seek out or uncover meaning from the content that they are learning through the use of a paradigm known as guided inquiry. According to Khoirudin et al. (2024), students are exposed to questions or problems that they are required to address in order to uncover new information by contrasting their current knowledge with the reality of the situation.

According to the findings of the research conducted during the learning process, students in the experimental class that utilized the guided inquiry model with the Kodular application appeared to have a greater level of enthusiasm when it came to conducting investigations. These investigations consisted of searching for and collecting information and data, both from textbooks and from Kodular application-based media, in order to get answers to questions or solve problems. Additionally, it seemed as though the students were eager and engaged in the process of categorizing and evaluating the information that was acquired in order to prove hypotheses and draw conclusions. Students receive training to strengthen their literacy abilities through the inclusion of activities such as inquiry, research, search, and information collection. These activities also enable students to compare the material received with their prior knowledge and to present arguments and opinions in order to make conclusions and provide answers to problems that already exist.

#### **4. CONCLUSION**

The following conclusions were reached as a result of the findings of the investigation and the subsequent testing: Students in grade XI at SMA Negeri 1 Aek Natas experienced a favourable and significant influence on their scientific literacy abilities as a result of the use of the guided inquiry approach, which was helped by the Kodular program. This was the case when the students were studying about the human

locomotor system. The scientific literacy skills of students were found to be significantly higher in the Kodular application-supported guided inquiry model (77.94) compared to the direct learning model assisted by PowerPoint slides (72.94). According to the findings, conclusions, and implications shown above, the researcher proposes a number of different things, including the following: By implementing appropriate learning models and media, tailored to student characteristics and subject matter, and making sure that they are enjoyable and meaningful for the students, the results of this study can be used as consideration and input for biology teachers in their efforts to improve students' critical thinking skills and scientific literacy. Biologists can use this information to improve their students' ability to think critically and to be scientifically literate. According on the findings of the study, the researcher suggests that biology instructors develop and deploy the Kodular application-assisted guided inquiry paradigm.

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