Application of Project Based Learning in Basic Science Concepts Lecture

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Abstract. The 21st century requires complex skills and life skills from every generation. One of the most recommended learning models for meeting the skills needs of the 21st century is project-based learning. Therefore, the aim of this study is to analyze the types of design work done in a project-based learning model when lecturing on basic science concepts. This study used a qualitative descriptive method. The data collection method is observation. Survey data were analyzed using the Miles and Huberman approach. The results revealed three themes that can be implemented in a lecture on basic science concepts, based on the perceptions of the learning outcomes. The range of projects includes the creation of exercise blogs, mini-videos and easy-to-read books, as well as scientific articles. Therefore it can be concluded that there are many types of activities aimed at learning basic science concepts using project based learning.

Keywords: Application; Basic Science Concepts; Project Based Learning.

1 Introduction

Project Based Learning (PjBL) is a type of model that organizes learning through specific topics [3]. Projects are the teacher's work on difficult or problematic questions [1]. Students will be involved in planning, problem solving, decision making and investigative activities. Students have the ability to accumulate and integrate new knowledge based on practical work experience over a long period of time [2] [5].

The use of components to implement PjBL has been developed based on various theories. Implementing PjBL starts by asking a question for students to practice [8]. Detailed studies will follow, such as identifying the components that are included and needed. Then, create a project plan and create a project implementation schedule, and the plan is agreed between the teacher and the students [6] [9]. The Plan includes rules for conducting activities, selecting activities that support answering basic questions using a variety of problem-solving approaches or sources, and providing explanations for the selection of methods or strategies [7]. The goal is for students to be able to generate multiple ideas, approaches, or ideas and to see the problem from different perspectives.

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In PjBL teaching, the teacher is responsible for monitoring the students' work while working on the project so that the students develop their thinking and get good results [10]. It is also important to conduct tests or evaluations of the results of the program so that the teacher can assess the progress of the students, and receive feedback on the level of understanding of the students [11]. This also occurs in the role of the teacher as a supporter of PjBL learning. At the end of the study, it is important to consider the activities and results of the program and hope to use and solve other problems in daily life [13].

In addition, basic science is a compulsory subject in primary school or madrasa ibtidaiya curriculum [12]. This course explores the life sciences. In the scope of this research, there is an introduction to quantities and units, matter, energy and motion, sound and light, electricity and magnetism, radiation and celestial bodies [14]. The learning outcomes of this course are to understand the environment and its contents, environmental features and characteristics. Upon completion of this course, students are expected to acquire a range of skills including skills in science, technology, literacy, problem solving, critical thinking and reasoning. creativity, communication and collaboration skills, and common sense. The application of this course can be combined by project work to explore basic scientific knowledge [15].

Research on the use of project-based learning in teaching has been done by previous researchers. However, no researcher has investigated the use of project-based learning and lectures on basic science concepts [16]. Therefore, the originality and novelty of this study lies in the subject matter and research variables. The aim of this study is to clarify the meaning of project-based learning that can be used in lectures on basic science concepts to guide the creation of interesting project-based lessons and to find scientific knowledge. based on environmental concepts and expected learning outcomes. course.

2 Research Method

The study was conducted from April to June 2024. The study was conducted as part of the Madrasa Ibtidayah study program at the Tarbii and Keguruan Faculty of the Islamic State University of North Sumatra. The nature of this research is an observational research design that examines project-based learning approaches and lectures on basic science concepts. The data was analyzed using the Miles and Huberman method, a four-step process, namely: data collection, data processing, data reduction and verification of results.

3 Results and Discussion

Based on the research conducted, it can be seen that in the project-based teaching model, there are three types of project activities that are carried out in the lectures in the main education programs. Various topics can be explained as follows.

Scientific Writing

This activity allows the students to present their results after the exercises on the topic of the lecture. The types of research papers produced by the students can be seen in Figure 1.

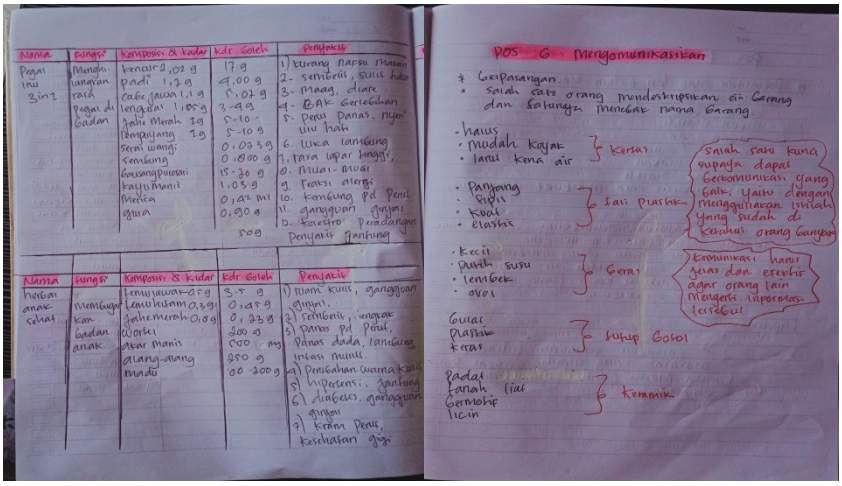

Fig. 1. Student Scientific Paper Results

Students will systematically produce written material according to the guidelines of good and accurate scientific writing. The data from the learning outcomes are interpreted in the form of theoretical knowledge and contextual knowledge so that students understand what was learned. The aim of this activity is to equip you with reading and writing skills, scientific thinking, creative thinking and creative thinking in the learning process and in the subjects. The physical aspects involved in this work include the identification of sensitive objects, the observation of animal behavior, the relationship of food items to human life in contemporary situations, mapping a variety of food and drink, and watching the sun move. light

Zhu et al. (2020) stated that a person working in the academic world must have writing skills. This writing skill is a way of communicating ideas, thoughts, feelings, needs and information to others through writing. Science is an activity based on scientific research, which has a specific scientific purpose [17]. Yu and Liu (2021) Scientific writing should be organized systematically, logically and carefully in all aspects, including linguistic aspects. Scientific work must meet the standards of practicality, rationality, and non-emotionalism based on systematic facts and regular preparation [18]. Wen et al. (2020) also stated that students are editors who need to improve quickly due to increased competition in teaching. The goal of teaching and learning is to use science, technology and skills to improve the quality of students in order to produce results and results that are useful in education [19]. Kayalp et al. (2022) also confirmed that one of the needs of students is the ability to convey a variety of ideas and useful information related to research. Writing scientific papers is one of the most useful and effective products [20]. Therefore, writing a research paper is compulsory for students who are completing their studies, and this is also a way to implement the third higher education.

Mini Educational Learning Video

This assignment requires students to report on individual work classes. Creating videos using video processing applications is a beautiful thing. The videos produced by the various models can be seen in Figure 2 .

Fig. 2. Students' Educational Learning Video Works

The goal is to equip students with the authentic digital skills to present unique and high-quality educational media concepts. The final skills expected from this assignment required by the final objectives of the course are creative and innovative thinking based on discovery and inquiry, scientific thinking and communication skills using digital technology . Learning topics related to this activity include the water cycle and the magic of science.

According to Gomez-del Rio and Rodríguez (2022) digital literacy is the ability to use and use digital devices, such as computers, laptops or mobile phones, to retrieve and produce information. Digital language is the ability to interact, communicate and find information through digital information in people's lives [21]. Guo et al. (2020) stated that the ability to use and optimize digital platforms in learning is one of the most successful factors in modern education [22]. In education, digital technology is used as a learning tool at home. Acquiring digital skills is very useful in student preparation. Digital skills are essential for students in the 21st century. Currently, digital media is having a major impact on education in all countries.

Cortázar et al. (2021) found that the digital skills of teachers are closely related to the ability of teachers to use digital media to communicate and receive and transmit information based on educational content, by showing in their impact on the implementation of methods in education [23]. Students' ICT skills are very important in today's learning environment. Hsu et al. (2022) further stated that digital literacy is the ability to use technology effectively and intelligently. Digital literacy is the understanding and use of information in a variety of formats from a variety of sources that can be accessed through computer hardware. Knowledge and use of information is defined as the ability of a person to process information correctly and intelligently so that the information received or used does not affect others but is beneficial to the many people [24]. The power of the press supported by ICT allows people to

publish and consume information, so digital language is important in reducing the need for information and good knowledge of information.

The four digital skills developed from educational video activities are: 1) information literacy, including students' ability to find, process, evaluate and use information effectively; 2) communication skills, including students' ability to use social media to communicate with others; 3) high creative skills, including students' ability to create creative work; 4) Security capabilities to protect all your data. The four main skills have a range, which significantly influences the students' achievement of learning outcomes [25] [30]. As students become more proficient in the four core skills, their level of digital literacy increases. This high level of digital skills is very useful in improving learning outcomes [26].

Simple Flip Book

This activity requires students to create an educational product that includes cartoon images and concrete images of visual effects. A specially designed educational product that contains scientific facts and concepts related to the subject being studied. The types of scrolls produced by the students can be seen in Figure 3.

Fig. 3. Student's Educational Learning Flip Book

Chang and Hwang (2018) stated that the knowledge product is also a visual representation that helps to understand the concepts learned. The aim of this activity is to provide students with some skills in designing scientific research, communicating creative ideas and presenting the results of scientific facts, and presenting research results in a presentation and high aesthetic value [27]. Waiata (2018) also stated that the topic of the lecture assignment was insect metamorphosis. A scroll book is a classic form of animation that consists of a sheet of paper arranged like a thick book [28]. Each page describes the processes that will be activated. A flip book is a classic form of animation that consists of several sheets of paper arranged like a thick book, each page depicting a process that appears to move or animate.

Tan and Huet (2021) also state that comic books are a classic form of animation that consists of a stack of paper that resembles a thick book, with some animation processes on each page. Using video books develops students' creative thinking and affects their academic achievement. The use of flipbooks leads to greater understanding and better learning outcomes [29]. The selection of textbooks is believed to be in line with current teaching developments.

Scientific education emphasizes the characteristics of modern teaching in the learning process that incorporates the scientific approach. Flipbook media complements existing e-books and thus facilitates all interactive learning activities such as listening, reading, writing and playing.

4 Conclusion

Based on the research conducted, it can be concluded that the students carry three main topics in the use of project-based teaching and lectures in the subjects of scientific subjects. These projects include writing research articles, reporting training results, creating small videos and simple video books. The design is combined to achieve the main teaching objective of the lecture.

This study only investigated the analysis of project-based learning and the application of lectures on basic science concepts based on the project method used. This study is limited in determining the learning outcomes of students after using the learning model. Therefore, it is highly recommended that other researchers investigate student learning outcomes. It will be used for further research and will help the research done.

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