



Development of Discovery Learning Learning Based on Pimca On Business and Energy Materials at SMP Lokon St. Nicolaus Tomohon

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Abstract: Science learning in junior high school was developed as an integrative science subject, not as a science discipline education. Integrative science means combining various aspects, namely the domains of attitudes, knowledge and skills. Substantially, science can be used as a tool to develop domains of attitudes, knowledge and skills. Science teachers must also have interdisciplinary science abilities demonstrated in science (knowledge). Science and also its relationship with the technological environment.

The PIMCA Learning Approach (Presentation, Idea-Mapping, Conceptualization, Formative Assessment) is an alternative that can be used and has great potential in science learning. Poluakan & Katuuk (2022) in PIMCA: A New Alternatives to Physics Learning Model wrote that using PIMCA in the classroom turned out to be effective as a physics learning model. The PIMCA learning model which consists of presentation, idea mapping, conceptualization and formative assessment can improve the ability to master the material and can trigger students to construct concepts correctly.

In implementing Discovery Learning using the PIMCA approach, learning media is needed that must be aligned and in accordance with concept mapping needs. So, developing learning media that will be used in class will really help the effectiveness of the learning process and delivery in class, and directly the PIMCA learning model is also expected to develop through the learning media developed.

Based on the description above, researchers are encouraged to develop a product which will be developed in the form of a discovery learning teaching module which will be executed using the PIMCA approach which is expected to solve students' misconceptions.

Therefore, researchers are interested in conducting PIMCA-based Discovery Learning Learning Development research on Business and Energy Material at Lokon St. Middle School. Nikolaus Tomohon.

Keywords: PIMCA, Learning Method, Junior High School

INTRODUCTION

Basically, humans in their lives cannot be separated from changing times which also affect the quality of their lives. Humans try to improve the quality of life, one of which is through education, so it can be said that to improve the quality of life of an individual, the quality of education obtained must also be improved. Education aims to improve the quality of human resources. Education can improve the abilities possessed by each individual as preparation for the future (Andesta, 2021; Harahap, Dimiyati, & Purwanta, 2021).

The implementation of the Independent Learning Curriculum is realized as an effort to improve the quality of education in Indonesia, by utilizing existing technology and providing opportunities for students to explore in learning activities. With the implementation of the Independent Learning Curriculum, the learning process in schools has changed. This is in line with the development of science and technology which is increasingly advanced day by day.

However, this also has an impact, namely that learning currently focuses on technology and automation. This results in teachers experiencing problems in taking roles in the classroom, or choosing the appropriate model or approach in implementing learning in the classroom.

The implementation of the independent learning curriculum makes both teachers and students overwhelmed in carrying out learning to achieve quality and productivity as well as understanding concepts, and flexible learning also requires students to learn independently, but this creates problems because independent learning tends to be monotonous, resulting in misconceptions because there is no direct guidance from the teacher.

The main components of learning are students who act as learning subjects and teachers as learning facilitators (Setiawati, Parwata, & Suratmin, 2020; Syukur & Makleat, 2021). Teachers as learning facilitators play a role in learning activities to create a pleasant learning atmosphere. This also requires learning that utilizes existing technology, especially in learning Natural Sciences (Science) subjects.

Science learning in junior high school was developed as an integrative science subject, not as a science discipline education. Integrative science means combining various aspects, namely the domains of attitudes, knowledge and skills. Substantially, science can be used as a tool to develop domains of attitudes, knowledge and skills. Science teachers must also have interdisciplinary science abilities demonstrated in science (knowledge). Science and also its relationship with the technological environment.

In developing science learning, teachers must first understand the characteristics of the lesson. In science learning, an understanding of concepts must be taught so that students can solve problems well and overcome misconceptions. Understanding the concept provides an understanding that the science material taught is not just theory but can be reflected in everyday life. If students do not have a good understanding of concepts then students will also not be able to solve problems well, one example is in the material on work and energy.

This is what is experienced by the 8th grade students of St. Nikolaus Tomohon. Data on student learning outcomes in science learning cannot yet be said to meet the level of conceptual completeness. This is due to indications of misconceptions in science learning, especially in understanding work and energy material, so an appropriate learning model is needed.

Discovery Learning Learning Model is a learning model to understand the concept of meaning and relationships, through an intuitive process to finally arrive at a conclusion (Simatupang, 2020). Discovery occurs when individuals are involved, especially in using their mental processes to discover several concepts and principles. Discovery is carried out through observation, classification, measurement, prediction, determination and inference. This process is called the cognitive process, while discovery itself is the mental process of assimilating concepts and principles in the mind (Robert B. Sund in Malik, 2001).

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In implementing Discovery Learning using the PIMCA approach, learning media is needed that must be in harmony and in accordance with concept mapping needs. So, developing learning media that will be used in class will really help the effectiveness of the learning process and delivery in class, and directly the PIMCA learning model is also expected to develop through the learning media developed.

Based on the description above, researchers are encouraged to develop a product which will be developed in the form of a discovery learning teaching module which will be executed using the PIMCA approach which is expected to solve students' misconceptions.

METHOD

The type of research that will be used is Research and Development which aims to develop a PIMCA-based Discovery Learning learning model.

The method used in this research is research and development (R & D) following the research stages of developing four-D-models (4D models) according to Thiagarajan, and Semmel (Palilingan, 2014). The 4-D model consists of four development stages, namely Define (defining or tracking), design (designing), develop (development) and disseminate (dissemination or dissemination).

At the design stage, the main activity is to analyze the need to develop new learning models/methods and analyze the feasibility and requirements for developing new learning media. The development of new learning media begins with a problem in the learning model/method that has been implemented. Problems can occur because the current learning model/method is no longer relevant to target needs, learning environment, technology, student characteristics, etc.

The second stage in the 4D model is design. There are 4 steps that must be followed at this stage, namely constructing criterion-referenced test (preparation of test standards), media selection (selection of media), format selection (selection of format), and initial design (initial design). The initial design in question is media in the form of modules/teaching materials which will later be developed which will be combined with the discovery learning learning model, as well as media that will be used in class using the PIMCA approach.

The third stage in developing 4D model learning tools is development. The development stage is the stage for producing a development product. This stage consists of two steps, namely expert appraisal accompanied by revision and developmental testing.

The final stage in developing 4D model learning tools is the dissemination stage. The dissemination stage is carried out to promote the development product so that it is accepted by users by individuals, groups or systems. Material packaging must be selective to produce the right shape. Some of the dissemination stages are validation testing, as well as diffusion and adoption. In the validation testing stage, the product that has been revised at the development stage is implemented on the actual target or targets.

DISCUSSION

This research aims to produce a product that meets the criteria of being valid, practical and effective in science learning. The procedure used is a 4D model design consisting of Define, Design, Develop and Disseminate. The research description will follow research procedures in 3 aspects that will be tested, namely validity, practicality and effectiveness.

From the results of an interview with one of the science subject teachers at Lokon St. Middle School. Nikolaus Tomohon, researcher summarizes the information as follows:

(1) Students need access to high quality education, including a curriculum that is relevant and presented in an interesting way. (2) In the digital era, junior high school students need access to technological devices such as computers or laptops, as well as a stable internet connection. (3) In

preparation for the future, junior high school students need learning that focuses on developing 21st century skills, such as problem solving skills, creativity, communication, cooperation and critical thinking. (4) Learning problems that often occur in schools, especially in the field of science, are misconceptions. Misconceptions occur when students have a wrong or inaccurate understanding of a scientific concept or principle.

In determining the material, researchers linked misconceptions that often occur in science lessons and determined that energy is one of the topics where misconceptions often occur. The indicators that need to be considered according to the interview are: (1) Using a student-centered approach. (2) using multiple representations. (3) Explicitly discussing (4) Learning that frees students to explore.

The Discovery Learning learning model is a learning model that involves students directly looking for and solving problems directly. This is reinforced by Sunarto's (2022) opinion that Discovery Learning is a learning model that requires students to be able to think critically in solving problems, play an active role in learning activities, and be independent in searching or finding material. Discovery Learning is a learning model that can solve problems that will benefit students in facing life in the future (Juhri, 2020). So the role of the teacher, which is an important part of learning, is responsible as a facilitator for students in carrying out learning activities. Discovery Learning certainly has several stages or steps that must be passed so that it can be carried out well and effectively. The steps of the Discovery Learning model are providing stimulation, identifying problems, collecting data, processing data, proving data, and drawing conclusions. The Discovery Learning model has steps in the form of stimulation, problem statement, data collection, data processing, verification, and generalization. (Cintia, 2018).

Based on tests from Siti et al (2019) in research on the Influence of the Discovery Learning Learning Model Using PPT Media on the Science Learning Outcomes of Class VII Students at SMP Negeri 27 Makassar, there is a significant difference between the learning outcomes of students taught using the Discovery Learning learning model using media. PPT with students who are only taught using the Discovery Learning learning model without using PPT media in class VII of SMP Negeri 27, the organizational system of living creatures. This is known through testing the research hypothesis which is carried out using the t-test. The results of data analysis obtained a calculated t value = 2.263 and a t table value at the significant level (α) = 0.05 and db = 46, t table (0.05) (46) = 1.670.

In development research conducted by Widiastuti et al (2022) Development of Discovery Learning-Based Middle School Science Learning Tools to Increase Motivation and Learning Outcomes, researchers analyzed aspects of product validity, effectiveness and practicality. The Valid Aspect is based on the results of validation by experts on learning tools in the form of Learning Implementation Plans (RPP), Student Worksheets (LKPD), Student Teaching Materials (BAPD), media, and Learning Outcome Tests with a percentage of 82.50% each. , 87.75%, 81.00%, 84.75% and 83.75% so they can be categorized as "Valid". Practical aspect, based on the results of observations by observers, the learning tools with an overall average of 1.86 can be categorized as fully implemented during the trial, while the overall response from students and teachers is in the "strongly agree" category. The effective aspect is based on students' classical completeness being achieved and students' learning motivation increasing from 69.04% to 82.04%.

PIMCA is a learning approach developed by C. Poluakan. PIMCA consists of Presentation, Idea-Mapping, Conceptualization, and Formative Assessment. From the perspective of educational psychology, PIMCA is part of the learning model, like other learning models, the MOMBI model of model based instruction which uses a theoretical basis in learning (Poluakan, 2021). So the

researchers concluded that PIMCA is a learning approach with presentation, idea, concept and assessment stages.

Based on research by Absalom (2023) Development of Android-Based Learning Media and the PIMCA Model at SMP Negeri 7 South Halmahera, the media developed by researchers is PIMCA-based Android media. The learning media was tested for suitability by experts from both material and media aspects, and obtained appropriate criteria results. It is said that the material and media are appropriate because the required assessment is in accordance with the curriculum, standard assessment indicators, and meets the criteria and is in accordance with the content elements contained in the Android application based on the PIMCA model. PIMCA gets good criteria because the media used is in accordance with standard testing criteria, the media used is interesting, and triggers students' interest in playing an active role in the learning process. This is also in line with the PIMCA model where the presentation of material sources is one measure of learning success. The results of student reactions on a limited scale met the appropriate criteria, so this research was continued at the next stage, namely field testing and obtained good category results. It was concluded that the Android application media based on the PIMCA model on human respiratory system material that was developed gave positive reactions or responses from the students. student. The good category given by students is of course because the media displayed is very interesting, clear, colorful so it is not boring, this motivates them to ask questions, answer and play an active role in the learning process because it creates student learning interactions, completeness of material descriptions in explaining concepts, and completeness. material.

Research conducted by Menggasa (2022) in the Implementation of PIMCA in Respiratory System Learning found that there were differences in learning outcomes from the experimental class and the control class because in the experimental class using the PIMCA model was able to change the way of learning for students who had not been active in the learning process, only memorizing. without understanding the material. So that there is progress in the teaching and learning process, students become more active in asking questions in exploring their knowledge. Besides that, students can be trained to analyze a problem carefully so that students themselves can develop their creativity to find new relationships by linking the material being studied so that learning becomes more effective.

CONCLUSION

The type of research carried out in this research is development (research and development) with research topics regarding the development of PIMCA-based Discovery Learning at Lokon St. Middle School. Nikolaus Tomohon. The model used is a 4D model (Define, Design, Develop, Disseminate). The research was conducted in 3 classes, namely Class 8A (Control) 8B (Experiment) 8C (Control) with 20 students each for a total of 60 students. The steps taken at the define stage are front-end analysis, specifying instructional objectives, concept analysis. At the design stage, the steps taken are format and media selection and initial design. In the development stage, product validation and testing is carried out, while in the disseminate stage, students are given positive response questionnaires

Based on the research that has been carried out, it can be concluded that:

a. In terms of product, the development process uses the 4D model (Define, Design, Develop, Disseminate), it can be concluded that the PIMCA-based Discovery Learning learning product at Lokon St. Middle School. Nikolaus Tomohon The quality of the product produced is in accordance with theory and internal consistency (valid), the product developed is easy to use (practical) and the product that has been created and developed provides good results for its users (effective)

b. From a research perspective, based on research statistical data it was concluded that PIMCA-based Discovery Learning at Lokon St. Middle School. Nikolaus Tomohon overcomes misconceptions about student learning which is measured through student learning outcomes through and increases the effectiveness of science learning through the PIMCA approach

Suggestion

In PIMCA-based Discovery Learning at Lokon St. Middle School. Nikolaus Tomohon, Infographic and Idea-Mapping learning media and worksheets can also be integrated with other learning models to make it easier for teachers to create maximum learning in terms of validity, practicality and effectiveness.

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