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DISCOVERY LEARNING MODEL TO IMPROVE CREATIVE THINKING SKILLS AND ABILITY TO UNDERSTAND CONCEPTS IN OHM'S LAW MATERIAL: META ANALYSIS

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Abstract :
This research is based on several articles published in articles found on Google Scholar throughout Indonesia from 2016 to 2023. Variables were analyzed using the descriptive method of systematic literature review by collecting data from written sources such as books, journals and sources related to improvement. discovery learning model to improve creative thinking skills and the ability to understand concepts in Ohm's law materials. The aim of this literature study research is to find out and see whether there is an increase in creative thinking skills and the ability to understand concepts through the application of the discovery learning learning model. The results of research literature show that the discovery learning model can improve creative thinking skills and the ability to understand concepts in Ohm's law material and improve material in several other subjects.

Keywords: Ability to Understand Concepts, Creative Thinking Skills, Discovery Learning Model, Meta Analysis

INTRODUCTION

Learning in the 21st century in the era of the industrial revolution is in the knowledge age with an extraordinary acceleration in increasing knowledge. Facilitating increasing knowledge requires support with the application of digital media and technology in learning. Learning activities during the knowledge age period must be in accordance with students' needs and knowledge (Fernandes, 2019). Learning materials provide a more authentic design in facing challenges where students can collaborate to create solutions in solving learning problems. One of the lessons in high school is physics.

Physics learning is a process or interaction between educators and students with the help of learning resources that discuss physical or exact sciences (Winarti et al., 2021). Learning physics is the same as developing abilities and success is measured by the number of problems that students solve correctly. Physics learning is also defined as learning that conveys concepts that are not only memorizing, calculating but also the concepts in physics also need more understanding, physics is a science aimed at studying all natural phenomena. One of the materials in physics is Ohm's law.

Ohm's Law states that the electric current flowing in a conductor will be proportional to the voltage it receives, but inversely proportional to the resistance (Naim, 2022). Ohm's Law is one of the

basic sciences of electronics that is often encountered in everyday life. In everyday life, we can see examples of the application of Ohm's law to televisions, lights, flashlights and radios. All electronic equipment will only turn on when there is an electric current originating from electrical voltage to produce a potential difference. In studying physics on Ohm's law, of course there are several problems.

The problem that occurs in high school currently, especially in Ohm's law material in class 12, is that students have difficulty understanding learning, students also lack accuracy and creative thinking skills because physics learning is based on the results of observations and also problem solving activities. Students also lack the ability to understand concepts in studying Ohm's law due to two things, namely dense physics material, memorizing and calculating, as well as non-contextual physics learning in class. So this makes students dislike physics lessons because physics learning in class is still very monotonous and students only listen to explanations from the educators who teach the subject.

Many educators do not use any media to convey their material, and only focus on the textbooks they use. Physics learning still uses direct and monotonous learning (Winarti, 2021). Several educators explained that educators understand and know about various interesting and fun learning models. However, educators do not use and utilize existing learning models, due to inadequate facilities in the classroom, as well as the mindset of educators who want to teach easily, due to limited time.

Psychologically, if students are less interested in the methods used by educators, then students will provide responses that are less supportive of the learning process (Sudarti, 2019). Apart from that, there are those who state that in the learning process most physics students are very forced, feel sleepy, boring, and think that learning is scary. So that students lack some skills and abilities, such as creative thinking skills and the ability to understand concepts. One solution that is expected to be able to overcome this problem is the use of a learning model combined with interesting methods, such as a discovery learning learning model that is modified by paying attention to the syntax of the model and making three assessment assessments, namely assessment as learning, assessment for learning , and assessment of learning.

Based on the statement above, this model, namely discovery learning, can be used as a learning model to improve creative thinking skills and the ability to understand concepts in the learning process. From here the question arises "Can this learning model improve students' creative thinking skills and students' ability to understand concepts well?", therefore a literature study was carried out to see whether these three models can really answer the previous question.

RESEARCH METHOD

This research is a literature study using descriptive research methods through literature studies that assess the improvement of creative thinking skills and the ability to understand concepts through the discover learning learning approach. This literature review is based on academic journals consisting of 20 journals from previous research as a source of research data. Literature writing was carried out by tracing published articles found on Google Scholar in 2016-2023. The articles searched were 20 articles with the keywords creative thinking skills, ability to understand concepts, learning models, discovery learning models. After tracing it, the article is analyzed using a descriptive analysis method which describes the facts regarding the problems that occurred and is then attached in table form and then summarizes each result from the literature study.

RESULTS AND DISCUSSION

Research results are presented in the form of graphs, tables, or descriptive. Analysis and Based on the results of literature study data collection, it was found that there was an increase in creative thinking skills and the ability to understand concepts in Ohm's law material and several subjects through the discovery learning model approach which can be seen in the details of table 1.

Table 1. Improving Creative Thinking Skills and Ability to Understand Concepts Through the Discovery Learning Approach

Researcher Name	Journal Publication Year	Article Title	Research result
Septiani Wahyu Tumurun, Diah Gusrayani, Asep Kurnia Jayadinata	2016	The influence of the Discovery Learning Learning Model on Students' Creative Thinking Skills on Characteristics Material Light	Based on the results of research, learning using discovery learning models and conventional models can improve students' creative thinking skills. However, learning uses the discovery learning model more able to improve students' creative thinking skills. This can be proven with the results of the difference test calculation of the average gain data in the two groups with a sig (1-tailed) value of 0.001.
Jayanti Putri Purwaningrum	2016	Developing Creative Mathematical Thinking Abilities Through Discovery Learning Based on a Scientific Approach	The results of the study show that students' creative mathematical thinking abilities can develop through discovery learning based on a scientific approach.
Nichen Irma Cintia, Firosalia Kristin, Indri Anugraheni	2018	Application of the Discovery Learning Learning Model to Improve Creative Thinking Abilities and Student Learning Outcomes	The results of the research are that the application of the Discovery Learning model can improve creative thinking abilities and thematic learning outcomes of class V students at SDN Sidorejo Kidul 02 Tingkir.
Wihelmina Advensia Dea, Tanti Diyah Rahmawati	2021	Application of the Discovery Learning Model to Improve Students' Mathematical Creative Thinking Abilities	After conducting research, the results obtained were that the use of the discovery learning model was able to improve the mathematical creative thinking abilities of X Jasa Catering students very well, seen from the

Researcher Name	Journal Publication Year	Article Title	Research result
			average observation of student creativity and the results of students' creative tests in each creative indicator in each cycle. Where the average aspect of creativity observation indicators in cycle I was 35.41%, which was in the low category, while in cycle II, 73.75% was obtained, which was in the high category. The average aspect of the indicators of students' creativity test results in cycle I was 28.41%, while in cycle II was 58.33%.
Retno Wulandari, Suwarto, Novaliyosi	2021	Efforts to Improve Understanding of Space Geometry Concepts in Online Learning with the Discovery Learning Model	The discovery learning model can be applied well, this can be seen from the results of students' work in answering questions well
Sanra Febri Diani, Della Maulidiya, and Agus Susanta	2019	Concept Understanding Ability of Middle School Students After Obtaining Learning Discovery Learning	The application of the discovery learning model can improve students' understanding of mathematical concepts in quadrilaterals and triangles in class VII A of SMPN 6 Bengkulu City, which is marked by the final score of students' understanding of concepts in cycle I, namely 65.7 in the medium category. Meanwhile, the average final score for understanding concepts in cycles II and III respectively was 64.93 in the medium category and 67.94 in the high category.

Researcher Name	Journal Publication Year	Article Title	Research result
Rian Hidayat, Lukman Hakim, and Linda Lia	2019	The Influence of the Media-Assisted Guided Discovery Learning Model PhET Simulation on Students' Understanding of Physics Concepts	The paired t-test results obtained were > 8.17 > 1.67; which means there is a significant influence of the application of the guided discovery learning model on students' understanding of physics concepts. It was concluded that the guided discovery learning model assisted by PhET simulation media significantly influenced students' understanding of physics concepts compared to conventional learning.
Lilik Ariyanto, Derisna Aditya, Ida Dwijayanti	2019	Development of Android Apps Based on Discovery Learning to Improve Understanding of Mathematical Concepts for Class VII Students	The results of this research can be concluded that (1) the validation percentage results of media experts were 80.26%, material experts 86.36% and responses Student responses were 87.16% with each criterion being very good. (2) the results of the n-gain test showed that there was an increase in students' understanding of mathematical concepts who used discovery learning-based Android apps learning media. (3) data from the field shows that the learning outcomes of students who receive discovery learning-based Android apps learning media are better than students who use conventional learning.
Lutfiatul Khofifah, Nanang	2021	Flipped Classroom Model and Discovery Learning on Abilities	This research resulted in the influence of learning models

Researcher Name	Journal Publication Year	Article Title	Research result
Supriadi, M. Syazali		Understanding Concepts and Solving Mathematical Problems	(flipped classroom and discovery learning) on the ability to understand concepts, the influence of learning models (flipped classroom and discovery learning) on problem solving abilities and the influence of learning models (flipped classroom and discovery learning) on the ability to understand concepts and mathematical problem solving.
Siti Mawaddah, Ratih Maryanti	2016	Middle School Students' Understanding of Mathematical Concepts in Learning Using the Guided Discovery Model (Discovery Learning)	The results of the research show that students' ability to understand mathematical concepts in learning mathematics using the guided discovery model (discovery learning) is overall in the good category and student responses tend to agree with learning mathematics using the guided discovery model (discovery learning).
Rahmi Ramadhani	2017	Improving Concept Understanding and Mathematics Problem Solving Abilities of High School Students Through Guided Discovery Learning Assisted by Autograph	The research results obtained: (1) The increase in KPKM and KPMM of students who received guided discovery learning assisted by Autograph was higher than students who received conventional learning; (2) There is no interaction between learning and students' KAM on increasing students' KPKM and KPMM
Ayu Anggraeni, Henry Suryo Bintoro, Jayanti	2020	Application of the Discovery Learning Learning Model in	In this research, researchers will use the Discovery Learning

Researcher Name	Journal Publication Year	Article Title	Research result
Putri Purwaningrum		Increasing the Ability to Understand Mathematical Concepts in Class IV Elementary School Students	model, which is a learning model that requires students to search for and discover knowledge according to their own abilities, so that students' ability to understand concepts can be improved. The results of this research show that there is an increase in students' understanding of mathematical concepts.
Rahma Dani, Nindi Ayu Latifah, and Septiona Anggela Putri	2019	Application of Discovery Learning Based Learning Through Talking Stick Method to Improve Understanding of Movement Concepts Straight	The results of the concept understanding test obtained an average of 77.80. Based on the results of this research, it can be concluded that learning based on discovery learning using the talking stick method can increase understanding of the concept of Straight Motion.
Vivi Fajar Setyaningrum, Putriaji Hendikawati, Sugeng Nugroho	2018	Increasing Conceptual Understanding and Cooperation of Class X Students Through the Discovery Learning Model	The research results showed an increase in students' understanding of concepts. In cycle 1, the average score was 73.28 with a completion percentage of 65.63%, while in cycle 2, the average score was 76.91 with a completion percentage of 75%. Student cooperation has also increased. This can be seen in the percentage for cycle 1 which was 65.96% and in cycle 2 it was 72.98%. From the results obtained, it can be concluded that students' understanding and cooperation of class
Marini Amalia Ocvianti, Dwi Sulisworo	2021	Virtual Laboratory Based Learning via Google Classroom on	Research has been conducted on the use of Google Classroom in

Researcher Name	Journal Publication Year	Article Title	Research result
		Ohm's Law Material to Improve Critical Thinking Abilities	virtual laboratory-based learning on Ohm's Law material for Class XII students at SMA Muhammadiyah 1 Yogyakarta. Using a discovery learning model with a scientific approach, a discussion and experimental learning method was designed through virtual face-to-face with Gmeet and group assignments. The results obtained show that learning can be carried out to foster critical thinking in learning combined with face-to-face learning, known as blended learning.
Kurnia Devita Sari, Adventia Putri Pradita	2018	Implementation of the Discovery Learning Learning Model Using Spreadsheet Media on Ohm's Law Material to Increase Student Interest	Learning activities using the Discovery Learning learning model and using Spreadsheet learning media can improve students' High Other Thinking Skill (HOTS) abilities.
Sari Aprilia Leksani, Erliany Syaodih, Ilyas	2018	Improving Creative Thinking Abilities Using the Discovery Learning Learning Model	The results of this research were obtained as follows: (1) There was an increase in the creative thinking ability to write in high school students after implementing the Discovery Learning learning model (2) The increase in the creative thinking ability in writing of high school students whose learning used the Discovery Learning learning model was better than students who used Scientific learning in generally.

Researcher Name	Journal Publication Year	Article Title	Research result
Welni Julitra Damanik, Edi . Syah Putra	2018	Development of Learning Tools to Improve Students' Creative Mathematical Thinking Abilities Using the Discovery Learning Model	The results of the research show that: the quality of the validity of the learning tools meets the valid criteria based on the average score of the RPP which is 4.25 from a maximum score of 5.00 with Good criteria and the average score of LAS which is 4.18 from a maximum score of 5.00 with good criteria. ; The learning tools developed have met the effectiveness criteria with: a) classical learning completeness has exceeded the minimum limit, namely in trial II at 87%, b) achievement of indicators/completeness of learning objectives has been achieved for each indicator in trial II, c) Quality The practicality of the learning device meets the practical criteria based on the average score of the student response questionnaire of 3.95 out of a maximum of 5.00 in trial I and 4.0 out of 5.00 in trial II. The implementation of learning activities was 88.7% in trial I and 93% in trial II. d) learning time does not exceed normal learning, that is, the time is the same as normal learning in trial I and trial II; students' mathematical creative thinking abilities have increased, namely the average value of concept understanding

Researcher Name	Journal Publication Year	Article Title	Research result
			ability in trial I was 70.1, increased by 11.3 to 81.4 in trial II and the number of students who completed trial I was 70%, an increase of 16. .6% to 86.7% in trial II.
Meissy Rizki Nurulhidayah, Patricia HM Lubis, Muhammad Ali	2020	The Influence of the Discovery Learning Learning Model Using Phet Simulation Media on Students' Understanding of Physics Concepts	Based on the research results, it shows that there is an influence of the use of the discovery learning model using PhET (Physics Education Technology) simulation media on students' understanding of physics concepts at SMA Negeri 10 Palembang as shown by tcount 7.255 > ttable 1.667.
Maya Aprilia, Patricia HM Lubis, Linda Lia	2020	The Influence of the Discovery Learning Model on Understanding the Concepts of Assisted High School Students Tracker Software on GHS Materials	The results of this research were obtained as follows: (1) There was an increase in the creative thinking ability to write in high school students after implementing the Discovery Learning learning model (2) The increase in the creative thinking ability in writing of high school students whose learning used the Discovery Learning learning model was better than students who used Scientific learning in generally.

Based on the overall results of the journals included in this literature study or literature review, the results of 20 articles showed that the discovery learning model can improve creative thinking skills and the ability to understand concepts in Ohm's law material and several subject materials.

The discovery learning model, or discovery learning, provides an approach that encourages students to actively seek, explore and discover knowledge independently. This approach is known as a constructivist learning model which is based on the belief that learning is more effective when students are involved in the process of constructing their own knowledge. In the context of discovery learning, teachers act as facilitators who provide a learning environment that stimulates creative thinking and exploration. Students are invited to discover key concepts, solve problems, and make their own connections through direct interaction with the course material.

The discovery learning model offers a number of advantages. First, this approach can increase students' motivation because they have an active role in the learning process, providing a sense of responsibility for their own understanding. Second, discovery learning can help develop critical and analytical thinking skills, because students are faced with the challenge of understanding, organizing, and interpreting information without direct guidance. However, this model also requires attention to careful learning design, ensuring that the material provided allows students to achieve the desired learning goals and remains relevant to the existing curriculum.

Creative thinking skills are very important for students' development in the world of education. Students who have creative thinking abilities tend to be able to explore various ideas and approaches in dealing with complex lessons. Creativity allows them to look at problems from different points of view and come up with innovative solutions. In an educational context, creative thinking skills not only produce students who are able to master subject matter better, but also shape their thinking to be more flexible and adaptive to academic challenges.

In addition, creative thinking skills help students develop strong imagination and curiosity. The creative process stimulates students' natural curiosity, encouraging them to explore topics outside the curriculum and develop their own interests. During the learning period, teachers can facilitate the development of creative thinking skills by providing tasks that involve problem solving, collaboration, and creative expression. In this way, students not only become passive consumers of information, but also become creators and discoverers themselves. Creative thinking skills also bring long-term benefits, helping students become innovative leaders of the future who are able to address global challenges in unique and effective ways.

Understanding students' concepts is an important aspect in the world of education which highlights the extent to which students can master and apply the concepts taught in the curriculum. This process involves students' ability to understand basic ideas, principles, and relationships between concepts in a subject. Understanding concepts creates a solid foundation for continued learning, allowing students to build deeper knowledge and be able to relate those concepts to their life experiences.

The importance of students' conceptual understanding is also related to their ability to transfer knowledge into real-life situations. Students who truly understand certain concepts can apply them in different contexts and identify the relevance of the subject matter to everyday situations. Teachers who understand students' level of understanding of concepts can design more effective and responsive learning, ensuring that each student truly masters key concepts before moving on to the next material. Thus, students' conceptual understanding is not only an indicator of academic success, but also a foundation for the development of critical thinking skills, problem solving, and the application of knowledge in various life contexts.

CONCLUSION

It should be noted that the success of Discovery Learning can depend on certain factors, such as good learning design, teacher support, and an adequate learning environment. So, to optimize learning potential, efforts need to be made to develop this method and provide appropriate guidance to educators. In conclusion, this meta-analysis confirms that the DL learning model has a positive impact in improving creative thinking skills and understanding concepts in Ohm's Law material. These results can provide a strong foundation for the development of more effective learning strategies in the future, providing significant added value in science learning approaches at secondary or even higher education levels.

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