

Constructivism Theory in Multidisciplinary Elementary Science Learning Environment

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Abstract: Constructivism theory refers to how a person constructs knowledge from the experiences that students already have. This is in line with science learning, emphasizing knowledge built by students themselves both personally and socially through group learning activities. However, studies on the theme of Constructivism Theory in Multidisciplinary Elementary Science Learning Environment are still limited. Based on the problem of limited research related to constructivism theory in science learning in elementary schools, researchers are interested in conducting research literature. The purpose of the first study describes constructivism theory in science learning so that more in-depth research can be carried out related to the importance of constructivism theory on student activity in the learning process. The second explains the results of the implementation of constructivism theory in science learning in elementary schools. The method used is review literature. Various literature obtained by Google Scholar from 2014-2023 received 30 articles with the keyword "constructivism theory in science learning in elementary schools". 30 articles were then identified, data selection and feasibility tests to analysis, 4 articles were obtained in accordance with the theme of literature review. The results of the research literature obtained 3 core points, namely (1) constructivism theory is very important in science learning to facilitate students to be actively involved in the learning process in class, (2) important in creating a learning environment through constructivism theory. (3) Constructivism theory in more effective in improving students' science learning outcomes at the elementary school level.

Keywords: Constructivist Theory, Science Learning, Sekolah Dasar.

Article History:

Received: 15-03-2024

Online : 16-04-2024



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A. INTRODUCTION

Behaviorism and constructivism are the two main educational theories on which many educational technologies are based today (Seema, 2013). Constructivism is the dominant theory in education in the 21st century (Krahenbuhl, 2016). In recent years, this theory seems to affect the teaching and learning process. Constructivism is basically a theory based on observation and scientific study, that is, about how people learn (Anjali, 2012). Traditional concepts regard teachers as conveyors of knowledge and students as passive recipients. In contrast, constructivism considers teachers as facilitators of learning and students as active learners who construct their own knowledge with the help of previous experience and diverse learning experiences provided by facilitators.

The theory of constructivism has proven that many teachers are enthusiastic about using this theory in science learning (Hasan, 2013). Many studies have proven the use of constructivism theory successful in centering students on learners and teachers only as facilitators (Jaleel & Verghis, 2015). For example, the teacher begins preparing a lesson plan that includes problem solving which is one of the main elements of constructivism (Baştürk, 2016). Lesson plans designed should pressure students to think creatively as well as learn with the real world (Savery & Duffy, 2001).

In the 21st century teachers can use STEM (Science, Technology, Engineering, and Mathematics) approaches in the learning process. STEM can develop students' creative thinking skills (Irfana et al., 2019). The theory used in STEM learning at the elementary school level is constructivism theory (Rahma & Isralidin, 2022). Constructivist theory holds that students build knowledge through the development of congestive and sequential frameworks through their experiences. In addition, STEM can create a safe teaching and learning environment where students feel free to reflect on learning (Ah-Nam & Osman, 2017).

This research literature was conducted with a review of the use of constructivism theory in science learning in elementary schools. The purpose of this research literature is to clarify and describe constructivism theory in learning, explain the results of using constructivism theory in science learning and reveal the implementation of constructivism theory in multidisciplinary elementary school science learning environments. Thus, it is hoped that this study can provide an understanding of the theory of Constructivism in Multidisciplinary Elementary Science Learning Environment and can be a topic of discussion for practitioners, academics and further research in the field of education, especially in basic education.

B. METHOD

This research uses literature boxing or literature review. Literature review is an activity that has a focus on a particular topic that becomes a study to be analyzed in depth on the content of the manuscript that has been studied (Creswell, 2018). Constructivism theory in science learning is a teaching and learning process where students themselves are mentally active, building their knowledge, which is based on their cognitive structure (Mardiana, 2018), so that this research literature uses artifacts published in 2014 to 2023. Various literature is accessed fulltext in pdf format and scholarly through google scholar. Eligible journals are taken to be used as study material from both international and national journals with the theme of constructivism theory in science learning in elementary schools. An article search with the keyword "constructivism theory in science learning" that gets 30 articles. The purpose of this review of the research literature is to find out the theory of constructivism in science learning in elementary schools from 30 articles found, then an analysis was carried out with several considerations, data selection and feasibility tests were carried out. So that the results of several ancillations found four articles that fit the purpose of this study. Furthermore, more in-depth data analysis was carried out. The results of the data analysis are then interpreted according to the writing of scientific papers.

C. RESULTS AND DISCUSSION

1. Results

Analysis of 4 articles that examine constructivism theory in science learning in elementary schools is presented in Table 1.

Table 1. Article Search Synthesis Analysis

No.	Name of Researcher and Year Published	Article Title	Purpose	Research Results	Updates
1	Kara (2018)	A Systematic Literature Review: Constructivism in Multidisciplinary Learning Environments	To explore the use of constructivist approaches in learning. The constructivist approach is a learning paradigm that emphasizes the active role of students in building their own knowledge. In multidisciplinary learning, students are encouraged to learn about various disciplines in an integrated manner.	1. State that the constructivist approach has the potential to enhance cross-disciplinary learning. This approach can help students develop deeper conceptual understanding, critical thinking skills, and problem-solving skills. 2. A constructivist approach can improve students' conceptual understanding. This is because this approach encourages students to be actively involved in the learning process, such as exploring, discussing, and solving problems.	The updates found in this research article regarding the use of technology in multidisciplinary learning are associated with constructivism theory. Technology can be used to help students explore material in a more immersive and interactive way. For example, students can use computer simulations to learn science concepts or use mapping software to study relationships between different disciplines.
2	Aydogdu & Selanik-Ay, (2016)	Determination of Teacher Characteristics That Support Constructivist	Identify the characteristics of teachers who are effective in creating constructivist	The results of this article provide evidence that teachers play an important role	Updates found in this article: 1) Focus not only on the pedagogical knowledge and

No.	Name of Researcher and Year Published	Article Title	Purpose	Research Results	Updates
		Learning Environments	learning environments, Increase the effectiveness of constructivist approaches, Provide a research basis for teacher development and training, deepen understanding of constructivist approaches.	in creating constructivist learning environments. The identified teacher characteristics can help teachers create a more effective and supportive learning environment for students.	skills of the teacher, but also attitudes and beliefs. Effective teachers have an open, supportive attitude, and value students' critical and creative thinking. 2) Teacher characteristics can be learned and developed through training and professional development. Teachers with less teaching experience tend to have characteristics that support constructivist environments.
3	Mehera & Bhattacharjee (2014)	Effectiveness of Constructivist Approach in Science Learning at Elementary School Stage	To test the effectiveness of constructivist theory in science learning at the elementary school level	The constructivist approach is more effective in improving students' science learning outcomes at the elementary school level. Students who learn with a constructivist approach show significant improvements in understanding of science concepts, critical thinking skills, and problem-solving skills.	The resulting updates are: 1) Science curriculum and learning materials can be designed to support a constructivist approach. Science curriculum and learning materials can be designed to encourage students to be actively involved in the learning process, for example through experiments, discussions, and projects.

No.	Name of Researcher and Year Published	Article Title	Purpose	Research Results	Updates
				<p>More specifically the results are as follows:</p> <ul style="list-style-type: none"> • Students who studied with a constructivist approach showed a 25% increase in understanding of science concepts. • Students who learn with a constructivist approach show a 30% increase in critical thinking skills. • Students who learn with a constructivist approach show a 20% improvement in problem-solving skills 	<p>2) Science learning assessments can be designed to measure learning outcomes appropriate to constructivist approaches. Science learning assessments can be designed to measure students' understanding of science concepts, critical thinking skills, and problem-solving skills.</p>
4	Tanjung et al., (2023)	The Effect Of Constructivism Learning On Student Learning Outcomes: A Meta Analysis Study	<p>1) Assess systematically and comprehensively the effectiveness of constructivist learning on student learning outcomes.</p> <p>2) Find out the effect size of the constructivist approach on student learning outcomes.</p> <p>3) Identify moderating factors that affect the effectiveness of constructivist learning</p>	<p>The results show that constructivist learning has a significant effectiveness on student learning outcomes. The effect size of the constructivist approach is 2.96, which falls into the category of high effect size. In addition, this article produces the effectiveness of constructivist</p>	<p>1) Constructivist learning has significant effectiveness on student learning outcomes, especially at higher educational levels and for abstract learning subjects</p> <p>2) Constructivist learning has significant effectiveness on student learning outcomes, especially at higher educational levels</p>

No.	Name of Researcher and Year Published	Article Title	Purpose	Research Results	Updates
			4) Provide strong empirical evidence to support or reject the use of constructivist learning in educational practice.	<p>learning which is influenced by several factors as follows:</p> <ol style="list-style-type: none"> 1. Student education level: Constructivist learning is more effective in higher education level students, such as high school and college students. 2. Learning subjects: Constructivist learning is more effective in abstract learning, such as mathematics and science. 3. Teacher experience: Teachers who have more experience in applying constructivist approaches will be more effective in improving student learning outcomes. 	and for abstract learning subjects

2. Discussion

a. A Systematic Literature Review: Constructivism in Multidisciplinary Learning Environments

In the first journal, constructivist theory in teaching environments can support the initial idea of my research on constructivism theory in multidisciplinary science learning environments. Why is this theory of constructivism so important in learning environments? Behaviorism and constructivism are the two main educational theories on which many educational technologies are based today (Seema, 2013). Constructivism is the dominant theory in education in the 21st century (Krahenbuhl, 2016). In the 21st century, learning skills and qualifications must show a difference from before because of the times. 21st century learning pressures students to think critically, collaboratively, creatively and communicate. The theory of constructivism has proven that many teachers are enthusiastic about using this theory in science learning (Hasan, 2013). Teaching science with a STEM approach is becoming very important today. A Study conducted by Glancy & Moore (2013) states that John Dewey's research has had an impact on multidisciplinary fields such as STEM.

In the 2nd century teachers can use STEM (Science, Technology, Engineering, and Mathematics) approaches in the learning process. STEM can develop students' creative thinking skills (Irfana et al., 2019). The theory used in STEM learning at the elementary school level is constructivism theory (Rahma & Isralidin, 2022). Constructivist theory holds that students build knowledge through the development of congestive and sequential frameworks through their experiences. In addition, STEM can create a safe teaching and learning environment where students feel free to reflect on learning (Ah-Nam & Osman, 2017). In addition, the first journal studied also stated that lessons that are rich in content have a good effect on the process of acquiring knowledge and applying student understanding. For example, to teach students how to think critically, develop reasoning teachers must use various ways, for science learning can use emphasis with learning activities such as experiments or experiments.

b. Determination of Teacher Characteristics That Support Constructivist Learning Environments

The second journal examines the characteristics of teachers who are effective in creating constructivist learning environments. The theory of constructivism in education emphasizes that students actively build their own knowledge through experience and interaction with their environment. Teachers in constructivist environments act as facilitators and guides, creating an atmosphere that encourages students to question, explore, and reflect on their learning. Environments with constructivist theory have seven main characteristics (Knuth & Cunningham, 1993; Honebein 1996) as follows: experience with knowledge; appreciation of multiple perspectives; using realistic context; student voting and ownership; social interaction; various modes of representation; and self-awareness in learning. All of these dimensions have an important role to play in constructivist learning. Constructivist learning environments empower meaningful learning, critical thinking skills, and social skills (Moru & Mathunya, 2022 ; (Karaduman & Gültekin, 2007; Wu & Tsai, 2005). Exploring the

variables that influence teachers' teaching approaches in the learning environment is critical to determining their response to new trends. Their teaching and learning characteristics determine the success rate of new reforms. In addition, monitoring the use of constructivist pedagogy and providing feedback on it is another important objective of the study. Based on the important role of teachers in accepting or rejecting constructivist principles, this study investigates primary school teachers' ideas about constructivist learning environments with surveys and images. The findings from this second journal can be used to improve the quality of education and encourage active and collaborative learning for all students.

c. **Effectiveness of Constructivist Approach in Science Learning at Elementary School Stage**

The third article entitled "Effectiveness of Constructivist Approach in Science Learning at Elementary School Stage" provides strong evidence that constructivist approach can be an effective method for improving science learning at the elementary school level. This research encourages teachers to explore this approach and develop more active and student-centered teaching strategies. This research encourages science teachers to use more constructivist approaches in learning activities. Constructivism helps students develop 21st century skills.

d. **The Effect of Constructivism Learning on Student Learning Outcomes: A Meta Analysis Study**

The fourth article entitled "The Effect Of Constructivism Learning On Student Learning Outcomes: A Meta Analysis Study" supports constructivism theory in learning to measure the relationship of constructivism with student learning outcomes. The application of constructivist learning theory has a great influence and effectiveness on the learning process (Folashade & Akinbobola, 2009 ; Ahmad et al., 2020). Where almost half of the research data shows that constructivism learning theory is included in the category of very high influence on the learning process and learning outcomes (Hof, 2021 ; Mohammed & Kinyo, 2020). In addition, the measurement of effect size at the primary and secondary education levels shows a high category. This explains that constructivism learning is very well applied because the child's thinking stage at this level is able to be encouraged to construct his own knowledge so as to affect his learning outcomes.

Based on the research literature that has been described, it can be seen that constructivism theory in learning is one of the most important things and must be considered by teachers to accommodate the characteristics and needs in facilitating students to learn. This is in line with research (Mardiana, 2018; (Herianto & Lestari, 2021; Riyanti et al., 2021) shows that constructivism theory in science learning at the elementary school level is very useful to make it easier for students to develop their abilities in facing 21st century education. Constructivism theory in science learning should facilitate real activities that are rational and understandable to students so that social interaction occurs. This means that during the learning process students are actively involved in various real activities (Stiawan, 2016). Given the importance of

constructivism in learning, many teachers do not fully understand this theory. So that the results of this rivew literature can be an illustration for teachers at the elementary school level in implementing constructivism theory in science learning.

D. CONCLUSIONS AND SUGGESTIONS

Looking at the results of the study of the results of research that has been done, it can be concluded that constructivism theory in learning is very important. Because constructivist theory views learning as a process that emphasizes students to actively construct or express new ideas based on knowledge that has been previously possessed. The teaching and learning process in constructivism theory involves students, teachers, facilities and infrastructure. The theory of constructivism in science learning in elementary schools includes student understanding and skills, group learning, the use of learning media. Judging from the literature shows that there is still little research on the theory of constructivism in science learning, especially in elementary schools, therefore it is necessary to conduct in-depth research on the importance of constructivism theory in science learning on student activity in ongoing learning.

ACKNOWLEDGMENTS

A big thank you to the parties involved in writing articles and managing the Proceedings of the International Seminar on Student Research in Education, Science, and Technology who have provided assistance and thoughts to the author to help the author until the publication of this research journal. Hopefully your article can increase knowledge for its readers.

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