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CONSTRUCTIVISM THROUGH PROJECT-BASED LEARNING MODEL ON NATURAL SCIENCE LEARNING SUBJECTS IN ELEMENTARY SCHOOLS (LITERATURE REVIEW)

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KONSTRUKTIVISME MELALUI MODEL PEMBELAJARAN BERBASIS PROYEK DALAM PEMBELAJARAN ILMU PENGETAHUAN ALAM DI SEKOLAH DASAR (KAJIAN LITERATUR)

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ABSTRACT

Abstract: *This paper describes the theory of constructivism as an effort to increase students' understanding of Natural Science learning subjects in elementary schools using Project-Based learning in learning practices. PjBL is based on constructivism theory, which prioritizes the urgency of the knowledge-compiling process by students themselves actively, based on the knowledge that has been previously possessed. PjBL is a learning process that supports student-centered learning and experiential learning. PjBL can be one of the solutions for teachers in an attempt to direct students to understand the material, foster creativity, work on projects, and strengthen the process of collaborative group cooperation. Natural Science learning subject in elementary schools aims to provide direct experience to students in order to gain a more meaningful understanding and insight about the environment, which becomes a medium for students to learn about themselves and their environment. The research in this paper is qualitative and uses literature review methods. Journal search comes from the search at Google Scholar, Researchgate, ERIC, and others. The data analysis techniques are (1) data reduction, which means that to remove various things that are not needed and focusing on the important ones, (2) data exposure, which is describing data presented based on certain sub-sections, and (3) drawing conclusions from the results of recent research that has not conducted yet before.*

Keywords: constructivism, project-based learning, natural sciences, elementary school

Abstrak: Artikel ini menjelaskan teori konstruktivisme sebagai upaya peningkatan pemahaman siswa terhadap materi IPA di sekolah dasar dengan menggunakan pembelajaran berbasis proyek dalam praktik pembelajaran. PjBL didasarkan pada teori konstruktivisme yang mengutamakan urgensi proses penyusunan pengetahuan oleh siswa sendiri secara aktif, berdasarkan pengetahuan yang telah dimiliki sebelumnya. PjBL adalah proses pembelajaran yang mendukung pembelajaran yang berpusat pada siswa dan pembelajaran berdasarkan pengalaman. PjBL dapat menjadi salah satu solusi bagi guru dalam upaya membawa siswa memahami materi, menumbuhkan kreativitas, mengerjakan proyek, dan memantapkan proses kerjasama kelompok kolaboratif. Pembelajaran IPA di sekolah dasar bertujuan untuk memberikan pengalaman langsung kepada siswa agar memperoleh pemahaman dan wawasan yang lebih bermakna tentang lingkungan, yang menjadi media bagi siswa untuk belajar tentang diri dan lingkungannya. Penelitian dalam artikel ini bersifat kualitatif dan menggunakan metode studi literatur. Pencarian jurnal dari mesin pencari *Googlescholar*, *Researchgate*, *ERIC*, dan lainnya. Adapun teknik analisis datanya adalah (1) reduksi data, yaitu membuang berbagai hal yang tidak diperlukan dan memfokuskan pada hal yang penting, (2) pemaparan data, yaitu mendeskripsikan data yang disajikan berdasarkan sub bagian tertentu, dan (3) menarik kesimpulan dari hasil penelitian terbaru yang belum pernah ada sebelumnya.

Kata Kunci: konstruktivisme, pembelajaran berbasis proyek, ilmu pengetahuan alam, Sekolah Dasar

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INTRODUCTION

The most vital element in building civilization and progress of a nation is education. Education plays a very important role in increasing highly competitive human resources. Education will affect the quality of human resources, affect the increase in welfare and affect the prosperity of the population of a nation (Shofwan et al., 2019). The Government of the Republic of Indonesia has committed to improving the quality of Indonesian education so that it can compete on the international stage. The government has made the necessary innovations and breakthroughs to assist the education improvement process. The government, through its policy, allocates 20% of education funds from the state revenue and expenditure budget in the hope that the quality of education in the country will be better (Fahrozy et al., 2022) in order to adapt and compete in the industrial era 5.0 (Muhlisin et al., 2022).

The education system is required to be able to present students who have 21st century competencies such as collaborative, communicative, critical thinking and problem solving, and the use of technology (Kartika Sari & Sutihat, 2022 ; Herawati & Istiana, 2021) so that they are ready to face the challenges of this age and the age to come (Muhali, 2019). The Ministry of Education and Culture has formulated a 21st century learning paradigm that emphasizes project-based learning *Problem-Based Learning*, *Inquriy-Based learning*, *Design-Based Learning*, and *Discovery-Based learning* (Fahrozy et al., 2022).

Science education is very useful in preparing students to be proficient in critical, logical, creative thinking (Fithri et al., 2021). But they think that science lessons are difficult to understand (Awang, 2015) according to Ali et al. (2013) the reason is that the learning process is not in accordance with the principles of science learning. For them science lessons are irrelevant (Schmit et al., 2019), because there is no relationship between learning science and life (Fuadi et al., 2020). An innovation in science learning is needed so that students are interested in learning science from elementary school.

Science or what is commonly called natural science should be taught in a fun way, in an interesting way, so that students are interested in learning. In learning science students can be directly involved in observing learning objects, natural phenomena, the process of the occurrence of science, discovering concepts about something learned (Imamah, 2012). Science learning prioritizes the process of providing direct experience to students to develop the ability to explore and understand the natural surroundings scientifically by finding out and doing or interacting directly. This helps students gain a deeper experience of the natural surroundings in the form of facts, concepts, principles, natural laws, models and theories that shape knowledge, so that a meaningful learning process occurs.

Numbers of articles discuss constructivism learning at the basic education unit level, Acesta (2015) examined constructivist learning in increasing students' understanding of the sense of hearing in elementary schools. Widyaningsih & Ganing (2021) conducted research on the approach of constructivism in natural science lessons using comic media that discusses the life cycle of animals. Fitri, Y (2020) examined the application of constructivism in basic education units. From these studies the authors

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found a gap that deserves to be raised into an article, this gap is: a literature review related to constructivism through project-based learning models in science learning in elementary schools, which will be discussed in this paper.

THEORITICAL STUDY

Constructivism

Constructivism is a learning approach that focuses on the urgency of the process of compiling an understanding of knowledge by the students themselves actively based on the understanding of knowledge they have previously possessed (Aldoobie, 2015; Fitri, 2017 ; Tuerah, 2019 ; Lestari & Fauziati, 2021), natural learning process through experience (Barlia, 2011) which is built up gradually bit by bit continuously (Ratnasari et al., 2017). The constructivism learning approach is believed to be able to encourage students to actively shape their knowledge based on the reality that has been predetermined by experience (Akpomi & Kayii, 2022). The constructivism model is more effective than the direct learning model (Asmar et al., 2022) constructivism combines behavior and cognitive. This illustrates how teachers can convey material more effectively and students are able to understand it better (Yustina & Kapsin, 2017).

The constructivist approach supports a variety of teaching methods and techniques (Akpomi & Kayii, 2022) student centered (Sugrah, 2019) who view learning as an active process of building in the form of text, dialogue, experience, or other forms (Waseso, 2018) in an effort to develop a learning atmosphere that seeks to encourage students to be able to form their own knowledge (Wayan & Mahendra, 2017). Constructivism aims so that learning activities are not only limited to memorizing concepts, formulas and other things that are rote, but are composed of activities that can build an understanding of knowledge, material through activities that are practiced by the students themselves. If the principles of constructivism are carried out correctly, then this approach is believed to be able to improve the quality of learning (Herianto & Lestari, 2021).

Constructivism includes reflection, exploration, hypothesis, observation which ends in concluding theories through investigations which are called scientific approaches. The principles of constructivist pedagogy have been adopted in many educational innovations, including problem-based learning, project-based learning, inquiry-based approaches, and design thinking (Funa & Talaue, 2021). Constructivism as an interactive learning method involves active students in class activities (Barlia, 2011) strengthen real-world relationships with students' everyday experiences of the knowledge learned (R. Fitri, 2017).

According to the theory of constructivism, the knowledge that we have is not something that was discovered suddenly, but is something that was born from the thought of a formulation found by someone who studies it. This theory is oriented to see how a process actually occurs, not to understand reality. In the context of learning that departs from not knowing something to knowing something new. This theory views learning as a process of finding out something actively in building meaning, personal experience and so on (Mardiana, 2018)

The Role of the Constructivist Teacher

The teacher's role in the constructivist classroom organizes information around big ideas that interest students, to assist students in developing new ideas, and to relate them to their previous learning. (Bhattacharjee, 2015). The teacher encourages students to build an understanding of teaching materials through previous experiences in the real world which then link it to classroom learning. Involve students in evaluating learning activities that can help help gain understanding (Golder Ph, 2018), involving students in the learning process, bringing students' understanding to the forefront and always

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reminding students that it takes time to construct new knowledge (Sugrah, 2019).

The role of the teacher in the classroom is not as a speaker delivering material, but rather as a facilitator facilitating students to achieve an understanding of knowledge, facilitating all students both for group and individual learning. Studying in groups makes the learning process more cooperative (Murtiyasa, 2015) between group students, and can solve problems more easily because it is done together. Constructivist teachers view that learnings are: 1) Learning is an active activity, 2) Learning is an adaptive process, 3) learning occurs where the activity takes place (Weasenforth, 2018), 4) all knowledge is distinct and personal. These four things describe that knowledge is built by the students themselves (Sugrah, 2019).

Constructivism Principles

The principles of constructivism include: (1) students construct their own knowledge, (2) The teacher does not transfer the knowledge he has to students, (3) students actively build knowledge continuously, resulting in changes in scientific concepts, (4) the teacher simply helps facilitate the means and conditions so that the understanding formation activities go well (Murtiyasa, 2015.; Argarini et al., 2019). Meanwhile, according to Driver and Bell (1986) some principles of constructivism learning; 1) The learning environment and students' prior knowledge affect learning outcomes, 2) students can build concepts using the knowledge that has been learned, 3) the process of connecting and forming concepts will be ongoing, 4) students begin to form their knowledge since they receive the knowledge being studied, 5) learning patterns of students when building concepts are influenced by learning experiences (Nurussama & Hermanto, 2022).

Assimilation and accommodation are two important concepts in the implementation of constructivism theory which able to present new knowledge constructions for students (Rangkuti, 2014). Assimilation is a process when students receive new knowledge or experience (Gede & Estini, 2015) organize it as knowledge that adds to existing knowledge or reinforces pre-existing knowledge. Accommodation is a process when new knowledge makes students change or reconstruct existing knowledge (Felicia, 2021). Through accommodation students able to develop new views, re-think about something that might be misunderstood, correct urgent matters which in turn change their views (Bada & Olusegun, 2015), Every student's experience certainly involves assimilation and accommodation.

Project-Based Learning (PjBL)

Project-based learning is considered as an alternative learning model that able to strengthen students' knowledge and skills. In project-based learning students are required to make work or projects related to the desired teaching materials/competencies that appear in the learning process (Fauzia & Kelana, 2020). NYC Department of Education (2009) defines Project-Based Learning (PjBL) as a learning strategy in which students must construct their own knowledge and demonstrate the understanding gained through various forms of representation.(Erlinawati et al., 2019).

Project-based learning (PjBL) is based on constructivism theory (Anekawati et al., 2021) which is part of active and innovative student learning (Wirma Hendra et al., 2017) student-centered learning (Jalinus & Azis Nabawi, 2017;Ratnasari et al., 2018). Students commonly use activities or projects as media (Melinda & Zainil, 2020) learning core (Furi et al., 2018 ; Barlenti et al., 2017) which consists of exploring, assessing, interpreting, and synthesizing the information obtained (Elisabet et al., 2019)

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In this process students are active while the teacher is only a companion, facilitator and motivator in learning (Ratnasari et al., 2018).

PjBL is oriented towards investigation and discovery to solve problems. The problems used in project-based learning are authentic problems from students' lives that can improve critical thinking skills (Widiana et al., 2019). PjBL involves students in project work to build learning that can produce real products and benefit the community (Jauhariyyah et al., 2017 ; Lely et al., 2020). Students transform the knowledge they find with daily activities so that the understanding they get can be more meaningful. Learning does not always require students to memorize but involves students to build knowledge in their brains to foster creativity, activity and solve problems they face (Fauzia & Kelana, 2020). PjBL offers flexibility to students in designing learning activities and thinking critically and creatively (Elisabet et al., 2019), do on collaborative projects that will result in an authentic work product (Tika & Agustina, 2021) can be presented (Utami & Nirawati, 2018) and useful for students and others.

Advantages of Project-Based Learning

These are the priority of Project-Based Learning (PjBL), 1. Being able to present a fun learning experience, which will impress students so that they will more easily understand the material of ongoing learning activities (L. Sari et al., 2020). 2. Students can determine their own project goals, 3. Students can choose projects according to their own interests (Barlenti et al., 2017), 4. Can help develop students' soft skills, related to problem solving skills, technical skills, and cognitive skills, (Jalinus & Azis Nabawi, 2017 ; Ratnasari et al., 2018), 5. Project-Based Learning can accommodate students to be creative both individually and in groups (Furi et al., 2018; B et al., 2022). This learning model can foster students' understanding and reasoning power to encourage students to produce contextual works in the form of products or activities (Sari et al., 2020; Jalinus & Azis Nabawi, 2017) knowledge and skills.

Project-Based Learning (PjBL) provides opportunities for students to learn through experience (experiential learning) and integrates essential competencies from various disciplines (Santoso, 2018). PjBL in the context of an independent curriculum, schools are given the freedom and independence to provide learning projects that are relevant and close to the school environment (Romanti, 2021) which aims to enable students to be independent in completing the obligations and assignments given, increasing learning motivation (Wahyu, 2016), teamwork (Baptist et al., 2020) in collaborating so as to achieve academic and non-academic abilities at the highest level which are needed as 21st century skills.

Characteristics of Project-Based Learning

The characteristics of Project-Based Learning (PjBL) are: 1. Students are allowed to make their own decisions (da Silva & Helnywati, 2021) in mutually agreed regulations, 2. Students are accustomed to solving the problems they face, 3. Students arrange activities to be carried out in finding solutions, 4. Students are encouraged to think critically (analyze and evaluate) (Trisdiono et al., 2019), collaborate, and try various forms of communication, 5. Evaluation is carried out while the project is in progress, 6. students periodically reflect on the series of activities carried out from process to result, 7. The products produced are not always in the form of material, but can be in the form of performances and so on that can be demonstrated, 8. Develop classroom conditions full of tolerance for every change and error. The most important of the characteristics of the method is to increase students' understanding of the material, and

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they will be responsible for their own competence (Jalinus & Azis Nabawi, 2017).

Teachers can implement Project-Based Learning which includes several stages (Fauzi et al., 2019): 1). asking; 2) planning; 3) prepare a schedule; 4) supervise; 5) rate; and 6) evaluate. The activities of students in the Project-Based Learning model are: (1) forming small study groups (3-5) members or individuals, (2) compiling proposals and presenting them, (3) integrating knowledge and skills by seeking and exploring from various sources, (4) processing project completion, and (5) show the results of work. Project-Based Learning has positive implications for students including: (1) creative, (2) innovative, (2) responsible for the assignments given, (4) trained in designing projects, (3) working systematically, (4) making projects useful, (5) better self-confidence, (7) communicate better, (8) self-actualization, (9) management and planning, (10) predict project success, and (11) apply a science (Muhali, 2019). According to Wayan & Mahendra (2017) Project-based learning has the following characteristics: 1. Students can determine the topics they want, 2. Product billing at the end of learning, 3. recommendations for finding solutions to problems related to real life, 4. Associating various knowledge disciplines, 5. Different in the length of time for the project.

Natural Science in Elementary School

Natural science is a science that studies phenomena (Kurnia Wardani & Syofyan, 2018) natural symptoms in the neighborhood (Herdianto et al., 2022), which is a fact or event related to cause and effect (Adnyani et al., 2020). Natural Science studies matters relating to life (Anam, 2015) material that is systematic, arranged regularly and applies in general, which consists of a collection of monitoring results and experiments that are interrelated with other branches of science (Mutanaffisah et al., 2021). Natural Sciences in elementary schools teach concepts in biology, chemistry, and physics subjects (Mufida & Widodo, 2021).

The term science in general means science, while specifically the term science means natural science (Rahayuni, 2016). Science is not just a combination of related living things, not only related to the mastery of a collection of knowledge in the form of facts, concepts or principles (Pratiwi et al., 2019) but learn about how this natural process works (Arrohman et al., 2022), thought processes and problem solving (Mardiana, 2018) that can provide welfare to mankind (Nurdin, 2019). Science learning in elementary schools is directed to provide direct experience (Subali & Mariyam, 2013) to students so that they gain a more comprehensive understanding of the natural world around them (Andriana et al., 2020), Direct experience is an effective and efficient way to train students' critical thinking skills as the demands of the times (Anisa, 2017). Natural Science or science lessons become one of the important subjects to teach, because through science learning, students are able to solve the problems found (Laksana, 2016).

Gagne gives the definition of Natural Science is" science should be viewed as a way of thinking in the pursuit of understanding nature, as a way of investigating claims about phenomena, and as a body of knowledge that has resulted from inquiry". Which can be interpreted that there are several dimensions in Natural Sciences, namely the dimensions of ways of thinking, methods of investigation, body of knowledge, and inquiry processes. Learning Natural Sciences must be able to cover these dimensions, so that students experience a more meaningful learning process (Dewi, 2016). Meaningful learning is carried out through preparation for learning, namely by paying attention to the needs and involvement of students as much as possible (Anisa, 2017).

Learning Natural Sciences should be carried out in the surrounding environment, by involving students in observing natural

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phenomena either directly or in reconstruction. The teacher encourages students to actively carry out experimental activities, optimizing the use of technology in processing data (Andriana et al., 2020) involve students discussing and asking questions in finding concepts, principles, laws, and theories. Learning natural sciences prioritizes the process of providing direct experience to students to develop the ability to explore and understand the natural surroundings (local potential) scientifically by finding out and doing or interacting directly. This helps students gain a deeper experience of the natural surroundings in the form of facts, concepts, principles, natural laws, models and theories that shape knowledge.

In practice Natural Science has six principles, namely: the principle of motivation, the principle of background, the principle of finding, the principle of learning while doing, the principle of learning while playing, and the social principle. 1. The principle of motivation is the support that the teacher gives to students, which can be done in various ways such as advice or real support so that students ask for greater learning, 2. The principle of background is closely related to the prior knowledge students already have, 3. The principle of discovery namely that basically every student has a great curiosity about something, 4. The principle of learning while doing, that is, students will more easily understand what they are learning after carrying out practical activities, 5. The principle of learning while playing this becomes the character of the participants students at the elementary school level who still like to play, 6. Social origin must receive attention, considering that students are social creatures (Lestari & Fauziati, 2021) who need someone else. Therefore, in learning science, teachers need to manage activities that can involve students, for example with Project-Based Learning which is one of the approaches to learning science in schools.

Learners are very unique individuals. They attend school with different expectations according to their multiple intelligence aspects. Therefore learning at the elementary school level should use an approach that is oriented towards the developmental needs of the child (*Developmentally Appropiate Practice*) DAP. According to (Amriyah, 2018) approach (*Developmentally Appropiate Practice*) consider a number of principles that need attention including: a. The principle of proximity, namely starting teaching materials from the things closest to students so that they are able to reach them, b. The factual principle, namely teaching materials should be according to the age stages of elementary school students, namely related to something concrete, then shifting to conceptual, c. Holistic principle, namely the teacher must think about everything that will be taught to students as an integrated whole (holistic), d. The principle of meaningfulness, teaching materials in elementary schools should be while playing while presenting various kinds of manipulative processes.

METHODS

This research uses the method of literature review which is qualitative in nature. Search and collect articles using search engines such as Googlescholar, Researchgate, ERIC, and others. In collecting literature sourced from the internet, researchers write keywords related to the topics to be discussed, on each search engine such as Googlescholar, Researchgate, ERIC, and others. The data that was successfully collected was then analyzed based on the specified criteria. The data collection techniques consist of; 1. Reduction, namely removing various things that are not important, 2. Data exposure, namely presenting data based on certain sub-sections, and 3. Drawing conclusions from recent research that did not exist before.

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RESULTS AND DISCUSSION

This research discusses the constructivist learning approach and the Project-Based Learning model, which has been widely used in numbers of field of scientific study, so researcher needs to analyze existing research to strengthen the research that will be carried out. It should be noted that existing (previous) research can be positioned as a reference in order to find a differentiator from previous studies. Some of these studies are;

Table 1. Previous research

No	Author	Title	Year	Journal
1	Wiwik Maladerita	*Implementation of the Thematic Learning Process Using a Constructivist Approach*	2021	*International Journal Of Humanities Education And Social Sciences (IJHESS).*
2	Dwi Resmi Novita Sari , Sri Wardani, Mulawarman Mulawarman	*The Effectiveness of The Constructivist Learning Model Using Children Learning In Science (CLIS) Type in Improving Science Learning Outcomes.*	2020	*Journal of Primary Education.*
3	Roos M. S. Tuerah	*Constructivism Approach in Science Learning*	2019	*International Journal of Innovation, Creativity and Change.*
4	Hendri Purbo Waseso	Kurikulum 2013 Dalam Prespektif Teori Pembelajaran Konstruktivis.	2018	*Jurnal Studi Pendidikan Islam*
5	Mislan Sasono, Farida Huriawati, Andista Candra Yusro	Pengembangan Perangkat Pembelajaran Melalui Pendekatan Konstruktivistik dengan Metode *Five E (5E) Stages Learning Cycle* untuk Meningkatkan Hasil Belajar dan Keterampilan Proses Sains	2017	*Momentum: Physics Education Journal*

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6	Yustina, Kapsin	*The implementation of constructivism-based student worksheets within the theme 'the prevention of land and forest fire' in science education for seventh graders in* Riau	2017	*Jurnal Pendidikan IPA Indonesia*
7	Cheng-Huan Chen, Yong-Cih Yang	*Revisiting the effects of project-based learning on students' academic achievement: A meta-analysis investigating moderators*	2019	*Educational Research Review.* Elsevier Ltd
8	Lifda Sari, Taufina Taufina, Farida Fachruddin	Pengembangan Lembar Kerja Peserta Didik (LKPD) dengan Menggunakan Model PjBL di Sekolah Dasar	2020	*Jurnal Basicedu*
9	Nenden Latifah Ulfani Fauzia, Jajang Bayu Kelana	*Natural Science Problem Solving in Elementary School Students Using the Project Based Learning (PjBL) Model.*	2020	*Jurnal Ilmiah Sekolah Dasar*

The studies in the table will be discussed in the following discussion. Maladerita (2021) tested the implementation of thematic learning using a constructivist approach. The research subjects were class III students at SDN 05 Alang Rambang Pesisir Selatan. Using the Classroom Action Research method, which starts from planning, implementing, observing, and reflecting. Collecting data in this study used two assessments, namely observation and assessment sheets. The improvement obtained during the two-cycle learning process shows that through the implementation of a constructivism approach in the thematic learning process it can improve learning outcomes. This increase can be seen from the average percentage of the lesson plan assessment in the first year of the cycle of 73.2, the assessment of the teacher aspect of 57.5, the implementation of student aspects in cycle I of 59.5, while the results of learning mathematics 59.7, social studies 62.73, and Indonesian 65.75. Cycle II, the average percentage of the RPP assessment in cycle II was 80.25, the assessment of the teacher aspect was 80, the student aspect of implementation in cycle II was 82, while the learning outcomes for mathematics were 87.6, social studies 78.5, and Indonesian was 81.1 . This research proves that the use of a constructivist approach can improve the thematic learning process of class III students at SDN 05 Alang Rambang Pesisir Selatan.

Sari, D.R.N et al (2020) analyzed the effectiveness of the Children Learning In Science (CLIS) constructivism learning model

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to improve learning outcomes. The method used is quasi experiment. Random sampling, namely the SDN control class. 2 Patikraja and the experimental class, namely SDN 1 Notog. Data were analyzed using one sample proportion test, N-Gain analysis and t-test. Research reveals that CLIS constructivist learning is effective in improving student learning outcomes compared to the expository model. The completeness of the experimental class reached >75% and the average learning outcomes of the experimental class were higher than the control class.

Tuerah (2019) examined the influence of constructivists on natural science learning on human respiration. The research subjects were fifth grade students at Inpres 4/82 Walian Elementary School. The number of students in class V is 21 students, consisting of: 16 male students and five female students. This study used the Kemmis and McTaggart class research method (CAR). The data collection method uses two assessments, namely observation and assessment sheets. Data collection techniques were carried out through observation sheets with two assessments used by class teachers to observe students who were studying and researchers who were teaching. The results showed that the implementation of the constructivism approach in science learning in class V of Inpres 4/82 Walian Elementary School could help students construct their knowledge related to human breathing and provide optimal learning outcomes. The conclusion is that the constructivist learning approach influences science.

Waseso (2018) researched Kurtilas in the view of constructivist theory. In this research, numbers of information was found, namely, 1) students are able to construct their knowledge using available media, the teacher acts as a liaison between students and learning resources, 2) constructivist learning provides a view of the approach scientific namely observing, asking, reasoning and trying, 3) Kurtilas accommodates constructivism approaches, especially adequate classes and other learning approaches.

Sasono et al (2017) developed a learning tool using a constructivist approach with the 5E method, which aims to improve learning outcomes and science process skills in material objects and the nature of grade V science. The researcher chose Research and Developmental (R&D) as the research method. The flow of teaching device development begins with designing, developing, and disseminating. The researcher validated the teaching tools using triangulation, recorded each student's activity and learning outcomes into qualitative data and then qualitativeized it. Student Worksheets, Learning Program Plans, product evaluation sheets were developed using the 5E learning cycle model. The conclusion of the study is that student learning outcomes and science process skills increase after using the developed learning tools. Students' science process skills increased in learning I (70.79%), learning II (73.97%) and learning III (78.10%). The mean pre-test score was 33 and the post-test average score was 64, with an average increase of 31.

Yustina & Kapsin (2017) conducted a verification research related to "The Implementation of Constructivism-Based Student Worksheets Within The Theme 'The Prevention of Land And Forest Fire' In Science Education for Seventh Graders In Riau". This research aims to test the correctness of stage competence in the constructivist approach of advanced tests on student worksheets 1 and 2 and compare them with the results of testing 2 on the theme of forest and land fires and peat swamp ecosystems and global warming and its impacts. The research was conducted in the laboratories of the Biology Department, Faculty of Teaching and Education, University of Riau and SMPN 1 Bungaraya in September-December 2016. The results showed that students' competence in constructing ideas through a constructivist approach was 'good' on LKS 1 (mean score = 3 .27) and 'very good' on LKS 2 (mean score = 3.43). The data also show that there is consistency between follow-up tests for Trial II trials. This study concluded that LKS 1 and LKS 2 could increase students' competence in building knowledge about the

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topic of forest and land fires, and both LKS (Student Sheets 1 and 2) were appropriate to be used as a reference for class VII science learning.

Chen & Yang (2019) examined the comparison of the effect of PjBL and traditional learning on students' academic achievement using meta-analysis. Data analysis was taken from 30 qualified journal articles from 1998 to 2017. There were 189 schools from all over the world and 12585 students represented. In this study it was revealed that overall PjBL can affect the academic results of students from medium to high levels. The dominant thing that can influence it is the location of the school, the length of learning, technology support.

Sari, L et al (2020) developed Student Worksheets (LKPD) utilizing Project-Based Learning at the elementary school level which aims to produce Student Worksheets (LKPD) for class V Project-Based Learning models that are effective, practical and valid. The researcher chose the 4D Model Research and Development (RnD) Method (Define, Design, Develop and Disseminate) as a way to get the best research results. Validity weight of 3.59 means it is very valid which includes Student Worksheets consisting of content, language, presentation, graphics and lesson plans. Then obtained an average practicality value of LKPD 88.9% and 86.7% effectiveness. The conclusion from this development is that the LKPD using the Project-Based Learning model is very feasible for use in grade V elementary schools.

Fauzia & Kelana (2020) examines how to apply problem solving in Natural Sciences using the Project-Based Learning model. The research subjects were 30 grade IV elementary school students. The findings of researchers based on fields observations, students understand well learning using project-based learning models. This happens because the learning process utilizes concrete objects. In learning the teacher relates teaching material to the lives of students, and gives the flexibility to ask questions. Student responses to solving energy problems using a project-based learning model based on filling out questionnaires were very good.

CONCLUSION

Based on the results of the literature review, it can be concluded that constructivism theory is a learning approach theory that emphasizes the process of forming knowledge by the students themselves actively, based on prior knowledge. In learning students construct the form of text, dialogue, experience, or other forms. Science learning can be done in an environment by observing natural phenomena directly and actively doing practices and experiments. Assimilation and accommodation are key concepts in constructivism learning theory. Assimilation is the absorption of new information in the mind. Meanwhile, accommodation is rearranging the structure of the mind because of new information. Constructivism theory can be implemented in learning, one of which is through a learning approach with the Project-Base Learning (PjBL) model which uses projects as the core of learning, students will construct learning to then produce real products, beneficial to the lives of the students themselves and for others. Project-Based Learning aims to increase learning motivation, teamwork, collaboration skills as abilities needed in the 21st century.

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