E-ISSN 2830-1013
P-ISSN 2830-1021
JIIET JOURNAL INTERNATIONAL Inspire Education Technology

Learning Theories According to Constructivism Theory

Nurhasnah[1], Nana Sepriyanti[2], Martin Kustati[3]

[1]*Universitas Islam Negeri Imam Bonjol Padang*, Indonesia
E-mail: nurhasnah220324@gmail.com
[2]*Universitas Islam Negeri Imam Bonjol Padang*, Indonesia
E-mail: nanasepriyanti@uinib.ac.id
[3]*Universitas Islam Negeri Imam Bonjol Padang*, Indonesia
E-mail: martinkustati@yahoo.com

Corresponding author: nurhasnah220324@gmail.com

***Abstract*— The education system carried out, especially in Indonesia, will often change according to the development and changes of the times, where all of that cannot be separated from the influence of technological developments and media that continue to reach developments every time, in learning to prepare for such things, a theory is needed, one of the theories that is also applied in the latest curriculum, namely the 2013 curriculum is the theory of constructivism. The purpose of this writing is to see how the theory of learning according to the theory of constructivism developed by Pieget and Vygotsky. The writing in this study uses the library method or Library Research. Where this paper finds the results that learning in constructivism theory, namely learning activities are active activities, where students build their own knowledge. Students seek their own meaning from what they learn, this is a process of adjusting new concepts and ideas to the existing framework in their minds. Piaget and Vygotsky cannot be separated from constructivism learning theory. However, there is a principle difference between Piaget's concept and Vygotsky's concept. If Piaget developed more schemata theory, Vygotsky developed more zone of development (ZD) theory and scaffolding.**

Keywords*— *Constructivism, Learning, Theory

Manuscript received 15 April 2024; revised 29 April. 2024; accepted 2 May. 2024. Date of publication 17 May. 2024.

How to cite: Nurhasnah, Nurhasnah., Sepriyanti, N., Kustati, M. (2024). Learning Theories According to Constructivism Theory. *Journal International Inspire Education Technology (JIIET)*, 3(1), 19–30. https://doi.org/10.55849/jiiet.v3i1.577

Published by: Sekolah Tinggi Agama Islam Al-Hikmah Pariangan Batusangkar

I. INTRODUCTION

The task for education is not only limited to transferring the results of science and technology (Leung et al., 2024; Masril et al., 2024; van Zyl, 2024). In addition, the field of education is also tasked with instilling new values demanded by the development of science and technology in students within the framework of the basic values agreed upon by the Indonesian nation. Learning theory was raised by learning psychologists after they experienced difficulties in implementing something in the learning process as a whole (Bai & Chai, 2024; Chang-Tik et al., 2024; Ilbeigi et al., 2024). Some psychologists give the meaning that learning is a process from not knowing to knowing, from not understanding to understanding (Ashtari et al., 2020). Learning is a process that a person will go through throughout his life.

It is important to identify and comprehensively understand learning theories derived from constructivism because this approach emphasizes the active role of students in constructing their understanding. In line with that,

this research can make an important contribution in the context of curriculum development, teaching methods and learning strategies that are in line with the principles of constructivism (Ann Molise et al., 2024; Mallek et al., 2024; Olatoye & Fru, 2024). Through a deeper understanding of constructivism learning theories, it is expected to open the door for educational innovations that are more effective and relevant to the needs of students in the contemporary era.

In addition, this research can also provide a broader view of the comparison between various constructivism theories proposed by figures such as Jean Piaget, Lev Vygotsky, Jerome Bruner, and others (Duresa, 2024; Sun, 2024; Wu et al., 2024). An in-depth understanding of the differences and similarities between these theories can help education policy makers, teachers and practitioners in choosing and implementing learning strategies that best suit the characteristics and needs of students.

Theory is very important. So that theory occupies a very important position in the world of education, the success of education is influenced by theories that always develop over time (Connell, 2024; Hu et al., 2024; Miyashita & Wark, 2024). Talking about educational theory is actually very much the theory, one of which is the theory of learning cotructivism which will be discussed in this paper

II. RESEARCH METODS

This research was designed by adopting a qualitative approach, as the outcomes of this research are not numerical in nature (Garibay & Teasdale, 2019). The qualitative approach was chosen because it is more in line with the scope of the discussion to be explored. The use of qualitative data aims to present the information obtained in a natural and authentic way (Watkins et al., 2019). In other words, the data collected reflects the actual situation and is explored in depth, so that with a qualitative approach, all these aspects can be understood thoroughly and deeply in accordance with the actual reality.

The research method used in this study is library research (Creţan et al., 2023). Library research is conducted without researchers going directly to the field; instead, this research is carried out through exploration of written works and various available literature, including books, journals, magazines, newspapers, and other sources of information. This study includes discussion, excavation, and analysis of ideas and thoughts related to the research topic, supported by data and information derived from various literature sources (Al Owayyed et al., 2024; Browne et al., 2024; Nyathi & Sisimayi, 2024; Rathinavelu et al., 2024). The author selects and examines this research historically and philosophically on literature materials related to learning theories according to constructivism

III. RESULTS AND DISCUSSION

Understanding Learning According to Constructivism Theory

Learning in constructivism theory involves students as active actors who independently build their knowledge. Students search for the meaning of the material they learn, which is a process of adjusting new concepts and ideas to the framework that has been formed in their minds (Kaliampos, 2024; Mohsen & Alangari, 2024; Muhdhar et al., 2024). Constructivism benefits students and teachers during the teaching-learning process (Shumba et al., 2012).

Basically, constructivism is an approach that emphasizes student activities to create, interpret, and reorganize knowledge individually (Supardan, 2016). The development of constructivism in the context of learning is inseparable from the persistent efforts of Jean Piaget and Vygotsky. Jerome Bruner observed that learning occurs through actions performed, as well as through the process of thinking about these activities. David Ausubel and Piaget are considered the main theorists in cognitive constructivism, while Lev Vygotsky is the main figure in social constructivism. Bruner developed a framework for applying this theory to learning practice.

They highlight that developmental cognitive change occurs when pre-existing concepts shift in response to new information, triggering a process of disequilibrium. Jean Piaget and Vygotsky also underlined the significance of the social environment in the learning process, recognizing that the integration of abilities in group learning can enhance conceptual change (Ainjärv & Laas, 2024; Imran et al., 2024; Xiao & Xiao, 2024). Constructivism basically has a constructive meaning (Ahmed et al., 2020). In the context of the philosophy of education, constructivism is defined

as an attempt to build a modern cultured living arrangement Constructivism means building.

Constructivism can be considered as a learning approach that enhances behavioristic and cognitive learning theories. It aims to improve students' understanding by emphasizing students' active involvement in dealing with learning problems (Díaz & Delgado, 2024; Ferrero & Álvarez Sainz, 2024). This concept has been widely accepted, in accordance with current curriculum documents, which emphasize that students should be active participants in the learning process, not just passive recipients of information from others (M. S. B. Reddy et al., 2021). In constructivism, learners construct meaning from the ideas, objects and events they experience (Cho et al., 2024; Milonaitytė & Kuda, 2024). Learning occurs when existing concepts are challenged, requires action and reflection on the part of the learner, and involves taking risks in the process.

Constructivism has the following characteristics (Masgumelar, 2021):

1. Learning is active, where students are directly involved in the learning process.
2. Students are involved in learning activities that are real and in accordance with life situations.
3. Learning activities are designed to be interesting and challenge students' interests.
4. Students are expected to connect new information with their existing knowledge through a process called "bridging".
5. Students are invited to reflect on the knowledge they acquire, enabling deeper understanding.
6. The teacher's role is more as a facilitator who assists students in constructing their knowledge.
7. Teachers are expected to provide assistance in the form of scaffolding needed by students in taking the learning process in stages.

.

Constructivism should be applied to learners who have reached the critical thinking level. This approach involves active participation of learners in the learning process, aiming to equip them with problem-solving skills through the application of discovery and meaningful learning methods (Chen & Zhao, 2024; Ford & Waller, 2024; Milonaitytė & Kuda, 2024; L. Yang & Li, 2024). In the framework of constructivism, learners are considered as individuals who process information and learning by organizing, storing, and finding connections between new knowledge and the knowledge they already have, emphasizing the process of processing information.

The similarity between Piaget and Vygotsky lies in both of them being adherents of the constructivist school in the learning approach. Both believe that in the learning process, learners must actively build their own knowledge, because learning is an internal process of the individual, not an influence from outside the individual. Information received from the environment or learning sources is a stimulus that needs to be processed by individuals to form new knowledge.

Thus, constructivism is also defined as an attempt to build a modern cultural life arrangement in the context of educational philosophy (Dong et al., 2024; Xu & Sun, 2024; Y.-F. Yang et al., 2024). This approach seeks to improve student understanding by emphasizing active engagement, reflection and risk-taking in learning (Tanaka & Okamoto, 2021). Characteristics of constructivism include active learning, student involvement in authentic situations, engaging learning activities, linking new information to existing information, reflection, the teacher's role as facilitator, and the use of scaffolding (“Correction to: Junior High Schools Teachers’ Perceptions and Practice of Constructivism in Ghana: The Paradox (Cogent Education, (2023), 10, 2, (2281195), 10.1080/2331186X.2023.2281195),” 2024; Mahama et al., 2024; Mamlok, 2024; P. J. K. Reddy & Revathy, 2024). This theory is best applied to learners who can think critically, engaging them in discovery and meaningful learning and emphasizing how information is processed by individuals (Braidotti, 2019). Although Piaget and Vygotsky share similarities as adherents of constructivism, the main difference lies in the information processing process.

Pieget's Theory of Constructivism

Piaget, a highly influential developmental psychologist in the history of psychology, divided children's development into four main periods as they age: sensorimotor, preoperative, concrete operations and formal operations. Piaget believed that all children experience these stages in a certain order as they grow older (He, 2019). According to him, it is impossible for a child to skip from one

stage to the next, although different children may pass through the stages at slightly different rates (Asrori, 2020).

Piaget's theory is based on the idea that child development involves the formation of cognitive structures or mental maps referred to as "schema" (plural: "schemata") (Gani & VAN DEN BERG, 2024; Ogodo, 2024; Yeh et al., 2024). The concept of schema has been extensively developed by linguists, cognitive psychologists and psycholinguists to explain the interaction between various factors that influence the comprehension process. Simply put, schema theory states that knowledge is organized into specific units, where information is stored in these units of knowledge or schemas. Therefore, a schema can be interpreted as a general description or conceptual system yang membantu memahami bagaimana pengetahuan dinyatakan atau diterapkan (Harianto, 2017). Piaget presented an analogy that the development of a child's ability to distinguish between living and non-living things can be likened to the growth of intelligence. In this concept, Piaget refers to what he calls socialization in adult thinking. This analogy emphasizes the relationship between a child's ability to understand the difference between animate and inanimate objects and the development of intelligence that plays a role in the socialization process towards adult thinking (Aslanian, 2018).

According to Pieget, in learning, two processes have actually occurred in humans, namely the information organization process and the adaptation process (Wahyuni, 2010).

1. Information organization process

   The organization process is a process in which a person can link the knowledge structures he already has with the new information he receives. Through this process, individuals can gain new knowledge by aligning existing knowledge structures with newly received information, thus allowing individuals to accommodate the information or knowledge.
2. Adaptation process

   In the adaptation process, there are two main activities. First, there is a process of combining two things, namely between existing knowledge structures and new knowledge, which is referred to as assimilation. Second, there is a process of changing between the old knowledge structure and the new knowledge structure, so that a balance or equilibrium is achieved.

Furthermore, Piaget states that children's cognitive structures develop as they age, transitioning from early reflexes such as crying and feeding to more complex mental activities. The process of human adaptation to new knowledge is also influenced by the phase of cognitive development. Jean Piaget divided the phase of human development into four phases, namely 1) sensorimotor period (age 0 - 18/24 months), 2) preoperational period (age 2-7 years), 3) concrete operational period (age 7-11 years), 4) formal operational period (over 11 years). For more information, here is a table of the stages of cognitive development according to Piaget (Wahyuni, 2010).

Tabel. 1

Stage	Age/Year	Overview
Sensorimotor	0-2	Infants experience a move from instinctive reflex actions from birth to the beginning of symbolic thinking. During this period, the infant constructs an understanding of the world by bringing together its sensory experiences and performing physical actions.
Operational	2-7	At this stage, the child begins to represent the surrounding world through the use of words and pictures. This process shows the development of symbolic thinking which involves the expression of concepts and ideas using verbal and visual symbols.
Concrete Oprasional	7-11	At this stage, children have the ability to do logical thinking related to concrete events and are able to group objects into different categories.

Formal Operational	11-15	In this phase, adolescents are able to think more abstractly and logically, and have more idealistic thinking characteristics.

These stages reflect the evolution of children's thinking from reflex action to symbolic, logical, and abstract thinking as they grow older.

Vygotsky's Theory of Social Constructivism

As a major figure in the philosophy of constructivism, Vygotsky is more likely to refer to his theory as social cognitive learning. This view emphasizes that individual development is strongly influenced by culture, where culture is considered the main determinant. Humans, as the only species with a self-generated culture, experience development within their own cultural context. Therefore, a child's learning process is influenced both significantly and to a lesser extent by his or her culture, including the culture of his or her family environment (Harianto, 2017).

To varying degrees, children's development is influenced by culture, including their family culture and environment. Some of the main principles in social cognitive thinking according to Vygotsky include (Harianto, 2017):

1. Culture plays a dual role in a child's intellectual development, as described by Vygotsky. First, through culture, the child acquires most of the content of his thinking, which is his knowledge. Secondly, the surrounding culture provides the child with processes or support for the results of his thinking, which Vygotsky calls the tools necessary for intellectual adaptation. In brief, Vygotsky's social cognition learning theory states that culture teaches students the essence of thinking and how to think.
2. Cognitive development, according to Vygotsky, occurs through a dialectic process where a student learns problem solving and then uses that experience to share with others. This interaction is not just limited to relationships with parents or teachers, but sometimes involves interaction with peers or even younger children. This process creates opportunities for students to share and convey their knowledge, which in turn enriches their learning experience.
3. Initially, individuals who interact with children assume that they have the primary responsibility in guiding children to solve problems. However, over time, the responsibility gradually shifts and falls more on the child themselves. This process reflects children's cognitive development, where they begin to take a more active role in solving challenges and problems they face.
4. Language is the primary form of interaction, through which adults share the wealth of knowledge contained in the culture with the child.
5. As a result of learning progress, children have their own language which they use as a primary tool for intellectual adaptation. Sometimes children can even use their own language to direct their behavior.
6. Internalization refers to the learning process, thus internalizing the culture that is rich in knowledge and used as tools for how to think - which originally exists outside the child, takes place very early through language; there is a difference between what children can do on their own and what students can do with the help of teachers or parents. Vygotsky called this the ZPD (zone of proximal development): since most of what a student has to learn comes from the surrounding culture, and most of the child's problem solving is mediated by adult help, it is wrong to focus on the isolated student (not in interaction with society). Such a focus fails to reveal the processes by which students acquire new skills,
7. Interaction with the surrounding culture and societal agents, such as parents and more competent peers, contributes significantly to the child's intellectual development.

Vygotsky considered that social interaction was crucial to cognitive development, and this led to the concept of cognitive development. The close relationship between cognitive development and language development became his focus. According to Vygotsky, cognitive development is closely linked to the stages of language development, which he divides into four stages: preintellectual speech, naive psychology, egocentric speech, and inner speech (Wahyuni, 2010)*:*

1. Preintelectual speech, the initial stage in cognitive development is the period from the time humans are just born, characterized

by basic biological processes such as crying, babbling, and body movements. Gradually, these abilities develop into more complex forms such as speech and behavior. Humans are born with language abilities that allow interaction with the environment, so that language development can reach its maximum level.

2. Naive psychology, the second stage of language development is when a child "explores" or explores the concrete objects around them. At this stage, the child begins to name or label the objects and can utter a few words in speech. They can achieve verbal understanding and use language to communicate with their environment. This helps develop their language skills, which in turn affects the way they think and strengthens relationships with others.
3. Egocentric speech. This stage occurs when the child is 3 years old. At this stage, children tend to engage in conversation without caring whether others are listening to them or not.
4. Inner speech. This stage has an important function in directing one's behavior. For example, a 5-year-old little girl wants to pick up a book that is on top of the cupboard. When her hand does not reach the book, she says to herself, "I need a chair to get the book." Then, she picks up a chair, climbs onto the chair, and says, "Ok, I can reach the book a little more. Oh yeah, I have to stand on tiptoe to reach the book." The example shows how self-talk can guide behavior. Like the little girl, adults also often use inner speech or private speech to direct behavior and complete difficult tasks.

Another fundamental principle of Vygotsky's learning theory is "scaffolding". Scaffolding involves providing support and assistance to a child in the early stages of learning, and gradually reducing that support once the child is able to solve the problem or complete the task at hand. The goal is for the child to learn independently. For example, a mother uses scaffolding to help her child learn to shine his shoes. At first, the child is guided with instructions and examples on how to clean shoes. After the child is able to do the task, the mother gives the child the opportunity to do it independently (Wahyuni, 2010).

Key concepts of social constructivism theory include (Harianto, 2017):

1. students as unique individuals
2. Self-regulated learner
3. Responsibility for learning
4. Learning motivation
5. Sona of development
6. Teacher's role as facilitator
7. The dynamic interaction between tasks, instruction, and learning
8. Collaboration between learners
9. Cognitive apprenticeship
10. Top-down process
11. Cooperative learning as an implementation of constructivism
12. Learning by teaching as a constructivist method.

Taken together, these concepts create the foundation for the social constructivism approach to education, which views learning as an active process that fully engages students in the construction of their knowledge.

Comparison between Pieget's Constructivism and Vygotsky's Constructivism

The names Piaget and Vygotsky are closely associated with constructivism learning theory. Although both contributed to constructivism, there are principle differences between Piaget's concept and Vygotsky's concept. Piaget focused more on the development of schemata theory, while Vygotsky emphasized zone of development (ZD) theory and scaffolding. In addition, Piaget is known for building his theory based on the development of children in accordance with their age sequence, while Vygotsky does not consider this as a major factor.

Then, if Piaget's theory focuses more on the development of students as individuals, without ignoring the views of social constructionism, Vygotsky firmly emphasizes that student development is more the result of social interaction, influenced by civilization, tradition, and cultural environment. This view is in accordance with the opinion of Supratiknya (2002) who states that in Piaget's view, the social environment only has a secondary role in the learning phenomenon. The main factor determining the learning process, according to Piaget, still lies with the individual who is learning. Furthermore, it is mentioned that Piaget was influenced by the views of Socrates who

emphasized the individualistic pursuit of the truth (Harianto, 2017).

Vygotsky's theory, which focuses on directly observable behavior, is considered to have limitations in explaining behavior that is difficult to observe. In this context, Piaget's theory can provide an explanation to the problem through the formulation of age-appropriate stages of development. Therefore, it can be concluded that these two theories actually complement each other and provide solutions to the weaknesses of each theory (Utami, 2016).

Piaget puts more emphasis on individual development and individualistic views in the pursuit of truth, while Vygotsky explicitly emphasizes that student development is strongly influenced by civilization, tradition, and social environment. Nonetheless, the author indicates that these two theories are actually complementary, where Piaget's theory can provide explanations for behaviors that are difficult to observe through developmental stages, so both provide answers to the weaknesses of each theory.

Proses Belajar Menurut Teori Konstruktivisme

The theory of constructivism in learning can be applied in learning by paying attention to (Mularsih, 2017):

1. Utilize learners' prior knowledge
2. Creating meaningful learning through experience
3. Creating a conducive social environment
4. Motivate learners' independence.

Forms of constructivism learning (Mularsih, 2017):

1. Cooperative learning
2. Problem-based learning (PBM)
3. Individualized Learning
4. Discovery learning
5. The accelerated learning
6. Quantum learning.

Constructivistic learning process. Conceptually, the cognitive approach to learning does not see it as a passive absorption of information from outside into the student. Rather, the learning process is understood as students giving meaning to their experiences through a process of assimilation and accommodation, ultimately updating their cognitive structures. Learning is seen more in terms of its process than as the accumulation of discrete facts. This process involves giving meaning to objects and experiences, which does not occur in isolation, but through interaction in a unique social network, both inside and outside the classroom. Therefore, learning management should focus more on managing students in processing their ideas, not just on organizing students and their learning environment, or even on assessing achievements related to external rewards such as grades, diplomas, and the like.

The Role of the Student (Si-learner). In a constructivist perspective, learning is considered as a process of knowledge formation that must be carried out by the individual who is learning. The individual needs to be an active agent involved in learning activities, thinking actively, designing concepts, and giving meaning to the material being learned. The role of the teacher remains important in creating an environment that provides optimal opportunities for learning, however, what is most decisive for the success of learning is the learning intention possessed by the students themselves. In other words, the essence of learning control is entirely in the hands of the students.

In the constructivist paradigm, students are seen as individuals who already have initial abilities before learning a new concept. This initial ability becomes the basis for constructing new knowledge. Although these initial abilities may be simple or not aligned with the teacher's view, they should be recognized and used as a foundation for the learning process and guidance.

The Role of the Teacher. In the constructivist approach, the role of the teacher or educator is to help smooth the process of knowledge construction by students. Teachers do not simply transfer the knowledge they have, but guide students in forming their own knowledge. Teachers need to understand students' way of thinking and worldview more deeply. There is no claim that the only correct way is in accordance with the teacher's perspective; on the contrary, it is important for teachers to recognize and respect students' various perspectives and understandings.

The key role of the teacher in educational interaction is control, which includes,

1. Develop student independence by providing opportunities for decision-making and action.
2. Enhance students' ability to make decisions and take action by improving their knowledge and skills.

3. Providing support systems to facilitate the learning process, so that students have optimal opportunities to practice.

Learning tools. The constructivist approach emphasizes that the main role in learning activities is student activity in constructing their own knowledge. All elements such as materials, media, equipment, environment and other facilities are prepared to support this formation. Students are given the freedom to express their opinions and thoughts about the situation at hand. Thus, students become skilled in thinking for themselves, overcoming problems, being critical and creative, and being able to account for their thoughts rationally.

Evaluation of learning. The constructivist view states that the learning environment significantly supports the emergence of multiple views, interpretations of reality, construction of knowledge and other activities derived from experience. This creates considerations in evaluating constructivist learning. Differences in the application of learning evaluation are seen between the objective behavioralist (traditional) and constructivist views. Structured and designed learning programs often adopt an objective approach, while Piagetian approaches and discovery learning tasks tend more towards constructivism. The objective approach recognizes the existence of knowledge reliability, where knowledge is considered objective, certain, and fixed, unchanging. Knowledge has been well structured, and the teacher is responsible for conveying that knowledge. The reality of the world and its structure can be analyzed and deciphered, and individual understanding is generated by processes external to the structure of the real world. Therefore, learning is regarded as the assimilation of real objects. The goal of curriculum designers and traditional teachers is to interpret the real events that will be presented to their students. (Budiningsih, 2012).

Impact of the Theory of Constructivism on Learning

The implications of the theory of constructivism for education are as follows (Harianto, 2017):

1. Education objectives

   Creating individuals or children who have the ability to think to solve every problem faced.
2. Curriculum

   In constructivism, curriculum does not require standardization. Instead, it requires a curriculum that is tailored to the students' prior knowledge. Furthermore, the curriculum should emphasize hands-on problem-solving skills. In other words, the curriculum design should create a situation where knowledge and skills can be constructed by learners.
3. Teaching

   In constructivism theory, the role of educators is focused on organizing relationships between facts and reinforcing students' understanding of new knowledge. Teachers should design learning strategies that pay attention to students' responses and responses, encouraging them to analyze, interpret and predict information. Teachers are also expected to present open-ended questions and encourage extensive dialogue between students. In this context, the teacher acts more as a facilitator, mediator and learning partner who creates a conducive situation for the construction of students' knowledge and skills.
4. Learning

   It is expected that students are always active and able to find learning methods that are suitable for themselves.
5. Assessment

Constructivism does not require standardized tests according to grade level. Instead, it emphasizes assessment as an integral part of the learning process (authentic assessment), allowing students to play a more active role in assessing and evaluating their own learning progress or results. Therefore, assessment models such as portfolios are presented as a form of physical evidence, including exam results, papers, skill demonstrations, certificates, awards, anecdotal notes, and other elements that demonstrate student learning outcomes or performance

IV. CONCLUSION

Learning according to constructivism is an activity where learners reconstruct their own knowledge by finding meaning from what they have learned and through ideas or concepts that they have made. Piaget's theory is based on the idea

that children's development means building their cognitive structures. As someone who is considered a pioneer in the philosophy of constructivism, Vygotsky prefers to state his learning theory as social cognition learning.

The names Piaget and Vygotsky are inseparable from constructivism learning theory. However, there is a principle difference between Piaget's concept and Vygotsky's concept. If Piaget developed more schemata theory, Vygotsky developed more zone of development (ZD) theory and scaffolding. Except that Piaget is known for developing his theory based on the development of children according to their chronological age, while Vygotsky does not see such things as important. Cognitive theories have an impact on education in terms of goals, curriculum, learning, assessment, and teaching

V. References

Ahmed, R., Sreeram, V., Mishra, Y., & Arif, M. D. (2020). A review and evaluation of the state-of-the-art in PV solar power forecasting: Techniques and optimization. *Renewable and Sustainable Energy Reviews*, *124*, 109792. https://doi.org/10.1016/j.rser.2020.109792

Ainjärv, H., & Laas, K. (2024). Applying constructivism in driving teacher education: Analysis based on transcripts of videotaped lessons. *Transportation Research Part F: Traffic Psychology and Behaviour*, *100*, 346–360. Scopus. https://doi.org/10.1016/j.trf.2023.12.004

Al Owayyed, M., Tielman, M., Hartholt, A., Specht, M., & Brinkman, W.-P. (2024). Agent-based social skills training systems: The ARTES architecture, interaction characteristics, learning theories and future outlooks. *Behaviour and Information Technology*. Scopus. https://doi.org/10.1080/0144929X.2024.2374891

Ann Molise, N., Botma, Y., & Van Jaarsveldt, D. (2024). A socially constructed framework for culturally congruent nursing curriculum transformation in Lesotho: A Multi-Methods approach. *International Journal of Africa Nursing Sciences*, *21*. Scopus. https://doi.org/10.1016/j.ijans.2024.100777

Ashtari, N., Bunt, A., McGrenere, J., Nebeling, M., & Chilana, P. K. (2020). Creating Augmented and Virtual Reality Applications: Current Practices, Challenges, and Opportunities. *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–13. https://doi.org/10.1145/3313831.3376722

Aslanian, T. K. (2018). Recycling Piaget: Posthumanism and making children's knowledge matter. *Educational Philosophy and Theory*, *50*(4), 417–427. https://doi.org/10.1080/00131857.2017.1377068

Asrori. (2020). *Psikologi Pendidikan Pendekatan Multi Disipliner*. Pena Persada.

Bai, L., & Chai, Q. (2024). A Perspective on Micro-Courses and Building Information Modeling for Enhanced Teaching and Learning. *International Journal of Engineering Education*, *40*(3), 606–613. Scopus.

Braidotti, R. (2019). A Theoretical Framework for the Critical Posthumanities. *Theory, Culture & Society*, *36*(6), 31–61. https://doi.org/10.1177/0263276418771486

Browne, A. C., Murphy, E., Finn, Y., & Cantillon, P. (2024). Addressing medial student knowledge deficits in 'hospital-to-home' transitions of care using a constructivism theory-based workshop intervention. *Clinical Teacher*, *21*(6). Scopus. https://doi.org/10.1111/tct.13679

Budiningsih, A. (2012). *Belajar dan Pembelajaran*. Rineka Cipta.

Chang-Tik, C., Dharmaratne, A., Driskell, J., & Kumari, Y. (2024). A framework informing the interplay of physical, digital and social spaces in supporting an environment for active learning. *Asia Pacific Journal of Education*. Scopus. https://doi.org/10.1080/02188791.2024.2309222

Chen, R., & Zhao, H. (2024). ChatGPT in Creative Writing Courses in Chinese Universities: Application and Research. *Int. Conf. Inf. Educ. Technol., ICIET*, 243–247. Scopus. https://doi.org/10.1109/ICIET60671.2024.10542824

Cho, H., Jeong, H., Yu, J., Lee, J., & Jung, H. J. (2024). Becoming a doctor: Using social constructivism and situated learning to

understand the clinical clerkship experiences of undergraduate medical students. *BMC Medical Education*, *24*(1). Scopus. https://doi.org/10.1186/s12909-024-05113-x

Connell, M. L. (2024). Actions on objects: A metaphor for technology-enhanced mathematics instruction. In *Using Inf. Technol. In Math. Educ.* (pp. 143–171). CRC Press; Scopus. https://doi.org/10.1201/9781003573159-12

Correction to: Junior high schools teachers' perceptions and practice of constructivism in Ghana: The paradox (Cogent Education, (2023), 10, 2, (2281195), 10.1080/2331186X.2023.2281195). (2024). *Cogent Education*, *11*(1). Scopus. https://doi.org/10.1080/2331186X.2024.2325812

Creţan, R., Covaci, R. N., & Jucu, I. S. (2023). Articulating 'otherness' within multiethnic rural neighbourhoods: Encounters between Roma and non-Roma in an East-Central European borderland. *Identities*, *30*(1), 93–111. https://doi.org/10.1080/1070289X.2021.1920774

Díaz, B., & Delgado, C. (2024). Artificial intelligence: Tool or teammate? *Journal of Research in Science Teaching*, *61*(10), 2575–2584. Scopus. https://doi.org/10.1002/tea.21993

Dong, L., Gu, Y., Liu, Y., Yang, D., & Han, Z. (2024). Construction and Practice of the Intelligent Classroom for Engineering Graphics. In *Lecture. Notes. Data Eng. Commun. Tech.* (Vol. 216, pp. 495–505). Springer Science and Business Media Deutschland GmbH; Scopus. https://doi.org/10.1007/978-3-031-71225-8_45

Duresa, M. (2024). A STUDY ON LINGUISTIC ETHNOGRAPHY OF TEACHING-LEARNING ENGLISH IN ELT CLASSES: THE CASE OF HINDE JUNIOR SCHOOL. *LLT Journal: Journal on Language and Language Teaching*, *27*(1), 517–530. Scopus. https://doi.org/10.24071/llt.v27i1.6882

Ferrero, A. M., & Álvarez Sainz, M. (2024). Attitudes of university students towards traditional face-to-face learning systems and learning with ICT. *E-Learning and Digital Media*, *21*(2), 180–200. Scopus. https://doi.org/10.1177/20427530231156185

Ford, G., & Waller, R. (2024). Changing the narrative of mental and emotional health training in an FE context: Explorations of transformational learning. In *Crit. Perspect. On Educ. Policies and Prof. Identities: Lessons from Dr. Stud.* (pp. 173–190). Emerald Group Publishing Ltd.; Scopus. https://doi.org/10.1108/978-1-83753-332-920241011

Gani, F., & VAN DEN BERG, G. (2024). Cultivating Awareness: A Framework for Online Learning in Open Distance Learning. *Open Praxis*, *16*(1), 54–69. Scopus. https://doi.org/10.55982/openpraxis.16.1.604

Garibay, C., & Teasdale, R. M. (2019). Equity and Evaluation in Informal STEM Education. *New Directions for Evaluation*, *2019*(161), 87–106. https://doi.org/10.1002/ev.20352

Harianto, S. &. (2017). *Belajar dan Pembelajaran Teori dan Konsep Dasar*. Remaja Rosdakarya.

He, B.-J. (2019). Towards the next generation of green building for urban heat island mitigation: Zero UHI impact building. *Sustainable Cities and Society*, *50*, 101647. https://doi.org/10.1016/j.scs.2019.101647

Hu, Y., Nath, N., Zhu, Y., & Laswad, F. (2024). Accounting students' online engagement, choice of course delivery format and their effects on academic performance. *Accounting Education*, *33*(5), 649–684. Scopus. https://doi.org/10.1080/09639284.2023.2254298

Ilbeigi, M., Bairaktarova, D., & Ehsani, R. (2024). A Gamified Method for Construction Engineering Education: Learning through Guided Active Exploration. *Journal of Civil Engineering Education*, *150*(2). Scopus. https://doi.org/10.1061/JCEECD.EIENG-2019

Imran, M., Almusharraf, N., Abdellatif, M. S., & Abbasova, M. Y. (2024). Artificial Intelligence in Higher Education: Enhancing Learning Systems and Transforming

Educational Paradigms. *International Journal of Interactive Mobile Technologies*, *18*(18), 34–48. Scopus. https://doi.org/10.3991/ijim.v18i18.49143

Kaliampos, G. (2024). An Overview of Constructivism in the Special Needs Spectrum. In Saregar A., Umam R., & Rahmat A. (Eds.), *E3S Web Conf.* (Vol. 482). EDP Sciences; Scopus. https://doi.org/10.1051/e3sconf/202448204008

Leung, A. C. Y., Liu, D. Y. W., Luo, X., & Au, M. H. (2024). A constructivist and pragmatic training framework for blockchain education for IT practitioners. *Education and Information Technologies*, *29*(12), 15813–15854. Scopus. https://doi.org/10.1007/s10639-024-12505-5

Mahama, P. Y., Amankwah-Sarfo, F., & Gyedu, F. (2024). Critical issues of online learning management in higher educational institutions in a developing country context: Examples from Ghana. *International Journal of Educational Management*, *38*(7), 1903–1924. Scopus. https://doi.org/10.1108/IJEM-01-2024-0059

Mallek, F., Mazhar, T., Shah, S. F. A., Ghadi, Y. Y., & Hamam, H. (2024). A review on cultivating effective learning: Synthesizing educational theories and virtual reality for enhanced educational experiences. *PeerJ Computer Science*, *10*. Scopus. https://doi.org/10.7717/PEERJ-CS.2000

Mamlok, D. (2024). Correction to: Landscapes of Sociotechnical Imaginaries in Education: A Theoretical Examination of Integrating Artificial Intelligence in Education (Foundations of Science, (2024), 10.1007/s10699-024-09948-x). *Foundations of Science*. Scopus. https://doi.org/10.1007/s10699-024-09953-0

Masgumelar, N. K. (2021). *Teori Belajar Konstruktivisme dan Implikasinya dalam Pendidikan dan Pembelajaran*. *2*, 49–57.

Masril, M., Jalinus, N., & Irfan, D. (2024). A Flexible Practicum Model on Education: Hybrid Learning Integrated Remote Laboratory Activity Design. *International Journal of Online and Biomedical Engineering*, *20*(10), 4–17. Scopus. https://doi.org/10.3991/ijoe.v20i10.48031

Milonaitytė, D., & Kuda, O. (2024). Burn your fat—A unique DIY board game about triacylglycerol breakdown. *Frontiers in Education*, *9*. Scopus. https://doi.org/10.3389/feduc.2024.1485234

Miyashita, H., & Wark, N. (2024). Action research to design a model for mediation in online discussion forums. *Thinking Skills and Creativity*, *52*. Scopus. https://doi.org/10.1016/j.tsc.2024.101489

Mohsen, M. A., & Alangari, T. S. (2024). Analyzing two decades of immersive technology research in education: Trends, clusters, and future directions. *Education and Information Technologies*, *29*(3), 3571–3587. Scopus. https://doi.org/10.1007/s10639-023-11968-2

Muhdhar, M. H. I. A., Afifah, S. N., Handayani, N., Abdillah, R. R., Pammai, K., Mardiyanti, L., & Rahmawati, N. D. (2024). Analysis of scientific literacy of 11thgrade students at SMA Nasional Malang. In Habiddin H. & Ronceviv T. (Eds.), *AIP Conf. Proc.* (Vol. 3106, Issue 1). American Institute of Physics; Scopus. https://doi.org/10.1063/5.0215779

Mulasih, K. & H. (2017). *Belajar dan Pembelajaran Serta Pemanfaatan Sumber Belajar*. RajaGrafindo Persada.

Nyathi, V. S., & Sisimayi, T. P. (2024). Adaptive learning technologies for higher education: Exploring the use of interactive online learning platforms for higher education. In *Adapt. Learn. Technol. For High. Educ.* (pp. 91–124). IGI Global; Scopus. https://doi.org/10.4018/979-8-3693-3641-0.ch005

Ogodo, J. A. (2024). Culturally Responsive Pedagogical Knowledge: An Integrative Teacher Knowledge Base for Diversified STEM Classrooms. *Education Sciences*, *14*(2). Scopus. https://doi.org/10.3390/educsci14020124

Olatoye, T. A., & Fru, R. N. (2024). A Review towards Enhancing Geospatial Technologies in South African Rural Education. *Journal of Culture and Values in Education*, *7*(4), 190–210. Scopus. https://doi.org/10.46303/jcve.2024.48

Rathinavelu, M., Chenchu, S., Jollireddy, S., & Bharambe, D. D. (2024). ACTIVE

LEARNING IN PHARMACY PRACTICE EDUCATION. *Pharma Times*, *56*(8), 5–6. Scopus.

Reddy, M. S. B., Ponnamma, D., Choudhary, R., & Sadasivuni, K. K. (2021). A Comparative Review of Natural and Synthetic Biopolymer Composite Scaffolds. *Polymers*, *13*(7), 1105. https://doi.org/10.3390/polym13071105

Reddy, P. J. K., & Revathy, K. (2024). Contextual Learning. In *Digital Skill Development for Industry 4.0* (pp. 83–104). CRC Press; Scopus. https://doi.org/10.1201/9781003504894-8

Shumba, A., Ndofirepi, A. P., & Gwirayi, P. (2012). A Critique of Constructivist Theory in Science Teaching and Learning. *Journal of Social Sciences*, *31*(1), 11–18. https://doi.org/10.1080/09718923.2012.11893010

Sun, Y. (2024). A study of multimodal education and discursive reading model in English based on multidimensional cognitive information aggregation theory. *Applied Mathematics and Nonlinear Sciences*, *9*(1). Scopus. https://doi.org/10.2478/amns.2023.1.00385

Supardan, D. (2016). TEORI DAN PRAKTIK PENDEKATAN KONSTRUKTIVISME DALAM PEMBELAJARAN. *Jurnal Edunomic*, *Volume 4 N*.

Tanaka, T., & Okamoto, S. (2021). Increase in suicide following an initial decline during the COVID-19 pandemic in Japan. *Nature Human Behaviour*, *5*(2), 229–238. https://doi.org/10.1038/s41562-020-01042-z

Utami, L. P. (2016). *TEORI KONSTRUKTIVISME DAN TEORI SOSIOKULTURAL: APLIKASI DALAM PENGAJARANBAHASA INGGRIS*. *Vol. 11 No*.

van Zyl, S. (2024). A framework for developing deeper self-directed learning in computer science education. In *Navig. Computer Sci. Educ. In the 21st Century* (pp. 66–88). IGI Global; Scopus. https://doi.org/10.4018/979-8-3693-1066-3.ch004

Wahyuni, B. & E. N. (2010). *Teori Belajar dan Pembwlajaran*. Ar-Ruzz Media.

Watkins, C. E., Hook, J. N., Owen, J., DeBlaere, C., Davis, D. E., & Van Tongeren, D. R. (2019). Multicultural Orientation in Psychotherapy Supervision: Cultural Humility, Cultural Comfort, and Cultural Opportunities. *American Journal of Psychotherapy*, *72*(2), 38–46. https://doi.org/10.1176/appi.psychotherapy.20180040

Wu, W., Tham, J., & Khatibi, A. (2024). A Study of Music Education Curriculum Design and Evaluation from a Constructivist Perspective. *Applied Mathematics and Nonlinear Sciences*, *9*(1). Scopus. https://doi.org/10.2478/amns-2024-0301

Xiao, Y., & Xiao, X. (2024). Application of BOPPPS Combined with Virtual Simulation Technology in Surgical Nursing Teaching. *ACM Int. Conf. Proc. Ser.*, 183–188. Scopus. https://doi.org/10.1145/3687311.3687345

Xu, X., & Sun, Y. (2024). CONCEPTS AND THEORETICAL FRAMEWORK OF CULTURALLY RESPONSIVE TEACHING GUIDED PLEs. In *The Development of Personal Learning Environments in High. Education: Promoting Culturally Responsive Teach. And Learner Autonomy* (pp. 13–32). Taylor and Francis; Scopus. https://doi.org/10.4324/9781003285243-3

Yang, L., & Li, R. (2024). ChatGPT for L2 learning: Current status and implications. *System*, *124*. Scopus. https://doi.org/10.1016/j.system.2024.103351

Yang, Y.-F., Tseng, C. C., & Lai, S.-C. (2024). Collaborative digital game design and play to facilitate college students' creativity development. *Interactive Learning Environments*. Scopus. https://doi.org/10.1080/10494820.2024.2368875