

Constructivism in Education: Exploring the Contributions of Piaget, Vygotsky, and Bruner

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Abstract: *Constructivism is an important learning theory that educators employ to help students acquire knowledge. Constructivism is based on the concept that individuals actively construct or create their own knowledge and that their learning experiences determine the nature of reality. Learners use their prior knowledge as a foundation and build upon it as they acquire new information. The teacher acts as a guide in the learning process; therefore, constructivism supports student-centred learning. In a constructivist classroom, learning is viewed as constructed, active, reflective, collaborative, inquiry-based, and evolving. The psychological theory of constructivism originates from the rapidly expanding field of cognitive science, primarily from the constructivist perspectives of Jean Piaget, the socio-historical work of Lev Vygotsky, and the constructivist account of discovery learning by Jerome Bruner. This article discusses constructivism and the contributions of Piaget, Bruner, and Vygotsky to its development.*

Keywords: constructivism, Piaget, Vygotsky, Bruner

1. Introduction

Constructivism is a theory of learning or meaning-making that enables people to create their own new understanding based on an interplay between what they already know and believe and the concepts and knowledge with which they interact (Resnick & Glaser, 2016). The theory also discusses the role of the teacher in enabling the student to learn. Contrary to the teacher-centred instructions advocated by the behaviourist school of thought, constructivism advocates student-centred learning in which the teacher serves as a facilitator of the learning process. Thus, constructivism requires a teacher to help students become active participants in their learning and to make meaningful connections between prior knowledge, new knowledge, and the learning processes (Hallas, 2008; Tangney, 2014). The central tenet of constructivism is that human learning is constructed and that learners construct new knowledge on the basis of prior learning (Brabrand, 2008; de Kock et al., 2004; Phillips, 1995).

Two fundamental concepts support the idea of constructed knowledge. The first is that students use their prior knowledge to construct new understandings. Many scholars agree that students acquire substantial knowledge before beginning formal education. With this prior knowledge or prior experience, learners modify their existing knowledge through new learning experiences (Phillips, 1995). The second concept is that learning is an active rather than a passive process. Here, the learner evaluates his or her knowledge in light of what he or she encounters in the new learning environment. In doing so, learners remain "engaged throughout the process; they apply current understandings, note relevant elements in new learning experiences, judge the consistency of prior and emerging knowledge, and based on that judgement, they modify their knowledge" (Phillips, 1995, p. 10).

Children are accountable for their classroom, instruction, and activity schedule within their social environment. While exploring the common elements of a constructivist

classroom, Dangel et al. (2004) argue that the provided curriculum should encourage children to see connections in learning, encourage them to spend more time doing activities and problem-solving, and provide them with a variety of tasks. In constructivist classrooms, teachers connect with students during interactions, and students have both planned and spontaneous opportunities to contribute to decision-making. In addition, Brooks and Brooks (1993) compiled extensive literature on constructivist teaching descriptions. They perceive a constructivist educator to be one who:

- Encourages and accepts student autonomy and initiative; uses a variety of student-friendly materials, such as raw data, primary sources, manipulatives, and interactive materials.
- Before sharing his or her own understanding of concepts, the teacher inquires about the pupil's understanding of those concepts.
- Encourage students to engage in conversation with their teacher and with one another.
- Encourage student inquiry by posing thoughtful, open-ended questions and by encouraging students to ask each other questions.
- Request that students expand on their initial responses.
- Engage students in experiences that reveal contradictions to their initial assumptions, and then encourage discussion.
- Allows students time to reflect after posing questions to them.
- Assess student comprehension through the application and execution of open-structured tasks (pp. 2–12).

In constructivist classrooms, social interaction is central to learning because higher mental functions such as reasoning, comprehension, and critical thinking emerge from social interactions and are then internalised by individuals (Magdalena, 2016). Traditional models and structures for teaching and learning do not always produce the desired outcome; therefore, constructivist-teaching strategies were developed as an alternative (Dangel et al., 2004). When knowledge is viewed from a constructivist perspective, it is

not distinct from the knower; rather, it is a representation of the real world in our minds that is the result of our experiences. Constructivism is no longer viewed as a process of transmitting information from the teacher to the learner; rather, it is a process of creating conditions that encourage student participation in the learning process (Al-Weher, 2004). Constructivism necessitates that teachers learn from and refine their teaching practises through their own classroom experiences.

The application of constructivist principles should not result in the creation of another rigid method of instruction, but

rather a lens through which to examine one's own classroom practise and make decisions about how learning and teaching should occur in the classroom."Constructivist teaching is more of a way of being than a method. It is genuinely perceiving yourself (as a teacher) as collaborating with individuals whose ideas matter—indeed, whose ideas are central to the learning or teaching process in which you are engaged (Shively, 2015, p. 23).

As demonstrated in Table1, learning is viewed as constructed, active, reflective, collaborative, inquiry-based, and evolving in a constructivist classroom (EBC, 2019).

Table 1: Constructivist Classrooms

In a constructivist classroom, learning is:	What actually happens:
Constructed	Students are not blank slates upon which knowledge is inscribed. They enter learning situations with previously developed knowledge, ideas, and understandings. This prior knowledge will serve as the foundation for the new knowledge they will generate.
Active	The student is the individual who develops new understanding. The teacher coaches, moderates, and makes recommendations, but the student is free to experiment, ask questions, and attempt things that do not work. Participation is required in all learning activities (such as hands-on experiments). Students' reflection and discussion of their activities is an essential part of the learning process. Students are also involved in determining their own objectives and methods of assessment.
Reflective	Students are in charge of their own learning, and they take the initiative by reflecting on their experiences. This process makes them experts in self-learning. The teacher facilitates private or group discussions in which students feel secure questioning and reflecting on their own processes. Additionally, the teacher should design activities that encourage students to reflect on their prior knowledge and experiences. It is essential to discuss what was learned and how it was learned.
Collaborative	The constructivist classroom relies significantly on student collaboration. There are numerous ways in which collaboration enhances learning. Students learn about learning not only from themselves but also from their peers, which is the primary reason for its prevalence in constructivism. When students review and reflect on their learning processes collectively, they can acquire new strategies and techniques from one another.
Inquiry-based	Problem-solving is the primary focus of a constructivist classroom. Students use inquiry techniques to pose questions, investigate a topic, and utilise a variety of resources to find answers. As students investigate a topic, they draw conclusions, which they revisit as their investigation continues. The exploration of questions leads to more questions.
Evolving	Students may develop theories that they subsequently realise are invalid, incorrect, or insufficient to adequately explain new experiences. These concepts are temporary phases in the process of knowledge integration. For example, until she encounters an evergreen forest, a child may believe that all trees shed their leaves in the autumn. The constructivist method of instruction takes into consideration students' pre-existing knowledge and builds upon it.

Note: Source: Educational Broadcasting Corporation, 2019.

Learning also occurs when children work with their peers, under the guidance of a teacher. Constructivists view learners as active protagonists of their own learning; the learner is at the centre of the learning process, and the teacher assists students in their learning (Livingstone, 2014). The concept of a "student-centered learning environment" has been added to the educational lexicon as a result of constructivism (Elen et al., 2007). A constructivist classroom is therefore student centered. Student-centred classrooms involve encouraging and supporting students' knowledge construction both in and out of the classroom (Kalpana, 2014; Tran et al., 2011). In addition, O'Neill and McMahon (2005) assert that student-centred learning entails students actively participating in the learning process and assuming increased responsibility. It is impossible to separate the learner from the environment in which learning occurs.

According to Gray (1997), student-centered classrooms enable teachers to provide students with opportunities to "hypothesise, predict, manipulate objects, pose questions, conduct research, investigate, imagine, and invent. The primary function of the teacher is to facilitate" (p. 4).

Multiple learning opportunities are provided by student-centered strategies. In student-centered learning, the teacher and textbooks are the source of information, which is then transferred to other sources such as the Internet (Smit et al., 2013). Teachers provide scaffolding to help students acquire knowledge and skills that are within their reach. In student-centered learning, the responsibility for the learning process is transferred from the teachers to the students (Boekaerts, 2002), and learning is assessed through both product and process reflection (Black & Wiliam, 2009).

The contributions of Piaget, Vygotsky and Bruner towards constructivism

The psychological theory of constructivism originates from the rapidly expanding field of cognitive science, primarily from the constructivist perspectives of Jean Piaget, the socio-historical work of Lev Vygotsky, and the constructivist account of discovery learning by Jerome Bruner (Fosnot & Perry, 2005; Gruber & Voneche, 1977).

Jean Piaget

Jean Piaget's (1896- 1980) work on educational psychology influenced the initial idea of constructivism (Larochelle et al., 1998). Piaget's work focuses on how humans create meaning when their experiences and ideas interact. The fundamental tenet of constructivism is that students learn through engagement rather than observation (Anthony, 1996). Students bring prior knowledge into a learning environment in which they are required to evaluate and re-evaluate their understanding. Piaget identifies three foundational processes that define the learning process. These are assimilation, accommodation, and equilibration. Assimilation is the process by which a learner integrates a new concept into their existing knowledge. When a new concept fuses with pre-existing mental structures, a new meaning is formed. As a result, the knowledge repository is strengthened to accommodate the novel concept. Accommodation is the process of adapting cognitive systems to a new concept that conflicts with existing mental structures. Equilibration is the maintenance of the status quo so that there is no conflict between new and existing ideas.

Piaget rejected the notion that learning consisted of the passive assimilation of information. Instead, he suggested that learning is a dynamic process involving successive stages of adaptation to reality during which learners actively construct knowledge by creating and testing their own worldviews. According to Piaget (1971), constructivism enables an individual to refine his or her knowledge through the systematic organisation, description, and adaptation of experiences. In doing so, learners actively reorganise knowledge in highly personalised ways, basing fluid intellectual configurations on existing information and formal instructional experiences. The fundamental premise of Piaget's theory is that a child's cognitive development progresses through distinct stages until it resembles that of an adult. The four phases outlined by Piaget are as follows:

- 1) The sensorimotor stage from birth to two years of age
- 2) The preoperational stage lasting two to seven years
- 3) The concrete-operational stage from seven to twelve years
- 4) The stage of formal operation that distinguishes adolescents and adults (p. 17).

The aforementioned four phases pertain to the early stages of a child's life, where the majority of learning occurs. This is one of Piaget's fundamental hypotheses: "early intellectual development results primarily from the child's interactions with objects in the environment" (Kuiper & BEP, 2010, p. 244).

Piaget focused not only on the role of learners but also on that of teachers. He believed that a teacher's role is to influence students' actual experiences in the environment and to know which environments tend to foster growth-promoting experiences (Ornstein & Hunkins, 2018). Constructivism has influenced a number of fundamental educational tenets, despite being less modern and noticeable. In his ground-breaking study, Phillips (1995) highlights four such principles. These include: 1. discovery-based learning; 2. sensitivity to children's readiness; 3. acceptance of individual differences; and 4. knowledge that is not imposed on learners but rather is created by them. Bodner (1986)

asserts, in contrast to Piaget's view on the role of teachers, that in constructivism, all knowledge is created from the learner's prior experiences, regardless of how one is taught.

Lev Vygotsky

While Piaget's cognitive theory is individualistic and describes how children acquire cognitive skills as they grow, Lev Vygotsky (1896–1934) emphasised the social context of learning. Vygotsky subsequently developed social constructivism. Vygotsky's social constructivism theory emphasises "the significance of sociocultural learning; how learners internalise interactions with adults, more capable peers, and cognitive tools to form mental constructs via the zone of proximal development" (America et al., 2021, p. 56). The zone of proximal development is "the realm of potential learning that each learner could reach within a given developmental span under optimal circumstances and with the best possible support from the teacher and environment" (Oxford, 1997, p. 43). Vygotsky argues that successful cognitive and intellectual development is dependent on social interaction. He places great emphasis on dialogue and other interactions between the learner and others. He expresses that:

[e]very function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (inner-psychological) and then inside the child (intra-psychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals (Vygotsky, 1978, p. 57).

The formation of knowledge follows a predetermined pattern. Numerous social constructivists argue that knowledge is initially generated in a social context and then utilised by individuals (Bruning et al., 2011; Eggen & Kauchak, 2004). In addition to the suggestion made previously, shared construction of meaning is also emphasised, whereby the practise of sharing individual perspectives results in learners jointly constructing understanding that would not have been possible otherwise (Greeno et al., 1996). Therefore, according to constructivism, learning is not constructed in isolation but in a social setting with peers and teachers. It is an "active process" in which learners independently discover principles, concepts, and realities, fostering "rational and intuitive thinking in learners" (Ackermann, 1996; Brown et al., 1989).

Jerome Bruner

Influenced by Vygotsky, Jerome Bruner (1915–2016) emphasised the role of the teacher, language, and instruction. Bruner (1966) defined constructivism as a learning theory in which learning is viewed as an active process in which learners create new ideas or concepts based on their existing knowledge. Bruner believed that learning is an active, social process in which the learner generates new ideas and concepts based on prior knowledge. Teachers are essential to the classroom process because they facilitate social interaction among students. Active and meaningful dialogic interactions fostered by teachers inspire students to

discover their own values. The role of the teacher is that of a facilitator who assists in the transformation of raw information into a personalised format appropriate to the learner's current level of understanding. As the recipient of this personalised information, the student:

mostly unconsciously, selects the information, creates assumptions and then assimilates this new material into their existing knowledge and mental constructs called schemas. The medium of language also has great importance for Bruner, as it has for other social constructivists (Bruner, 1983; Gage et al., 1998).

Bruner (1966) outlined, in his major works, three constructivist principles that serve as the foundation for social constructivism and other social learning theories. Bruner's three proposed principles are as follows:

- 1) Instruction must address the experiences and contexts that make the learner willing and capable of learning (learner readiness);
- 2) Instruction must be structured for easy comprehension by the student (structured teaching), and
- 3) Instruction should be designed to facilitate extrapolation and/or fill in the gaps (beyond the information provided) (p. 11).

Bruner's idea could be viewed as linear from the outset. However, Bruner clarifies by stating that "once identified, central ideas should be continually revisited and re-examined so that understanding develops over time." The concept of revisiting and re-examining fundamental concepts over time has come to be known as "spiral curriculum" (p. 17). He then continues:

Learning should not only take us somewhere; it should also allow us later to go further more easily. The more fundamental or basic the idea, the greater will be its breadth of applicability to new problems (Bruner, 1966, pp. 17–18).

Over time, students revisit fundamental concepts, build upon them, make them more complex, and gain a complete understanding of them.

2. Conclusion

Constructivism is an important learning theory that educators employ to help students acquire knowledge. Constructivism views that the new knowledge is created by the learners' prior experiences. The teacher's role is that of a facilitator who help the students actively construct new knowledge. The contributions of Piaget, Vygotsky, and Bruner to constructivism have significantly improved the teaching and learning process in schools, thereby placing the learner at the centre of the learning process. Teachers facilitate the learning process by involving students in classroom activities. Learning is viewed as constructed, active, reflective, collaborative, inquiry-based, and evolving in a constructivist classroom.

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