

Constructivism and Its Implication for Course Design and Learning

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Abstract

This paper aims to clarify the concept of Constructivism and to present its implications in the course design and learning. Constructivist theory overcomes the weaknesses of previous learning thoughts, cognitivism and behaviorism. The most important thing according to this learning 'philosophy,' Constructivism is that a learning process should facilitate the construction of knowledge by the student. In the process of learning, among other things, inquiry, cooperative, collaborative activities, the connection of learning to the real world and consideration of the students' prior knowledge are crucial to be noted by the teacher. Constructivism is partly criticized, especially by the practitioners of education. However, Constructivism is currently recommended by the educational psychologists.

Keywords: Constructivism, Design, Learning

Introduction

Constructivism is a grand theory or current learning thought recommended by the educational psychologists. Before Constructivism emerged, the grand learning theory was cognitivism which is the improvement of the earliest grand learning theory, behaviorism. This paper is aimed at making clear the concept of Constructivism and to present its implications for course design and learning. To make this presentation clearer, let us have an overview of behaviorism and cognitivism. Behaviorism became references of learning theories around 1920 to 1950. This theory focused on or around stimulus-response. Pieces of research on how the learner learned during that era was limited to providing stimulus

and observing the response caused by the stimulus. Attention was just given on the measured and observable behavior. Among others, classroom setting, attention, retention, reward and punishment were primarily addressed by researchers and educators during that era.

Cognitivism which was relatively popular around the period of 1950 to 1980 takes seriously into account the mental process or learner internal process. This theory regards that feeling, learning (observing), remembering and thinking the information is a learner's learning process. Cognitive psychologists have given more highlights on how learners process information internally or mentally. Most of the explanations are commonly known as the information processing theory. It is just like the working system of computer. So, when the learners absorb information, they use input, throughput and output functions. Cognitive psychologists assume that by observing people's response to various events and objects, it is more likely to draw an accurate conclusion or scholarly guess the cognitive process resulted in their response (Omrod, 2011). The leading figures of the cognitivism are Piaget, Bruner, Ausubel. Some of them are also followers of Constructivism.

Constructivism

Grand theory of learning, Constructivism, has evolved since 1980s and proceeded up till now. This learning 'philosophy' is to overcome the weaknesses of the previous main learning theory, cognitivism. In this theory, the learner constructs knowledge not only based on what he or she absorbs, but also based on his or her prior knowledge, widely known as schema or schemata. As the result of this adjustment, the learner gains new knowledge. In other words, basically, Constructivism means that the learner develops his or her understanding about the world by experiencing something and reflecting his or her experience (Ed Online, 2004).

Based on Peaget's basic assumption, children are enthusiastic and active knowledge seekers. They have curiosity and actively seek for information to help themselves, and give meaning of what they have been experiencing. They are continuously experimenting with

the objects they encounter, manipulating them and observing the effects derived from their activities with the objects. Children construct knowledge rather than absorb it. In daily life, children do not just accept the facts they find. Rather, they recall their past experiences, combine and compare with what they are currently observing on how the world is operating. When children are interacting with pets, visiting the zoo, having a look at the picture and so on, they develop a more complex understanding on animals (Omrod, 2011).

With better organized thought and knowledge, children could think in more complex and logical ways. For example, a child is commencing to differentiate cat and dog or even types of dog. Children learn in 2 ways, that is, through assimilation and accommodation. Assimilation takes place when a child is cognitively dealing with an object in a way that is consistent with his or her available mental model or schemata. Putting it in another way, a child in a learning process, when interpreting something new, does not face any difficulties because the information or the new knowledge is in line with his or her prior knowledge, his or her schemata. Thus, a child just accepts the new knowledge without any problems and this is called assimilation. Nevertheless, when a child is experiencing or absorbing new things which are not consistent with their schemata, they have to choose one of the two ways, change the schemata to accept new knowledge or create new schemata. Both these processes are called accommodation. Children's physical interaction with social environment is significant for their cognitive development. According to Piaget, by exploring and manipulating physical objects such as by playing with sand or water, bores, and so on, children would learn characteristics of things such as volume and weight; find the principles related to power and earth's gravitation and so on. In Piaget's view, social interaction is also very influential for children's cognitive development. When a child is interacting with another person such as through conversation, which is sometimes amusing but sometimes not, he or she begins to understand the different points of view of people on something as they grow up. They would know that the different points of view are reasonable. They also realize that their inaccuracy and illogicality in figuring out something is also natural.

Children, according to Peaget's theory, are often in the condition of equilibrium in which they easily interpret and response new events by using their schemata. However, a child is

growing up and their insight is broader and broader. They then start discovering that their knowledge and skills are not enough yet. Such a situation creates disequilibrium, which is a sort of mental insecurity that triggers them to figure out what they are observing. By changing, reorganizing or integrating their schemata better in the way of accommodation, children would understand better the phenomena that they did not understand before (Omrod, 2011). So, when disequilibrium happens a child is increasing his or her knowledge about the world.

Constructivist followers are not in line with the theorists of cognitivism and behaviorism. Cognitivists and behaviorists believe that knowledge is mind-independent and it could be formed in the learner. Even though it is not clear cut, cognitivism does not take seriously into account student's prior knowledge and the real world, just focus on the internal information process. Constructivist experts do not deny the existence of the real world but have a view that we know the world based on our own interpretation of our experience. Human beings interpret, not just accept the real world (Bednar, Cunningham, Duffy & Perry, 1991). To say a straightforward way, people's knowledge is a result of integration between what they are learning and their prior knowledge. The prominent theorists of Constructivism are Thorndike, Watson and Skinner (Budiningsih, 2012).

Literature on constructivism does not address the age level of students suitable for constructivist theory implementation. It is the teacher's job to decide the age level and the appropriate format used to aid in student understanding (Jen & John Uriarte, 2011).

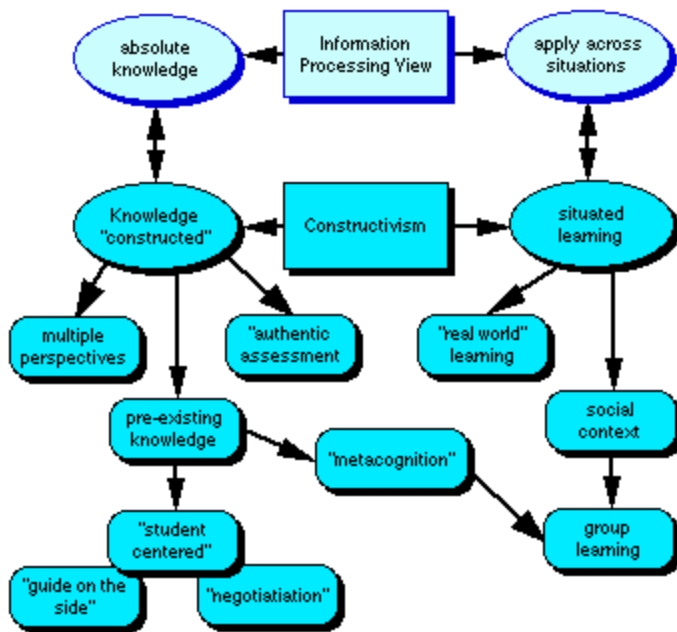


Figure 1. Constructivist Theory by Richard H. Hall.

Constructivist Recommendation for Course Design

Course design is an important step for an effective learning. The most important thing for the design is that, based on Constructivism, instructional objectives are not strictly set, but negotiated. Constructivist view regards that there is no the best way to arrange and sequence the learning. Therefore, the theory of course design system focuses more on the learner's constructivist mental development in accordance with the learning atmosphere. So, accurate and strict learning objectives are not recommended. Above all, based on this learning 'philosophy,' the learning process should facilitate knowledge construction by the learner (Jonassen, 1991). In this case, learning material is not content-independent knowledge or skills, but the learning is designed in such a way that it becomes domain-independent in which the learner is not guided to achieve too specific instructional objectives. Jonassen urged that current learning atmosphere like cognitive and constructivist mind-tool including databases, hypermedia, and expert systems be utilized (Jonassen, 1990). In line with this argument Sawyer notes on the significance of computer system equipped with internet facilities. The computers play a significant role as an

important access point for information and knowledge access, and it is the source of global education in this juncture, point of time.

Similarly, evaluation also needs to be carried out wisely. According to Sawyer, evaluation needs to be designed in such a way that it takes into account multi-dimensional instructional goals. As a result, evaluation should be less focused on narrow criteria tests (Sawyer, 1992). Furthermore, it can be said that learning program designed by a designer or teacher should refer to flexible learning objectives intended by the learner, no tutor or teacher's objectives. Course design should organize information in such a way that the learner is able to connect current information with the learner's prior knowledge. Analogy and metaphor are sorts of cognitive strategies recommended. Other cognitive strategies could be used such as outlining, mnemonics, concept mapping, advance organizer etc. (West, Farmer & Wolf, 1991). Constructivist designer recommends the design in a way that helps students explore topics and complex atmosphere. Thus, the learner is encouraged to develop understanding and validate them through social negotiation; learning materials need not be pre-specific; information derived from multi-sources are very important. For example, in the field of instructional design, students are not forced to memorize facts on course design, but students are assisted to use the facts of course design as a course designer does. Several strategies used by constructivist designers include task assigning in the context of real world, cognitive apprenticeships (modeling and coaching students to experts), multi-perspective presentation (cooperative learning to develop and share different perspectives), social negotiation (debate, discussion, or evidence giving), use of example in the real world, reflective awareness, and providing enough guidance in the process of constructivist usage.

One of the most important tasks of a designer is to understand that learners bring learning experience into the classroom. This learning experience influences learning objectives which would be knowledge and behavior of the students (learning outcomes); determines the most effective way of organizing new information with the eliciting of students' prior knowledge; organizes the learning with feedbacks so that new information could effectively and efficiently assimilated and accommodated in the structure students' cognition (Stepich & Newby, 1988).

Learners do not transfer knowledge from the real world to their memory, but they develop their personal interpretation about the world based on individual interaction and experience. Therefore, internal representation of knowledge is changing continuously and openly; there is no objective reality that the learner strive to know. As consequence of this, it is crucial for a designer to understand the learning that has been taking place in the student him or herself. To know this, prior experience and knowledge of the student should be examined (Bednar et al., 1999).

Constructivist Recommendation for Learning

In line with what has been presented above, schemata which is also called the learner's mental model is considered very influential in the students' learning process. Therefore, the teacher is asked to count learner's prior knowledge, schemata. The learning is student-centered. In the other word, students themselves actively construct knowledge, develop their understanding. The teacher functions as a facilitator who facilitates the students' learning instead of spoon-feeding the information into students. In this way, controlled autonomy is given to students so that they could independently do inquiry. It is carried out by the students by conducting research, to certain extent, consistent with their task description. To gain knowledge independently, students could also be engaged in group discussion. Collaborating with classmates in doing project assignment is also recommended by learning 'philosophy' of Constructivism. Constructivism encourages contextual learning. This could be done in a simple way such as asking students something on their daily activities. For instance, suppose that a biology teacher teaches cat anatomy, he or she could ask: "Who has cat at home?" To a high extent, a teacher takes students to the real world to a field, a certain ecosystem, a factory or a garden in accordance with the field of study learned.

Except for this, beliefs, attitude, experience, prior knowledge of the students need to be taken into account by the teacher. Students' prior knowledge plays the most significant role

in students' success of learning (Ahmad, 2011). Every student has different prior knowledge. For example, there are two students walking down the street. One comes from a very rich family, but the other belongs to a poor family. Both of them happen to notice IDR. 10.000, - laid on the side of the road. The child coming from the poor family would say that "oh, there is so much money!" While the child deriving from the rich family would say that "ah that is a little money, just IDR 10.000." Beliefs are also different from one child to another particularly in the multi-cultural classrooms. For example, students may interpret hurricane and big flood because of unfriendly natural meteorological power. However, for those who come from Muslim families, those who frequently hear from their parents on this case, the catastrophe is a punishment from God due to human beings' wrong deed. Apart from this, some students may struggle against science curriculum that explores how human beings could manipulate and control natural phenomena, while their culture consistently teach them on the importance of living in harmony with the nature (Omrod, 2011).

Therefore, the constructivist supporters stress on the importance of being wise in using students' prior knowledge, not simply retrieve students' schemata (Spiro, Feltovich, Jacobson, & Coulson, 1991). In addition to this, it is also important for a teacher to know that learning should take place in a realistic setting and the learning materials be relevant to students' life experience (Clancey, 1986). The focus of learning is on students' activities instead of spoon-feeding or lecturing. Based this grand theory of learning, Constructivism, students are not allowed to be continually spoon-fed. Or they depend on this way after leaving school. They would become waiters rather than initiative takers in fulfilling their needs. Just a baby needs spoon-feeding. In constructivist view, the transfer of knowledge should be facilitated by involving students in doing real and authentic tasks. Learning should happen in the context and the context would form link with the knowledge in it. So, instructional objectives are to describe the students' tasks, not to specifically define learning objectives. People do not learn the instruction usage of a device just by following instruction points. The proper and effective usage derives from getting them to be engaged in real usage of the device in a real situation (Bednar, et al., 1999).

In this way, a teacher equips students to be able to educate themselves independently after leaving school. They would learn along their life which is called life-long education. They would become initiative takers. Their natural curiosity is maintained. So, learning is seen as a process and students' understanding of concept is the main concern of the teacher, rather than memorizing learning materials or rote learning. The learning condition is carried out in such a way that the learning process would equip the students with the capability of critical thinking and higher order thinking skills. They would get used to using cognitive terminology like analyze, evaluate, predict and create. Jonassen agrees that for acquisition of basic knowledge, at a certain extent, behaviorism or cognitivism is good to apply. However, he recommends that the transition to constructivist approaches be done when students need to learn much knowledge that equips them with conceptual ability needed for handling unstructured and complex issues well (Jonassen, 1991).

A teacher is also obliged to observe how the students learn (metacognition). By counting the ways each student learns, a teacher could properly treat and be able develop his or her potential maximally.

Apart from this, Constructivism obviously puts emphasis on the creation of cognitive tool that reflects cultural wisdom in which the tool is used. It is no need for the acquisition of complete and detail concepts. To be successful, meaningful, and sustainable, the approach must involve three factors: activity (practice), concept (knowledge), and culture (context) (Brown, Collins & Duguid, 1989). Inquiry is also one of the principles of constructivist learning.

Technological system that could be utilized for learning is very relevant to principles of Constructivism. The real benefit of the presence of Information and Communication Technology (ICT) for learning is equipping students with facility to inquire the information needed. ICT provides abundance of information resources. Using search engine like Google and Yahoo learners could surf, browse and search for information and retrieve the information needed of various fields of study, from fine art to engineering to Islamic Studies and all fields of studies. Then, ICT, among others, also offers feature and interface like facilities for mailing list, whatsApp, tweeter and the alike which provides tool for users

for collaborative activities. Mind-tool, for example, is also a sophisticated computer technology that supports users think critically. So, Constructivism is a learning 'philosophy' which is of relevance to the sophistication of technology, particularly Information and Communication Technology.

There are models of curriculum that have been tried in Indonesia and most of them follow Constructivism. For example, CBSA (Student Active Learning Model) or Curriculum 1984 and Curriculum 2013 adopt main principles of Constructivism. The main characteristic Curriculum 2013 is that it uses Scientific Approach in which students conduct 5 steps in learning: Observing, Asking questions, Exploring, Associating and Communicating. Indeed, the five steps are recommended by principles of Constructivism

In this curriculum, the learning process is student-centered; teacher functions as a facilitator; inquiry is most of the learning process; students are actively engaged in learning activities (Hamalik, 2012); students construct knowledge by observing, asking questions, exploring, associating (experimenting, reasoning, analyzing) and communicating (Mulyasa, 2013).

Conclusion

The application of Constructivism for course design and learning is criticized for not enough details to be applied in the design and process of learning. Relating the learning to the real world, for example, it is not easy. Investigating students' background to figure out their prior knowledge is also difficult. Handling passive students is another problem which takes time and special skill. The integration of learning and the materials is also neglected in use of Constructivism. This theory ignores strict evaluation system. Therefore, the application of this learning theory is considered having some disadvantages.

However, this grand learning theory is a broad theory. This theory just offers general guides that serve as directions for course design and learning. Constructivism is a current theory recommended by educational psychologists. This grand theory copes with the weaknesses of previous theories such as cognitivism and behaviorism. The advantages, among others,

are said that the learner has a deep understanding on the learning materials, because the learner does not learn by heart or memorize the learning stuffs that are fed by lecturing, but the students do inquiry by exploring, experimenting and conducting research themselves. The students learn so confidently that they draw conclusions themselves based on the results of the exploration, experiment and research. Constructivist based-learning is student-centered, the teacher plays the role of a facilitator. Students are actively involved in the learning process. Cooperative and collaborative activities are encouraged. Learning activities like this promote multiple perspectives of thought that emerge as a result of information and experience sharing, and of course, the students work together, the strong would help the weak and the weak would learn from the strong. As a result, their tolerance would grow and they would use this social experience in their life and society. As we know that in daily life almost all works are done cooperatively. Teachers have a learning community of those who teach the subject, lecturers have a coordinated group whose members are those who teach the same course, offices have divisions or sections consisting of staff members who do and accomplish similar works, the members of the House of Representative have commissions, medical doctors or surgeons also work together in a team and so on. Then, since the students construct knowledge, draw conclusions themselves and work together, they would become critical thinkers and develop higher order thinking skills and problem solving skills. As a consequence of the learning designed based on principles of Constructivism which stress on the significance of concept understanding, it also indicates that the learner has a good retention of the materials learned. As majority of educational psychologists agree the learners learn at different ways and paces. Some enjoy learning while listening to the music, with pet like cat, by discussing, by asking questions, by being alone in a quiet and peaceful place, and so on. Constructivist learning takes these differences seriously into account. This theory recommends that teachers teach students in a way that considers individual differences.

Constructivist learning urged that the learning be connected to the real world. This recommendation points out one of the main weaknesses of conventional learning approach in which the learning just takes place in the classroom, never connected to the real world. Probably, this is one of the reasons why the quality of education in Indonesia is low and

the schools' graduates are not skillful enough in the work place. Constructivism encourages learners to learn how to apply their knowledge in line with the working condition. To apply their knowledge, students are engaged in authentic tasks. They are trained in a way that they have personal management and study independently. Above all, this approach promotes metacognition skills which are of use for future students' learning process and lifelong education. So, after they leave school, they possess skills for autodidact which ensures that they are becoming smart in adjusting themselves to society to which they belong to and to the era in the years to come. Information and Communication Technology (ICT) is evolving tremendously. Principles of Constructivism prove suitable for the use of the ICT for learning.

Unfortunately, some important stakeholders of education are not familiar with the theory of Constructivism which is the umbrella of cooperative/collaborative teaching techniques. Therefore, teachers, tutors, lecturers, faculty members, deans, rectors, school principals, and educational authorities should understand Constructivism or they had better leave the jobs assigned to them.

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