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HOW TO DESIGN CONSTRUCTIVIST LEARNING ENVIRONMENTS IN THE CLASSROOM?

The article presents a constructivist model that means establishing a place conducive to research activity that emerges usually in the environment. A «learning environment» that entails cognitive and has the potential to influence an individual's behavior conducive to its development is defined.
Key words: *cognitive representation, mental representation, constructivist model.*

У статті розглядається конструктивна модель навчання, що сприяє дослідницькій діяльності під час занять. Крім того, автор дає визначення поняттю «атмосфера навчання», яка впливає на когнітивну та особистісну поведінку студентів.
Ключові слова: *когнітивна репрезентація, розумова репрезентація, конструктивна модель.*

В статье рассматривается конструктивная модель обучения, которая способствует исследовательской деятельности во время занятий. Автор также определяет «атмосферу обучения», которая влияет на когнитивное и личностное поведение студентов.
Ключевые слова: *когнитивная репрезентация, ментальная репрезентация, конструктивная модель.*

The scientist, such as philosophers, psychologists and pedagogues were wondering about the phenomenon of constructing knowledge in the mind. Plato and Aristotle compared the mind to a stamp pressed into wax. This conception is called realism. It assumes that the representations (objects, ideas, judgments, mental models, whose function is to present stimuli within the mind) are the result of direct «impress» the stimulus in mind [9, p. 61]. The idea that knowledge is something that exists outside of man. It is an objective representation of the underlying facts, principles and theories, and so you can pass it directly from books or by the teacher.

This position dominated from antiquity to the Middle Ages when Ockham, stated that the representation does not need to show properties of the object to which it refers. He created his theory on the basis of the existence of fictitious objects that are not subject to the processes of perception, thus they cannot be «impress» in mind. Nevertheless, these objects exist in the cognitive representation and every man imagines them on their own way. In this way Ockham argued the existence of their own, individually and actively constructed mental representations [9, p. 62].

In recent years, a growth of empirical evidence to demonstrate that the same object can be mentally represented in many different ways. The researchers turned their attention to the value of this theory in other fields such as psychology and pedagogy. Nowadays most psychologists supports the theory of constructivism. They deny the assumption of realism that the object was independent of the cognitive subject. Mental representation is dependent on the setting, context, previously acquired knowledge, expectations, motivation, moods or emotions and intellect and personality [1].

This way of thinking is the source of Constructivism. According to cognitive psychologists it is a process of creating a mental structure, which encodes the sensory data in a special language. As a result, sensory data are translated into mental data [9, p. 62]. Psychologists draw attention to the assumptions of constructivist thinking in the consideration of the process of thinking, perception and memory. Therefore, pedagogues began to notice the value of constructivism in the development of competencies and academic skills such as writing, reading, communication, research, problem solving and asking questions.

M. Chomczyńska-Rubacha considering how to put the assumptions of Constructivists into educational practice. She said that the learning environmental is a stimulus external to the individual, which influence on quality of the school day learning and learning outcomes [2, p. 240]. Furthermore the classroom is the direct environment of the student, where he interacts with teachers and peers. Classroom provides the stimulation necessary to maintain an adequate level of student's activity.

There are many educational solutions for the inclusion of a constructivist model in the school. These solutions create the most favorable conditions for the student that are relevant to their individual needs. This includes aspects such as the learning content and methods and role of student and teacher. Student is an explorer of reality and the teacher is responsible for fulfillment of the constructivist learning environment conditions.

Constructivist model assumes the creation of a place that is conducive to research activity occurs naturally in the environment. Is is called «learning environment» that provokes cognitive and has the potential to impact on an individual's behavior conducive to its development [8, p. 494]. This is the environment determining the development of the student. According to B. Wilson learning environment «is a place where people can draw upon resources to make sense out of things and construct meaningful solutions to problems» [10, p. 3]. We add «constructivist» to the front end of the term, shortly CLE (Constructivist learning environments), to bold importance of meaningful activities that provide to construct understandings and develop skills relevant to solving problems. Outside the classroom CLE is a place containing cultural transmission, such as a museum, gallery, library, park. In this environment learning student activates own cognitive schemas are not always responding to the expectations of the teacher, but being in accordance with their development needs and the system of meanings.

The creator of the term of constructivist learning environment is D. Jonassen. He proposed guidelines in the form of a chart necessary for the design of such an environment [6]. These are: active/manipulative, constructive (students are to incorporate new ideas and prior knowledge in their into the new knowledge construct), collaborative (students working together, combine their forces to achieve common goals), conversational, reflective (this is reflective ap-

proach to learning that provides a deep understanding of the issues), contextualized (students have to work on a project focusing on the real problem or task), complex and intentional.
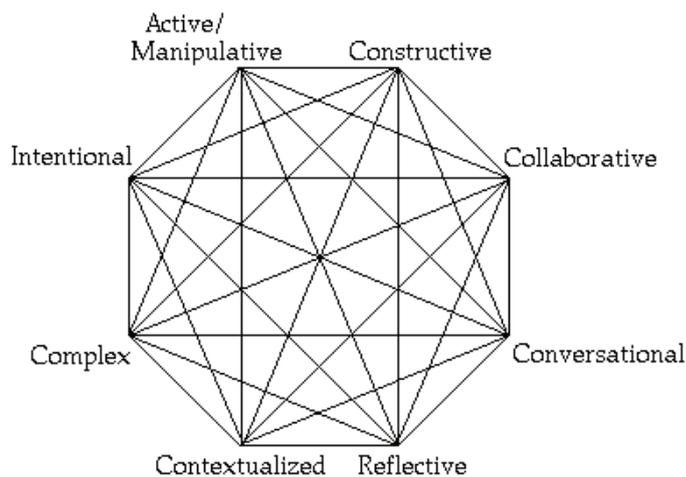
Picture 1. Features of constructivist learning environment

On this basis, S. Dylak listed three main principles of constructivism in the learning process [4, p. 71]. First principle is to put relevant problems. These problems are attractive and developing, has many ways of solutions, are appropriate to the age and based on previous student's knowledge. These problems are not strictly planned, but they are formulated spontaneously during the teaching.

The second principle relates to organize teaching around the basic concepts, problem, question or situation. Realization of the separate issues in a different fields of life causes difficulties in the integration of knowledge. S. Dylak proposes to explore the reality based on the problem or question that affects many areas of life.

The third principle is promoting and celebrating the subjective point of view of the student and encourage to express their personal beliefs. This can be achieved by selecting appropriate problems dealt with in the classroom. This question or problem are formulated in such a way that every child can answer, based on his personal experiences. In this situation, student can express themselves using current knowledge and he want to develop it.

P. Honebein listed seven main aims of designing constructivist learning environment [5].

First of all it is to provide experience with the knowledge construction process. Student should be responsible for determining the topics or object. He should choose the learning method and the strategies for solving the problems. Teacher have to facilitate this process.

Second aim is to provide experience and appreciation for multiple perspectives. In the real world there are a lot of ways of thinking about or solve problems. One correct answer or one correct solution is rather rare. In contrast in the learning process there is usually one proper solution or acceptable result. Activities in the classroom should encourage student in evaluate alternative solutions to problems which enriching their understanding. In addition, each student has their own way of thinking, so they should construct their own solution, instead of submit to the pattern given by the handbook or teacher. Therefore, the teacher cannot impose ready instructions to solve the problem, because as a result, a student could be passive and carry out the tasks given by the teacher after his earlier explanations. In the future this student won't be able to solve tasks that require logical and creative thinking.

Third aims is to learning in realistic and relevant context. The learning environment should be adequate for the real life. The constructivist learning environment is based on a realistic and meaningful context for the child. The school should not be a separate institution unconnected with the environment. Student's knowledge should be practical used outside the classroom. As an example B. Wilson wrote about word problems in math textbooks, which are rarely relate to the types of problems found in real life. In this case the students have a lot of difficulties to transfer what they learn in school to everyday life.

The next aim is to encourage ownership and voice in the learning process. This is the idea of the student-centeredness of constructivist learning. The teacher should be a consultant who supports their student and help them. He shouldn't determining the learning content and methods. Student have to identifying their issues, direction of thinking and goals.

Embed learning in social experience is the fifth goal considered by P. Honebein. Nowadays is relevant to develop social skill. Thus, collaboration between both teachers and students, and students and students is very significant. In the classroom there should be a lot of activities, which base on work in pairs or in group.

Next goal is about using of multiple modes of representation. Learning process with only the most common forms of transmitting knowledge, which is oral and written, limits how student see the world. Other forms, which provide richer experiences are media such as video, computer, photographs, and sound. Teacher should use also these forms of representation.

The last goal is to encourage self-awareness of the knowledge construction process. For instance when student explore the object he should analyze their construction of knowledge and process. Thus, he wondering what he already know about it, what he would like to know and how he want to get this knowledge. While the student solves the tasks

he has to explain how he did it and why he solved the problem in this way. As a result, the student develops his mental constructs of the way to solve the task. For the teachers, this condition will allow to follow the progress of children thoughts and to catch potential errors during this process.

Next scientist who examine constructivist learning environment is J. Kruk. She lists several conditions of design CLE [8, p. 497].

First of all is interactivity, which calls for making research activity. Interactive environment is full of elements that allow the child to explore reality. In the traditional approach, teaching aids is limited to the illustrative materials that are specific to the level of iconic representation. The student copy what has been presented to him in a passive and imitative way. Although, thinking is not a copy but an operational activity, leading to knowledge representation. The natural processes of exploring the world, cognitive activity and curiosity exist in an environment full of the material items of everyday life. However, the author writes that in a traditional school there are no objects for research by students in the areas of classroom.

Another condition of constructivist learning environment mentioned by the author is the incorporation into their surroundings educational strategies. This condition will allow for independent learning. As an example of fulfill this condition is media, which allow learning phenomenon in the natural context. As inspiration for such solutions the author writes about cognitive paths that take place on interactive exhibitions containing various fields of knowledge. As a result, the student will be able to understand the complicated and complex phenomena in an intuitive way.

The last issue mentioned by J. Kruk is to design of the environment in such a way that all participants would be interested. In this approach, the main task is to establish common rules for communication. This feature allows the student to understand the situations and the meaning of the concepts in a more clear and interesting way.

These assumptions concerning the design of constructivist learning environment described by P. Honebeina and J. Kruk are very similar. However, the difference appears when we consider who take responsibility for design constructivist learning environment at school. It seems that it is the teacher. However, in contrast to concept described by J. Kruk, P. Honebein don't treat the teacher as a main person, who is responsible for putting the principles of constructivism to the learning environment. It seems that goals listed by P. Honebein concern the whole environment, especially the students. According to him, the students must be responsible for creating their knowledge and constructing it in a conscious, independent and active way. They learn from each other and exchange experiences. The students in accordance with their needs and interests determine what and how they want to learn. Thus the learning content, methods and forms depend on them.

The other hand J. Kruk often emphasizes the role of the teacher. He is responsible for putting principles of constructivism into the school. In this concept the teacher is a professional who understands the complexities of the educational reality, knows the theory of the development process and flexibly adapts to the individual behavior or skills of his students. The design conditions of constructivist learning environment, described by the author, is a guidelines for teachers how to understand and interpret what is happening in the classroom. It is a type of support for teacher didactic ideas.

Finally, three principles listed by S. Dylak are generalized and accept mentioned difference in the approach to responsibility for the practice of constructivist assumptions. Both the curriculum, the teacher, and the student are responsible for that. According to this assumption curriculum determines those fundamental issues, which should be based on the specific problems. They are based on the student's current knowledge and allow him to a holistic approach to the problem. The role of the teacher is to create appropriate conditions for cognitive activities, mediating in the development of the student's knowledge from the less to the more complex construct and encouraging students to discuss about their judgments or critical thinking (Dylak 2000, 72). As a result, students have an impact on the management of the learning process, changing the learning methods or the content.

The article presents the establishment of a school based on the theory of constructivism. This is a different proposition functioning school. It is about school, where the student is at the center of the educational process. The role of the teacher is not a transfer of knowledge, which is characteristic for schools based on the cultural transmission theory. His role is to create the conditions of a constructivist learning environment to allow the student an active exploration of the surrounding reality.

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