

Piaget and His Role in Problem Based Learning

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Problem Based Learning (PBL) is becoming more popular in medical circles. In the last few years, PBL formed the curricular foundation for many medical schools in North America. The interest in PBL now extends beyond the boundaries of North America to Europe, Asia, Central, and South America. Therefore it is essential to understand the theoretical basis of PBL and its connection to Piaget's pedagogical philosophy. The intention of this editorial is to introduce and briefly discuss Piagetian theory and its relation to the problem based learning methodology adapted in medical schools of North America.

Jean Piaget was born on August 9, 1896, in the university town of Neuchatel, in Switzerland. From a young age, Piaget was dissatisfied with many superficial explanations of natural and social events. He wanted to find a scientific explanation for every thing that he found amusing. As young as 10 years of age, he became interested in scientific research. At this age he published an article about an albino sparrow, which he observed and studied in the park near his home. By age 21 he obtained his doctorate in the natural sciences. As a young graduate he started working in the Binet Laboratory in Paris. His job required him to construct a tool test to be used for the evaluation of children's intelligence. Although for this task he was asked to focus only on the correct answers provided by the children, Piaget was more curious and listened to their incorrect answers, as well. He found that the incorrect answers followed a strange and consistent pattern not demonstrated by the correct answers. Piaget believed that these patterns provide a clue to the way thought processes develop in children. In 1925, Piaget's first child, Jacqueline, was born. Piaget and his wife, Valentine Chatenay, observed and recorded every movement that Jacqueline made from infancy, and later with their other two babies, Lucienne and Laurent. The findings he obtained from the observation of his children and other children served as a turning point in his future career. He was the first to study children's thinking, and created a comprehensive theory of cognitive development. In the development of his theory, Piaget first observed, listened, and studied children's thinking in their spontaneous activities. He then combined

observation with flexible questioning, and followed up the children's responses with subsequent questioning. In addition to observation and questioning, he also provided specific tasks for students to perform. As a result of his passive and active observation he came to a conclusion that young children are not unintelligent, but they follow a different thought process than adults.

Piaget explains that cognitive development occurs in a series of qualitatively different stages. According to Piaget there are four stages of cognitive development:

1. **Sensorimotor.** (birth to 18 months or 2 years)
Infants know the world through sensory information and motor abilities. This is the time when a child uses his or her reflexes and gradually moves to voluntary action.
2. **Preoperational.** (2 to 7 years)
A young child can use mental images to reason and think, but are not yet logical.
3. **Concrete operational.** (7 to 11 years)
Children begin to think logically, but still rely on concrete objects and events.
4. **Formal operational.** (12 years and beyond)
Individuals can think logically about abstract issues and hypothetical situations.

In every stage, a child develops a new way of thinking about the world he or she lives in. Piaget believed that cognitive development occurred in all four stages, involving three principles: organization, adaptation, and equilibration.

Organization is a complex system of integrating knowledge to make sense of reality. Children, through reflexes, senses, and motor abilities create mental representations of the world around them. These first mental images are called, according to Piaget, "schemes". As children grow older and acquire more information, their schemes become more complex.

Adaptation is the child adjusting to new information, which involves two steps:

1. **Assimilation**, taking in new information on the base of existing knowledge.

2. **Accommodation**, changing existing information to include new information. In order to produce cognitive functioning assimilation and accommodation must work together.

Equilibration is the basic process in human adaptation, in which individuals seek a balance or fit between the environment and his or her own structures of thought. The mind always tries to find a balance between assimilation and accommodation.

Piaget saw children as active, growing beings with their own internal patterns of development and impulses. He believed that children have an inborn ability to adapt to their environment. He viewed children from infancy to adolescence as active learners who construct their own minds. Rich and stimulating environments have a significant influence on how children think. Therefore, open-ended questions and materials will stimulate a child's natural curiosity to explore the world.

To summarize Piaget's theory of cognitive development, it is conceivable to state that learning is secondary to and dependent upon progressive reorganization of cognitive function. "To learn," said Piaget, "is not to reshape behavior, but to provide a suitable environment for students to explore themselves." This suitable environment can be provided by self directed, stimulated, and motivated experiences.

Medicine as a whole consists of health related problems. The classical medical education provides the theory of medicine at first followed by examples of problems related to particular theories. Therefore, the delivery of medical knowledge is the reverse of practical medicine. As a result, when students complete medical school and encounter practical medicine, they realize that the patient does not come to the doctor with a clear etiology. In contrast, the patients usually are preoccupied by their pain and discomfort and it is the doctor's job to relate this discomfort to the theoretical knowledge they obtained in medical school.

This reverse cognitive programming creates difficulties for young doctors in their first few years of practice.

The new PBL approach solves this problem. Medical students according to the PBL curriculum should

encounter medical problems from the first year of medical school. In addition, the PBL curriculum provides a suitable environment for the students to deal with medical problems and learn medicine through a self directed, stimulated, and motivated environment. Only in this type of environment are they able to enrich their theoretical knowledge and association with practical medicine. Therefore, it can be assumed that medical students graduating under this new curriculum will not experience difficulties facing practical medicine in the first few years of practice.

The PBL curriculum is new and might have its own deficiencies in its application. It is not in the scope of this editorial to discuss those deficiencies or provide solutions, however, it is our intention to provide a review on the PBL approach, its outcome, and future strategies in the next edition of this journal considering the information in hand. It is important to mention that this curriculum, like any other revolutionary idea, will find its place in the educational system.

I believe that schools, other than medical, will soon adopt the PBL approach.