

Dynamics of Piaget's Cognitive Learning Approach and Vygotsky's Sociocultural Theory in Different Stages of Medical and Allied Health Education

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ABSTRACT

The two learning theories which were evidently used in medical education include cognitive and sociocultural frameworks. The interplay of different learning theories in education is vital since most of the existing theories have specific focus of development. In addition, a certain theory is best fit with a particular learning outcome and audience profile. The application of learning theories in education is said to be dynamic and becomes more complex with increasing educational level. This systematic review aims to describe the possible shift from integration of cognitive learning theory to employment of socio-cultural approach in medical and health-allied education over the years among students, educators and the learning institution through systematic review following the PRISMA guidelines. In addition, the changes in teaching modality and individual acceptance of the shift of learning framework among cognitive constructivist and social constructivist will also be documented. This present review may serve as baseline information on the connection of two widely used theories in medical education in different year levels. Further, this study emphasizes the significance of the alignment of different learning theories and combination of insights from several educational frameworks, would permit the creation of a teaching/learning design with real theoretical depth. A more inclusive systematic review is necessary to involve more related studies, and exploration of interaction among other learning theories in health and other fields of study is encouraged.

Keywords: learning theory, cognitive, sociocultural, medical education

INTRODUCTION

McLeod (2015) stated that learning theories are frameworks that describe how knowledge is received and processed during the learning experience. The application of learning theories in education is said to be dynamic and becomes more complex with increasing educational level. The interplay of different learning theories in education is vital since most of the existing theories have specific focus of development. In addition, a certain theory is best fit with a particular learning outcome and audience profile. Thus, educators and learning designers must primarily identify the objective of the course or training to properly determine the most appropriate theoretical framework to achieve the desired learning outcomes.

According to Lancken & Levenhagen (2014), the three fundamental learning theories employed in science education includes behaviorism, cognitive constructivist and social constructivist. Specifically, in medical education, the cognitive and social constructivist are the two evident theories commonly observed as described by Jeffries & Rogers, (2012). Jean Piaget introduced the concept of cognitive theory in education which suggests that learning is a process of adaptation, dependent on both experience and student's maturation and occurs in progressive stage (Cilliers *et al*, 2012). While, the social constructivist theory was instigated by Lev Vygotsky, a Soviet psychologist who proposed that social interaction is a vital factor in cognition development. Moreover, he believed that learning occurs primarily with interaction

among others followed by the integration of knowledge in the student's mentality (Ericsson, 2015).

Health-related courses such as nursing, physical therapy and medical technology devotes the first three to four years of their curriculum in capacitating the students with the fundamental knowledge in the field through the conduct of lectures and laboratory activities within the premise of the learning institution. And generally, the last year of these courses allows the students to experience working on a real hospital setting and showcase the application of their learnings through on the job trainings or internship. It was also observed among medicine students who are required to take the four-year medicine proper courses and undergo clerkship and post-graduate internship on their fifth and sixth year respectively. Does the change from the lecture-based approach to actual internship among medical and allied health students consequently result to the switch in the use of one learning theory to another framework?

There were numerous publications on learning theories observed in medical and allied health education, however information on the interplay of these implemented guides were not well documented. Specifically there is limited knowledge on the possible shift from one theory to another with respect to different levels of health related courses. This systematic review may bridge this gap and may provide an empiric information on deviation of learning theories distinct with medical and health education.

In particular, this systematic review aims to describe the possible shift from integration of cognitive learning theory to employment of socio-cultural approach in medical and health-allied education over the years among students, educators and the learning institution. In addition, the changes in teaching modality and individual acceptance of the shift of learning framework among cognitive approach and social constructivist were also documented.

Jean Piaget and the Foundation of Cognitive Learning Theory

On August 9, 1896, Jean Piaget was born in Switzerland and showed an early interest in the natural sciences. Piaget began his career as a researcher at the age of eleven by penning a brief article about an albino sparrow. The University of Neuchâtel awarded Piaget a doctorate in zoology in 1918 after he pursued his studies in the natural sciences in the institute. He authored two pieces at this period that served as the basis for his later ideas and beliefs. In 1920, Piaget began to exhibit his works as a psychologist. In 1923, Piaget married Valentine Châtenay, and had three kids together. Many of Piaget's subsequent beliefs were based on his observations of his own children. He once returned to the University of Neuchâtel and became a psychology, philosophy and sociology professor. He then directed the International Bureau of Education in Geneva from 1929 to 1967.

Piaget spent a year working at an institution for boys founded by Alfred Binet during which time he developed an interest in psychoanalysis. Piaget assisted in scoring these tests, which were created by Binet, who is credited with creating the first IQ test. It was considered that he is a generic epistemologist and which he explained in his publication that:

Genetic epistemology proposes the discovery of the roots of the different varieties of knowledge, since its elementary forms, following to the next levels, include also the scientific knowledge (pp. 459-480).

Piaget arrived with the conclusion that children thought differently than adults as a result of his early work with Binet's intelligence tests. Although it is now a commonly held belief, this idea was once regarded as innovative. This finding sparked his curiosity about how information develops during childhood. Children organize the knowledge they learn through their experiences and interactions into schemas, according to Piaget. When new information is collected, it can either be integrated into the schemas that already exist, or it can be accommodated by updating an existing schema or by generating a brand-new category of information. Within the disciplines of psychology, sociology, education, and genetics, Piaget's theories are still being researched. His research helped us better grasp how children's minds develop. Piaget contributed

to the understanding that childhood is a distinct and significant stage in human development.

Brainerd and Reyna (2005) indicated the influence of Piaget in their text “The Science of False Memory” which states that:

In the course of a long and hugely prolific career, he contributed important scholarly work to fields as diverse as the philosophy of science, linguistics, education, sociology, and evolutionary biology. Above all, however, he was *the* developmental psychologist of the 20th century.

Piaget’s theories are widely studied today by students of both psychology and education. He advocated for discovery learning, problem-solving and stage-based teaching principles which are adapted in classrooms (cognitive learning theory). The first principle highlights the notion that students should have the flexibility to explore and learn new things on their own. Additionally, a learning environment must offer classes in dance, music, and visual arts. On the other hand, during problem-solving activities, Piaget thought that teachers should pay attention to how students arrive at the right answers, as well as how they solve issues. Lastly, Piaget believed it was important that the learning environment reflects which stage a student is in since it is apparent that children enter into different stage of cognitive development.

Lev Vygotsky and the Establishment of Social Constructivist Learning Theory

On November 17, 1896, Lev Vygotsky was born in the western Russian Empire city of Orsha. At Moscow State University, where he also studied sociology, linguistics, psychology, and philosophy, he graduated with a law degree in 1917. In 1924, he began his official training in psychology at the Institute of Psychology in Moscow. He finished a dissertation on the psychology of art in 1925, but due to an intense TB relapse that rendered him debilitated for a year, he received his degree in absentia. In ten years, Vygotsky published six volumes on psychology. Although he had a wide range of interests, he frequently focused on language development, education, the psychology of art, and child development. He created a number of significant theories regarding how children learn and develop within culture and society.

Lev Vygotsky added that the dynamic interaction between people and society is what leads to human growth. Children learn from parents and teachers gradually and continually through this connection. Vygotsky’s views weren’t well known outside of Russia until the 1970s, when new theories and concepts in the domains of educational and developmental psychology started to take hold. Since then, Vygotsky’s writings have received widespread acclaim around the world, especially in the field of education. Vygotsky (1978) argued in his book that the mind cannot be understood in isolation from the surrounding society and added that:

Learning is more than the acquisition of the ability to think; it is the acquisition of many specialised abilities for thinking about a variety of things (pp. 209-210).

The application of the sociocultural theory in education asserted that language made it possible for reflective thinking, logic, and reasoning. As a result, instructional strategies for fostering literacy growth were created, and the classroom environment was reviewed. Teachers were expected to promote student leadership, group projects, and critical conversations. Except for the autonomous assignments, which were also included, the objective was to foster meaningful, purposeful interactions between students. The teacher’s job was to encourage learning by guiding discussion and praising contributions in an effort to inspire the student even more.

Side by Side: The Two Learning Theories Compared

According to Vygotsky, cognitive development requires interaction with others and cannot take place in the absence of language and communication. Piaget held that children acquire knowledge on their own and

form their own unique worldviews. The importance of peer interaction in a child’s gradual, stage-by-stage learning process was recognized by both Piaget and Vygotsky. They believed that both nature and nurture have significant effects on this process. Although there are some commonalities between their beliefs on child development, there are also substantial disparities. Vygotsky’s theory stated that cultural differences have a dramatic effect on development, while in Piaget’s theory, it breaks development into a series of predetermined stages. Moreover, sociocultural theory emphasizes the importance of more knowledgeable others, while the cognitive theory implies that development is largely universal.

METHODOLOGY

Research Questions

The following research questions were sought in this review:

1. Is there an observed shift from integration of cognitive learning theory to employment of socio-cultural approach in medical and health-allied education over the years among students, educators and the learning institution.
2. What are the observed changes in teaching modalities employed?
3. What are the adjustments and acceptance status observed among students, educators and the learning institution.

Literature Search Strategy

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed in this review. A total of twenty (20) full text studies were collected from various databases including Pubmed (Medline), CINAHL, Embase, ERIC, and PsychINFO. The search terms used were as follows: learning theory, cognitivism, sociocultural, medical education, Jean Piaget and Lev Vygotsky. During the screening, seven duplicate studies were removed, while three studies were then excluded since they were published before 2012. Lastly, four studies were not included since the articles did not clearly reflect the population (pre-clinical students or interns/ clerks) involved in their study. Overall, six articles were analyzed in this review and the disciplines most frequently represented were medicine and nursing.

Flowchart

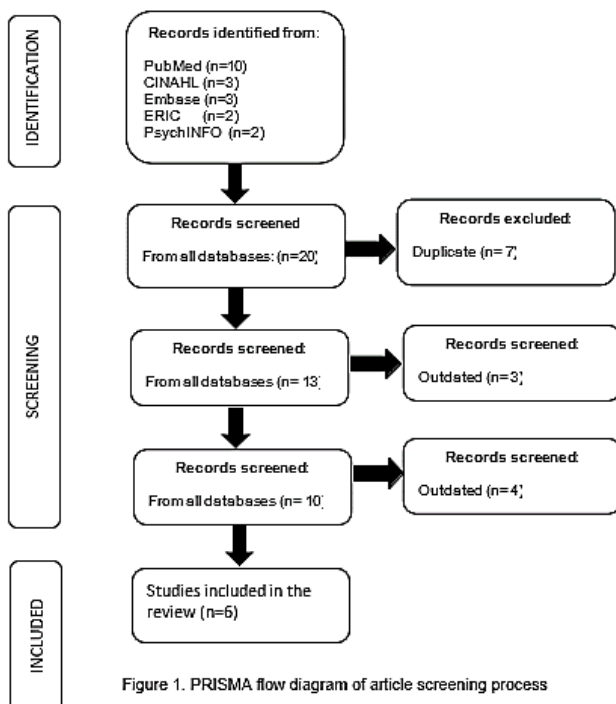


Figure 1. PRISMA flow diagram of article screening process

Eligibility Criteria

The titles and summaries of articles in health sciences education were reviewed to include research articles, literature review and synthesis articles which demonstrated the use of learning theories within specified stage in medical or allied health education. Articles were excluded if the learning framework and definite population of student was absent or not explicitly mentioned (even if it could be inferred), or if it was not applied to health sciences education. Only research journal with available full-text articles, written in English language and published from 2012-2022 were included in this review.

Data Extraction

Data extraction included the following items: author and year of publication, article type, population of student involved, learning theories employed during the pre-clinical and internship/ clerkship stages of medical education.

RESULTS AND DISCUSSION

A total of six articles were included in this review, and most document reviews and qualitative research. The disciplines most frequently represented were medicine and nursing. There were at least six distinct learning theories described in the articles which were followed during the pre-medical years and internship/ clerkship in medical education.

Multiple Learning Theories Work Together in Medical Education

Learning theories describe the phenomena of learning, including how individuals learn, what variables affect learning, and more. Learning is a complicated phenomenon with many contributing components and numerous theoretical explanations for the intricacies of human behavior. Learning, for any given theory, typically concentrates on a single component of education. Healthcare education is usually divided into stages of learning, the first few years are allotted for knowledge development and the succeeding years are for application of these acquired fundamental information. For each education stage, a different learning theory might be applicable to suffice the progressing complexity of instructions or change in learning environment. According to Lacasse *et al.* (2019), practice, cognitive, psychodynamic and humanistic theories give emphasis on internal psychological factors of learning process which are commonly employed in on the initial courses of the medical/ allied health curriculum. While behaviorist and social learning theories are focused on external factors in the environment that promote learning such as interaction and community immersion.

Shift from Cognitive Learning Theory to Social Constructivist Framework in Different Stages of Medical Education

Table 1 shows the summary of research articles analyzed in this review. Evidently, all articles indicated the employment of cognitive learning theory of Jean Piaget alongside with behaviorism and constructivism among pre-clinical students. It was also observed that sociocultural learning theory proposed by Lev Vygotsky was the main theoretical framework employed when dealing with medical clerks or interns.

In the study of Omer (2020), he stated that learning is a process of continuous building and modification of the schemes on a new learner's mind. In addition, according to him, instructions on clinical reasoning can be explained in part by cognitive theory. A gentle analytical approach in unfamiliar scenario was applied to novice learners. It was also emphasized in this study that central memory specially among younger individuals hold cognitive schemes that corresponds to problem solving ability. While, experiential and sociocultural learning was the most used framework among students during their internship years.

Tewary *et al.* (2020) also stated that cognitivism is one of the four learning theories followed in curriculum delivery among medicine proper students. This study utilized the principles of cognitivism for academic advising. One of the major challenges faced by these students was the difficulty in integrating multiple concepts from coursework. One of the approaches that professors implemented was the use of concept maps and reflective thinking, further, memorization techniques such as mnemonics and spaced repetition were also advised. However, among medical clerks, low-performing students were paired with highly skilled partner during hospital rotations, so the latter can share materials and guide the less performing student.

Changes in Teaching Modality

The six articles shared the notion that during the latter years of medical education, the role of teachers was changed from being implementors to facilitators or advisers. And the students were more aware of social constructs and developed self-efficacy through meeting other colleagues in a work setting and socialization with patients. Piaget pointed out that learners constantly restructure their schemata, or pattern of thoughts and behaviors, through assimilation and accommodation when new information is presented. It is noteworthy that, during the pre-clinical years, studies would suggest that they rely heavily on instructional materials and use of theoretical use of case studies to stimulate cognitive learning. While, gradually this teaching modality was replaced with the actual learning experiences of the students during their duty hours. It was also highlighted that learning was documented among the medical clerks through focus group discussions of the actual cases they experienced to promote both critical and collaborative learning, which was the foreground of Vygotsky’s sociocultural learning theory.

Table 1. Summary of data extracted from research articles analyzed in this review

Author & Year of Publication	Type of Article	Population	Learning theories employed within first 3-4 years of medical/ health allied education (Capacity building period)	Learning theories employed beyond 5 years of medical/ health allied education (Clerkship/ Internship)	With documented change from the learning theories employed between capacity building period and clerkship/ internship
Ahmad Abdul Azeem Abdullah Omer, MD (2020)	Narrative Review	Medical interns	Behaviorism Constructivism Cognitivism	Experiential Learning Sociocultural learning Humanism	Yes
Tewary <i>et al.</i> , (2020)	Narrative Review	Pre-clinical medicine students/ medical clerks	Cognitivism Behaviorism Self-efficacy Constructivism	Sociocultural learning	Yes
Horsburgh & Ippolito (2018)	Qualitative Research	Medical interns	Cognitivism Behaviorism	Sociocultural learning Feedback	Yes
Nalliah & Idris (2014)	Commentary	Medical clerks	Behaviorism Constructivism Cognitivism	Sociocultural learning	Yes
Lacasse <i>et al.</i> , (2019)	Literature Review	Medical and Allied health professionals	Behaviorism Constructivism Cognitivism	Experiential Learning Sociocultural learning Humanism	Yes
Aliakbari <i>et al.</i> (2015)	Qualitative Research	Nursing interns	Behaviorism Constructivism Cognitivism	Sociocultural learning Humanism	Yes

Acceptance of the learning theory shift among students, education and institution

Four out of the six articles described in this review suggested that the shift from cognitivism to sociocultural learning framework among students and educators did not cause big adjustments on their end. Most of the studies would indicate that preparatory activities were conducted to facilitate the next level approach to be followed. Faculties undergone trainings on how to support and evaluate medical interns during their hospital rounds. It also includes medical advising sessions and familiarization with internship rules and regulations. On the other hand, students were gradually given assignments and clinical reporting tasks to prepare them for actual discussions or conferences involving other medical professionals aside from their lecturers. Furthermore, the institution facilitates the cooperative agreement between the partner hospital to where the medical interns would render their duties.

CONCLUSION

The learning theories advanced by Jean Piaget and Lev Vygotsky were observed in two different levels of medical education. The principles of the cognitivism and sociocultural learning are widely used to devise various learning instructions and create more informed decisions about identifying the appropriate educational practices to benefit the students, educators as well as the learning institution. It must be noted that the emerging learning theory has not made the previous theories obsolete. And the learning theory to follow depends on the subject matter to be taught and the objective to be achieved.

One of the limitation of this study is the minimal number of related researches captured which further restricted the research questions that can be formulated and extracted from these publications. Nevertheless, this present review may serve as baseline information on the connection of two widely used theories in medical education in different year levels. Further, this study emphasizes the significance of the alignment of different learning theories and combination of insights from several educational frameworks, would permit the creation of a teaching/learning design with real theoretical depth.

A more comprehensive systematic review which involves more related articles is required to address further research questions pertaining to observed changes in learning theories in medical education. Moreover, interaction among other educational theories may be explored concerning health education or other fields of study.

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