ORIGINAL ARTICLE

Educational Learning Theories & Their Implications in Modern Instructional Designs

Talat Waseem[1], Fatima Aslam[2]

ABSTRACT

In an era of exponential growth of medical knowledge, it is becoming increasingly important to adopt modern learning techniques which stem from modern educational theories. There is a paradigm shift from classical behaviorism towards the constructivist approach in which student more actively participates and learns at higher Bloom's Taxonomy level. The purpose of this review is to understand the role of various educational theories which form the basis of modern curricula in a medical school environment and promote understanding in this regard. This review gives a brief historical perspective of various education theories and focuses on current educational theories which matter in our current constructivist educational environment.

Introduction: The time has changed and so should the medical instructional designs. Medical education is in the process of enormous transformation, therefore medical educationists need to reassess standard teaching practices and improvise teaching strategies to compete with the pace of innovation. Accreditation Council of Graduate Medical Education (ACGME) has set new standards further enhancing the need for this transformation (Torre, Daley, Sebastian, & Elnicki, 2006). We have moved on and off the narrow path of behaviorism to the vast field of constructivism where students have more liberty, self-control, and a collaborative environment that readily facilitates their learning (Schunk, 2012). In modern learning, the role of classical educational theories remains instrumental. It is, however, being overridden by constructivist, self-regulated and self-directed learning paradigms (Torre et al., 2006). Acquisition of knowledge is rising from low order Bloom's cognitive levels to higher levels because the instructional designs are being optimized to enhance the standard of knowledge to application, evaluation and creation level (Rostami & Khadjooi, 2010). This review gives a brief overview of the various educational theories, their impact on the human understanding about the process of learning in terms of historical perspective and gives reasons for adopting modern learning theories as we move on from behaviorist approach to constructivist approach. The article explains how these theories are inter-related and how they can be practically utilized in the medical school environment to promote student learning.

Historical Perspective of Learning Theories

Till the middle of the last century, behaviorism dominated the realm of educational psychology and human behavior was measured in terms of reflex responses to stimuli (Nalliah & Idris, 2014). Later this orientation and psychological explanation were criticized for excluding the role of human cognition, but it remained quite instrumental in designing many competency-based curricula and produced reasonable outcomes. Cognitivism based theories like Bandura's Social learning theory later explained the role of human cognition in our thought process and behavioral modifications (Rostami & Khadjooi, 2010). Finally, constructivism has come to play in our classrooms with exceptional results in achieving higher learning skills in our adult students particularly.

The classical paradigms of behaviorism, cognitivism, humanism, and constructivism are based on certain theories, which have been shown in the Table 1 below. The table gives the timeline of various educational theories and their related paradigms. It clearly shows that modern learning at large has shifted from behaviorist and cognitive approaches to a constructivist approach.

Practical Implications of Educational Theories in Medical School

1. **BEHAVIORIST PARADIGM**

a. Pavlov & Skinner's Conditioning Theories

The behaviorist approach is based on the fundamental idea that the reinforced behavior is likely to continue and punished behavior is likely to cease at some point (Rostami & Khadjooi, 2010). Although this approach was quite popular in the early last century, and now has been overshadowed by novel theories, models, and approaches, it still remains quite useful in shaping student behaviors in our classrooms. Many competency-based curricula have consistently produced reasonable and reproducible outcomes (Rostami & Khadjooi, 2010). Pavlov's classical conditioning and Skinner's operant conditioning have strongly influenced the realm of educational psychology in programmed learning. Pavlov drove his results through experimentation of dogs while Skinner experimented on pigeons to define an operant condition (Schunk, 2012).

Operant conditioning can be easily administered in the classroom by simply praising or not praising some students after a given task to improve the performance in upcoming activities. For example, if a teacher exempts the student from the final exam if he regularly attends the classes, this will greatly improve the student attendance in

1. *Associate Professor of Surgery, Consultant Endocrine Surgeon and Surgical Oncologist, Shalamar Medical & Dental College, Lahore*
2. *Assistant Professor, Department of Psychiatry & Behavioural Sciences, Avicenna Medical & Dental College, Lahore.*

Correspondence: Dr. Talat Waseem
Email address: twaseem@gmail.com

Funding Source: NIL; Conflict of Interest: NIL

Received: July 29th, 2019; Accepted: November 5th, 2019

class. On the contrary, classical conditioning has little role in modern classroom practice. It can be used in conjunction with operant conditioning. For instance, if one teacher is quite interactive and encouraging for the students, students would associate this pleasure and comfortable environment with a specific classroom and would more likely attend that particular class.

2. **COGNITIVISM:** Cognitivism is a psychological science which deals with 'learning how to learn' (Anderson, 2004). In contrast to behaviorism, the locus of learning lays in the cognitive skills of the human mind rather than the environment. The objective is to understand the structure and process of learning which is self-directed. According to Ausbel, meaningful knowledge is a product of the integration of the new information with the old one. Learning depends on internal concepts rather than environmental influences (Torre et al., 2006). Critical thinking through reflection plays a central part in the cognitivist approach. Concept mapping is one mostly utilized practical application of cognitivism. Here in this article a concept map of learning theories provides a reflection of this exercise (Figure 1).

a. Bandura's Theory of Social Learning: Bandura's Theory of Social Learning is based on reflection of observed behavior and modeling (Bandura, 1977). The theory stems from the components of *attention*, *retention*, *reproduction,* and *motivation*. According to theory, learning occurs through a continuous interplay between behavior, personal factors, and the environment. This is in contrast to the prior beliefs based on behaviorism in which cognition did not matter in the process of learning. Bandura also elaborated the concept of 'Self-Efficacy' which is the context-specific judgment of the capabilities to perform a task. The classical Bubo Doll experiment was the origin of this theory (Bandura & Schunk, 1981).

Social Modeling can be effectively applied in the medical school environment. If the students see positive consequences from a particular activity or behavior they are more likely to repeat them. If the students see bad consequences for a certain behavior or activity, they are less likely to repeat that activity. Novel concepts readily catch the attention of the students. Students for instance are more likely to model the successful surgeon or would follow the most popular trends. Students with the application of this theory can improve their self-efficacy through constructive feedback.

3. **CONSTRUCTIVISM:** Constructivism is the modern face of learning paradigms and it forms the basis of many theories proposed for adult self-regulated and self-directed learning. Constructivists think that knowledge is formed in the learner by integrating learning activities with prior experiences of the learner. Lev Vygotsky and Piaget played a central role in defining the basic principles of this approach (Schunk, 2012).

a. Vygotsky's Zone of Proximal Development Theory & Piaget's Constructivism: Vygotsky's zone of proximal development theory implies that the quality and depth of learning that occurs through an interaction between the learner and the 'more knowledgeable other' (MKO) would be higher than what the learner learns independently. This additional benefit in depth of knowledge achieved by learning through the facilitation by the facilitator is considered zone of proximal development (ZPD). Vygotsky observed the children to define his theory of proximal zone of development (Shabani, 2016).

The teacher in the classroom has the responsibility to identify the areas of the curriculum which a student can cover independently and those which a student cannot. The teacher needs to invest time on the activities and design the activities in such a way that areas of curriculum which need assistance by teacher are covered through the help of the teacher. To promote a better understanding of the concepts the instructional designs need to be optimized and 'scaffolding' is the tool to be utilized. In scaffolding, the role of the teacher is not simplified but the role of learner is simplified through programmed and measured interventions by the teacher. For instance, the teacher in outpatient department first dissonances the students with a clinical scenario and asks them to diagnose and craft a management plan, and during the latter half the class may facilitate to sort out the proposed problem.

Piaget's theories have focused on constructivism like Vygotsky (Richardson & Kelly, 1972). He observed children of different ages to conclude the value of constructivism. Now the responsibilities of learning are gradually shifting to the students and the teacher's role is gradually transforming to a facilitator one. The classical example of constructivism is problem-based learning (PBL).

4. **HUMANISM:** This approach towards learning is considered as a personal activity necessary to achieve the learner's full potential (Torre et al., 2006). It is an advanced form of self-regulated and self-directed learning in which the learner has a significant role in deciding the process of knowledge acquisition. The learning theories described below form the framework for such learning and it has become an essential component of graduate and postgraduate self-directed learning.

a. Maslow's Hierarchy of Needs Theory: Maslow's Hierarchy of Needs is a motivational theory that formulates a hierarchy of needs in the form a pyramid which includes physical, safety, love/belonging, esteem, and self-actualization needs (Jerome, 2013). Although we prioritize physical, safety, and belonging needs first, personality development heavily depends on building self-esteem and finally achieving self-actualization. The theory is instrumental in character building and in inducing professionalism in our students in a self-regulated fashion. Maslow studied the top 1% of college students and iconic people like Einstein to formulate this theory (Jerome, 2013).

The physiological needs of the students can be addressed and facilitated by providing subsidized eatables, a comfortable learning environment, and addressing the basic human needs. Safety needs can be ensured through behavior management in classes, well-planned lessons, and emergency procedures and by ensuring facilitating environment rather than a judgmental one. The love and belonging component can be promoted through interaction and a collaborative environment in the school. The instructional designs should ensure the building and promotion of self-esteem. Self-actualization can be promoted through ac-

tivities with creativity where the students can explore their potentials and emotional/multiple intelligences.

b. Knowles Theory of Adult Learning: According to Malcolm Knowles, adult learning (andragogy) is different from childhood learning (pedagogy) in many respects (Taylor & Hamdy, 2013). Adults learn if they want or need to, learn through experience, doing, problem-solving in an informal situation. During this process, they want equal participation and consideration in the process. The learner is self-motivated; self-directed, self-confident, self-aware, and learns through problem-solving and experiential way (Taylor & Hamdy, 2013).

Knowles describes adult learning to be based on the involvement of stakeholders, prior experience of the learner, relevance to the learning objectives, and problem-centered instructional design (Taylor & Hamdy, 2013). This implies that in a medical school, the students need to be involved in instructional planning and assessment methodology; the new knowledge should be constructed on the prior knowledge to promote comprehension and relevance, and finally, the instructional designs need to be optimized as problem-based.

c. Kolb's Experiential Learning: Experiential Learning is simply dubbed as the learning attained through the process of doing (Kolb & Kolb, 2005). The theory is based on the situated context-specific experience of the learner in a constructivist environment. David Kolb identified various types of learners, according to their emphasis on intuition, experience, and cognition, namely, *divergent, convergent, assimilating,* and *accommodating learners.* The learners in this process first *experience*, then *reflect* on their experience, then *conceptualize,* and finally *experiment* to consolidate their learning. The theory is based on case studies on longitudinal development of the institutions like Cleveland Institute of Arts (Kolb & Kolb, 2005).

Experiential learning has a huge role to play in the clinical setting whether it is the outpatient or inpatient department or operation theater. The clerkships at many institutes utilize Kolb's experiential learning theory with outstanding outcomes. For instance, in a clerkship module, first, the student encounters a clinical situation or a patient on which he takes history, does a clinical examination, and formulates a provisional diagnosis under the supervision of the senior. Then in the second step, the senior clinician gives reflective feedback about the activity. In the third step, the student brainstorms about the activity and conceptualizes the scenario, and then does a self-reflection. In the fourth step, the student applies the learned clinical skill in another clinical scenario. Experiential learning forms the backbone of clinical teaching in a medical school.

d. Self-Regulated Learning Theory: Self-regulated learning (SRL) emphasizes cognitive strategies, task engagement, metacognition, motivation, and social supports in classrooms (Zimmerman, 2002). Motivational interviewing, counseling, and mentoring are based on self-regulated theory and they all can be utilized quite effectively to motivate and counsel medical graduates to promote their self-esteem and skill of self-organization (Godard, Dufour, & Jeanne, 2011).

e. Multiple Intelligence Theory: Howard Gardner proposed 8 dimensional model of intelligence to define a broad spectrum of intelligence quotient (I.Q.) (Gardner, 2011). According to Gardner, intelligence is not a static concept or quality but has a range of dimensions that are expressed in the people in varying quantities that facilitate and flourish the specific aspect of the intelligence. Intelligence can be linguistic, mathematical, spatial, kinesthetic, musical, interpersonal, and intrapersonal. The theory implies that these aspects of intelligence are exclusive and can work independently but usually they operate together (Gardner, 2011). For instance, a good debater with excellent linguistic intelligence can be more impressive by applying emotions and expressions to his speech by using intrapersonal intelligence.

For example, the teacher should try to design the modes of instruction that not only use linguistic intelligence by just delivering the lecture that would only focus the students with linguistic intelligence but also include graphical models, figures, and videos to stimulate different areas of intelligence through his lecture.

f. Emotional Intelligence: Goleman's emotional intelligence originates with the use of self-awareness, self-regulation, social skills, empathy, and motivation (Mayer, Salovey, & Caruso, 2004). The theory provides an insight into personal feelings, moods, drives, and their consequences on the people around us.

Emotional intelligence is a highly required skill in the hospital setting to have a better understanding of the patient problems by empathizing with them, establishing rapport by using social skills, flexibility to modify treatment plan according to patient's emotional needs and internal motivations to take risks involved during the treatment process (Omid, Haghani, & Adibi, 2016).

g. Communities of Practice: Communities of practice, proposed by Wenger, are a group of people who share a common interest or practice and regularly meet in this regard to improve their understanding and its application through shared wisdom (Egan & Jaye, 2009). For example, the endocrine surgeons in a certain geographical area can meet regularly to promote the endocrine knowledge and practices through conferences, seminars, etc.

Conclusions: Constructivism has revolutionized our instructional designs and medical teaching. The paradigm of constructivism and other lateral dimensions of learning need to be incorporated in our new curricula to meet the needs of our students in an era of rapid change and exponential growth of knowledge. Learning has to be self-regulated, experiential, need-based, relevant, collaborative, and goal-oriented. The instructional designs need to be individualized to the varying spectrum of multiple intelligence and emotional intelligence with the goal of character building and promotion of professionalism. Although the role of behaviorism and cognitivism and their respective applications are lowering however they remain at times not only appropriate but also quite effective. To embrace this rapid change, the time is now.

Declaration of interest: None

Notes on Contributors:

Talat Waseem: Conception and design of the article, interpreting the relevant literature, drafted the article, and critically revised it.

Fatima Aslam: Interpreting the relevant literature, critically revised the publication.

References: Anderson, J. (2004). Cognitive Psychology and its Implications. Retrieved from http://www.citeulike.org/group/1788/article/989282

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215. https://doi.org/10.1037/0033-295X.84.2.191

Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology*, *41*(3), 586–598. https://doi.org/10.1037/0022-3514.41.3.586

Egan, T., & Jaye, C. (2009). Communities of clinical practice: the social organization of clinical learning. *Health (London, England : 1997)*, *13*(1), 107–125. https://doi.org/10.1177/1363459308097363

Gardner, H. (2011). Frames of Mind: The Theory of Multiple Intelligences. Basic Books, USA.

Godard, A., Dufour, T., & Jeanne, S. (2011). Application of self-regulation theory and motivational interview for improving oral hygiene: a randomized controlled trial. *Journal of Clinical Periodontology*, *38*(12), 1099–1105. https://doi.org/10.1111/j.1600-051X.2011.01782.x

Jerome, N. (2013). Application of Maslow's hierarchy of need theory; impacts and implications on organizational culture, human resource and employee's performance. *International Journal of Business and Management Invention, 2 (3), 39-45.*

Kolb, A. Y., & Kolb, D. A. (2005). Learning Styles and Learning Spaces: Enhancing Experiential Learning in Higher Education. *Source: Academy of Management Learning & Education*, *4*(2), 193–212.

Mayer, J. D., Salovey, P., & Caruso, D. R. (2004). TARGET ARTICLES: " Emotional Intelligence: Theory, Findings, and Implications" *Psychological Inquiry*, *15*(3), 197–215. https://doi.org/10.1207/s15327965pli1503_02

Nalliah, S., & Idris, N. (2014). Applying the learning theories to medical education: A commentary. *International E-Journal of Science, Medicine & Education*, *8*(1), 50–57.

Omid, A., Haghani, F., & Adibi, P. (2016). Clinical teaching with emotional intelligence: A teaching toolbox. *Journal of Research in Medical Sciences : The Official Journal of Isfahan University of Medical Sciences*, *21*, 27. https://doi.org/10.4103/1735-1995.181983

Richardson, E., & Kelly, M. R. (1972). Piaget and Bruner: Can they help the technical teacher? *The Vocational Aspect of Education*, *24*(59), 113–117. https://doi.org/10.1080/03057877280000191

Rostami, K., & Khadjooi, K. (2010). The implications of Behaviorism and Humanism theories in medical education. *Gastroenterology and Hepatology from Bed to Bench*, *3*(2), 65–70.

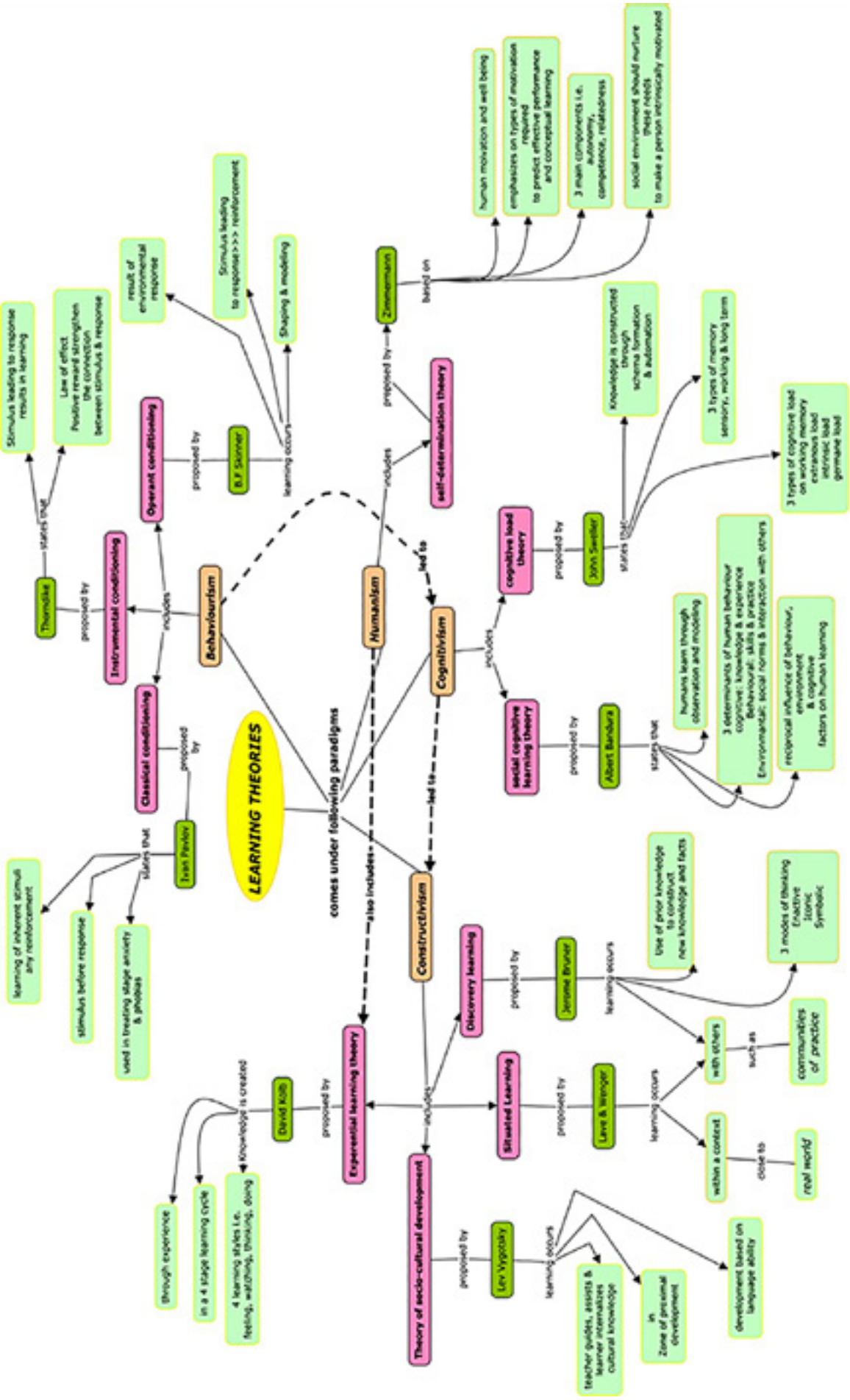
Schunk, D. (2012). *Learning theories an educational perspective. Sixth edition*. Pearson, USA.

Shabani, K. (2016). Applications of Vygotsky's sociocultural approach for teachers' professional development. *Cogent Education*, *3*(1). https://doi.org/10.1080/2331186X.2016.1252177

Taylor, D. C. M., & Hamdy, H. (2013). Adult learning theories: Implications for learning and teaching in medical education: AMEE Guide No. 83. *Medical Teacher*, *35*(11), e1561–e1572. https://doi.org/10.3109/0142159X.2013.828153

Torre, D. M., Daley, B. J., Sebastian, J. L., & Elnicki, D. M. (2006). Overview of current learning theories for medical educators. *The American Journal of Medicine*, *119*(10), 903–907. https://doi.org/10.1016/j.amjmed.2006.06.037

Zimmerman, B. J. (2002). Becoming a Self-Regulated Learner: An Overview. *Theory Into Practice*, *41*(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2


LEARNING THEORIES
comes under following paradigms
also includes
led to
led to
Behaviourism
Humanism
Cognitivism
Constructivism
Experiential learning theory
Theory of socio-cultural development
Situated Learning
Discovery learning
Instrumental conditioning
Classical conditioning
Operant conditioning
Thorndike
Ivan Pavlov
B.F Skinner
proposed by
proposed by
proposed by
includes
includes
learning occurs
Stimulus leading to response results in learning
Law of effect
Positive reward strengthen the connection between stimulus & response
result of environmental response
Stimulus leading to response>>>> reinforcement
Shaping & modeling
learning of inherent stimuli any reinforcement
stimulus before response
used in treating stage anxiety & phobias
self-determination theory
Zimmermann
based on
human motivation and well being
emphasizes on types of motivation required to predict effective performance and conceptual learning
3 main components i.e. autonomy, competence, relatedness
social environment should nurture these needs to make a person intrinsically motivated
cognitive load theory
John Sweller
states that
Knowledge is constructed through schema formation & automation
3 types of memory sensory, working & long term
3 types of cognitive load on working memory extraneous load intrinsic load germane load
social cognitive learning theory
Albert Bandura
states that
humans learn through observation and modeling
3 determinants of human behaviour cognitive: knowledge & experience Behavioural: skills & practice Environmental: social norms & interaction with others
reciprocal influence of behaviour, environment & cognitive factors on human learning
Discovery learning
proposed by
Jerome Bruner
learning occurs
Use of prior knowledge to construct new knowledge and facts
3 modes of thinking Enactive Iconic Symbolic
Situated Learning
proposed by
Lave & Wenger
learning occurs
with others
such as
communities of practice
within a context
close to
real world
Theory of socio-cultural development
proposed by
Lev Vygotsky
learning occurs
teacher guides, assists & learner internalizes cultural knowledge
in Zone of proximal development
development based on language ability
Experiential learning theory
proposed by
David Kolb
Knowledge is created
through experience
in a 4 stage learning cycle
4 learning styles i.e. feeling, watching, thinking, doing

Timeline	Theorist	Theory	Paradigm
1889	Pavlov	Classic Conditioning	Behaviorism
1890	Von Ehrenfels	Gestalt Theory	Behaviorism
1903	Thorndike	The Law of Effect	Behaviorism
1913	Watson	Behaviorism	Behaviorism
1929	Piaget	Genetic Epistomology	Behaviorism
1938	Skinner	Operant Conditioning	Behaviorism
1938	deSaussure, Barths, Bakhtin	Semiotics	Cognitivism
1943	Maslow	Maslow's Hierarchy of Needs	Cognitivism
1956	G. Miller	Information Processing Theory	Cognitivism
1961	Brunner	Discovery of Learning	Constructivism
1963	Piaget	Developmental Psychology	Cognitivism
1966	Bruner	Discovery Learning	Cognitivism
1968	Atkinson/ Schifrin	Information Processing	Cognitivism
1969	Festinger	Cognitive Dissonance	Cognitivism
1971	Deci, Ryan	Self Determination Learning Theory	Cognitivism
1972	Craik/Lockhart	Thinking levels	Cognitivism
1974	Weiner	Attribution Theory	Cognitivism
1975	Knowles	Self Directed Learning Theory	Constructivism
1975	Sticht	Functional Context Theory	Constructivism
1977	Gibson	Affordance Theory	Constructivism
1977	Bandura	Social Learning Theory	Social Cognitivism
1978	Lev Vygotsky	Social Development Theory	Social Cognitivism
1978	Lev Vygotsky	Zone of Proximal Development	Social Cognitivism
1978	Premack, Woodruff, Perner, Wimmer	Theory of Mind, Empathy, Mind Blindness	Constructivism
1979	Reigluth	Elaboration Theory	Constructivism
1979	Flavell	Metacognition	Constructivism
1979	Bronfenbrenner	Ecological Theory of Development	Constructivism
1980	Knowles	Andragogy- Adult Learning Theory	Constructivism
1981	Malone	Intrinsically Motivated Instruction	Constructivism

1983	Card, Moran & Nowell	GOMS Model	Constructivism
		a set of Goals, a set of Operators, a set of Methods for achieving the goals, and a set of Selections rules for choosing among competing methods for goals	
1983	Keller	ARC Model of Motivational Design	Constructivism
1984	Kolb	Experiential Learning	Constructivism
1985	Gagne	Conditions of Learning	Cognitivism
1988	Sweller	Cognitive Load Theory	Cognitivism
1989	Browns/ Collins/Duguid	Situated Cognition and Culture of Learning	Constructivism
1989	Collins	Cognitive Apprenticeship Theory	Cognitivism
1990	Bransford	Anchored Instruction Theory	Constructivism
1990	New London Group	Multi-literacies	Constructivism
1991	Gardner	Multiple Intelligence Theory	Constructivism
1991	Lave & Wenger	Communities of Practice	Constructivism
1991	Lave	Situated Learning	Constructivism
1993	Mazur	Flipped Class Room Theory	Constructivism
1995	Goleman	Emotional Intelligence	Constructivism
1996	Ericson Gladwell	Expertise Theory	Constructivism
1996	Staats	Psychological Behaviorism	Behaviorism
1998	Schunk	Self Regulated Learning Theory	Constructivism
2002	Seligman	Positive Psychology/ PERMA Theory	Constructivism
2003	Mayer	Cognitive Theory of Multimedia Learning	Cognitivism
2005	Siemens, Dwones	Connectvism	Constructivism
2007	Duckworth, Mathews, Kelly, Peterson	GRIT	Constructivism