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Teachers' Use of Theoretical Frames for Instructional Planning: Critical Thinking, Cognitive, and Constructivist Theories

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Abstract

In this article, I examine three broad categories of learning theories that can facilitate instructional planning: critical thinking, cognitive, and constructivist theories. Critical thinking shifts classroom design from a model that largely ignores thinking to one that renders it pervasive and necessary. Cognitive theorists consider learning to occur when students are able to learn by doing through experiences or are able to add new concepts to their cognitive structure by recognizing a relationship between their prior knowledge and what they are learning. Constructivists believe that students construct knowledge for themselves—each learner individually (and socially) constructs meaning through the learning process.

The best instructional planning and designs are based on the teacher's knowledge of theoretical frames of learning. Theoretical frames, although not prescriptive, are useful to teachers, because they make them more aware of how learning takes place and how students acquire, retain, and recall knowledge. Additionally, teachers can use the learning theories as guidelines to help them in instructional planning, specifically in selecting instructional tools, techniques, and strategies to enable students to successfully complete course objectives.

Critical Thinking

The concept of critical thinking may be one of the most significant trends in education relative to the dynamic relationship between how teachers teach and how students learn (Mason, 2010). Critical thinking shifts classroom design from a model that largely ignores thinking to one that renders it pervasive and necessary (Cohen, 2010;

Tittle, 2010; Vaughn, 2009). Critical teaching views content as something alive only in minds, as modes of thinking driven by questions, as existing in textbooks only to be regenerated in the minds of students.

Once we understand content as inseparable from the thinking that generates, organizes, analyzes, synthesizes, evaluates, and transforms it, we recognize that content cannot in principle ever be "completed" because thinking is never completed. To understand content, therefore, is to understand its implications. But to understand its implications one must understand that those implications in turn have further implications, and hence must be explored thoughtfully.

The problem with didactic teaching is that content is inadvertently treated as static, as virtually "dead". Content is treated as something to be mimicked, to be repeated back, to be parroted. And since students only rarely process content deeply when they play the role of passive listeners in lecture-centered instruction, little is learned in the long term. Furthermore, because students are taught content in a way that renders them unlikely to think it through, their minds retreat into rote memorization, abandoning any attempt to grasp the logic of what they are committing to memory.

Those who teach critically emphasize that only those who can "think" through content truly learn it (Numrich, 2010). Content "dies" when one tries to mechanically learn it. Content has to take root in the thinking of students and, when properly learned, transforms the way they think. Hence, when students study a subject in a "critical" way, they take possession of a new mode to thinking which, so internalized, generates new thoughts, understandings, and beliefs. Their thinking, now driven by a set of new questions, becomes an instrument of insight and a new point of view.

History texts become, in the minds of students thinking critically, a stimulus to historical thinking. Geography texts are internalized as geographical thinking. Mathematical content is transformed into mathematical thinking. As a result of being taught to think critically, students study biology and become biological thinkers. They study sociology and begin to notice the permissions, injunctions, and taboos of the groups in which they participate. They study literature and begin to notice the way in which all humans tend to define their lives in the stories they tell. They study economics and begin to notice how much of their behavior is intertwined with economic forces and needs.

There are ways, indeed almost an unlimited number, to stimulate critical thinking at every educational level and in every teaching setting (Dunn, 2010; hooks, 2009; Liecester, 2010). When considering technology for this stimulation, the World Wide Web (WWW) is important to instructional design; it contains three keys to educational value: hypertext, the delivery of multimedia, and true interactivity (Stewart, 2010). These values are operant and alive in the classroom through such applications as: graphics, sound, and video which bring to life world events, museum tours, library visits, world visits, and up-to-date weather maps (Griffin, 2010). Through these WWW mechanisms, a constructivist instructional model advance higher level instruction, such as problem solving and increased learner control. The WWW becomes a necessary tool for student-centered discovery and research. Of course, it can also be used for lower level drill and practice.

At every level and in all subjects, students need to learn how to: precisely put questions, define contexts and purposes, pursue relevant information, analyze key

concepts, derive sound inferences, generate good reasons, recognize questionable assumptions, trace important implications, and think empathically within different points of view (Dunn, 2010; Hooks, 2010; Leicester, 2010). The WWW enables learners and teachers in each area by providing information for good reasoners to figure things out (Bowell, 2010; Levy, 2010). Critical thinking may be a key organizing concept for all educational reform (Bulach, Lunenburg, & Potter, 2012).

Constructivism

Constructivism is another, somewhat related, trend in education that can play a dynamic role in the relationship between how teachers teach and how children learn. One foundational premise of constructivism is that children actively construct their knowledge, rather than simply absorbing ideas spoken to them by teachers (Fosnot, 2006; Phillips, 2000; Larochelle, 2010). For example, Jean Piaget (1970) proposed that children make sense in ways very different from adults, and that they learn through the process of trying to make things happen, trying to manipulate their environment. Theories like these, which assert that "people are not recorders of information, but builders of knowledge structures," have been grouped under the heading of constructivism (Pass, 2005; Wadsworth, 2004). Thus, students are ultimately responsible for their own learning within a learning atmosphere in which teachers value student thinking, initiate lessons that foster cooperative learning, provide opportunities for students to be exposed to interdisciplinary curriculum, structure learning around primary concepts, and facilitate authentic assessment of student understanding.

In constructivist theory, it is assumed that learners have to construct their own knowledge—individually and collectively. Each learner has a repertoire of conceptions and skills with which she or he must construct knowledge to solve problems presented by the environment. The role of the teacher and other learners is to provide the setting, pose the challenges, and offer the support that will encourage cognitive construction (Chaille, 2008). Since students lack the experience of experts in the field, teachers bear a great responsibility for guiding student activity, modeling behavior, and providing examples that will transform student group discussions into meaningful communication about subject matter (Flynn, 2005).

Constructivism emphasizes the processes by which children create and develop their ideas. Applications lie in creating curricula that not only match but also challenge children's understanding, fostering further growth and development of the mind (Baltes, 2007; Kincheloe, 2006; Leitner, 2010). Furthermore, when children collaborate in cooperative learning groups, they share the process of constructing their ideas with others. This collective effort provides the opportunity for children to reflect on and elaborate not only their own ideas but also those of their peers as well. With the improvement and access to the WWW, the children's cooperative classroom becomes the world (Payne, 2010; Stewart, 2010). In this cooperative learning setting, children view their peers as resources rather than as competitors. A feeling of teamwork ensues. These processes have resulted in substantial advances in student learning (Bulach, Lunenburg, & Potter, 2012; Larochelle, 2010; Phillips, 2000).

Constructivism is serving as the basis for many of the current reforms in several subject matter disciplines. The National Council of Teachers of Mathematics (NCTM) has published its document, *Curriculum and Evaluation Standards for School Mathematics*, which calls for mathematics classrooms where problem solving, concept development, and the construction of learner-generated solutions and algorithms are stressed rather than drill and practice on correct procedures and facts to get "the right" answer. The National Committee on Science Education Standards and Assessment similarly has issued its document, *National Science Education Standards* which calls for science education reform based on experimentation and learner-generated inquiry, investigations, hypotheses, and models. The National Council of Teachers of English (NCTE) has called for emergent literacy as an important thrust in language arts reform. Interdisciplinary curricula is the theme of social studies reform being advocated by the National Council of Social Studies.

Cognitive Theories: Stages of Intellectual Development

Piaget, a Swiss psychologist, theorized that intellective capability undergoes qualitative developmental changes linked to the child's maturation. In this connection, Piaget identified four developmental stages, each one a necessary condition for subsequent intellective development. Although all children pass through these stages, it is important to recognize that all students in a given classroom will not be at the same cognitive developmental stage. Piaget's (1950) stages of cognitive development are the following:

Sensory motor stage. The sensory motor stage, which lasts from birth to about two years, is the prelanguage stage; it is vital to the development of thinking. During this stage, the child learns the rudimentary concepts of space, time, causality, and intentionality.

Preoperational stage. True language begins during the preoperational stage, which extends between the representative ages of two to six years. During this stage, the child learns to label with words the external world around him and to express his own feelings through language. He learns to adjust to the world through trial and error, to extract concepts from experience, and later to make perceptual and intuitive judgments. However, the child adopts an egocentric orientation, a cognitive state in which the cognizer sees the world from a single point of view only – his own – unaware of the existence of viewpoints or perspectives of others. Instruction during this stage must focus on repeated and forced social interaction with others in order to fortify reflective thought and help the child to relinquish his egocentric orientation.

Concrete operational stage. During the concrete operational stage, which occurs in the range of seven to eleven years, the child can move things around and make them fit properly with developed fine motor skills. She can attack physical problems by anticipating consequences perceptually. However, because the student is dependent on personal experience during this stage, instruction must be appropriately arranged and must be concrete. For example, an urban student who sees a movie, videotape, or picture

depicting farms, tractors, barns, and silos can understand the concept of a rural environment; but she cannot understand the concept by hearing a verbal description only.

Formal operational stage. During the formal operational stage, which takes place between the ages of 12 and 16 years, the child is no longer tied to concrete reasoning about objects. The child can think hypothetically, reason through the possible process of a logical solution, perform a controlled experiment, and reach some possible conclusion. Instruction can be organized by classifying, seriating, and corresponding. The results of these operations for learners are logical thinking and the intellectual processes of inference, implication, identity, conjunction, and disjunction.

Each successive stage of Piagetian theory requires more abstract thinking; therefore, a prime difficulty for the teacher involves selecting subject matter content that is abstract enough to challenge without being so abstract as to frustrate the student (Smith, 1992). When course is properly selected, it is possible to build a spiral curriculum in which basic concepts are structured so that they can be used at different levels of abstraction, dependent on the students' ages and abilities. For example, Taba (1971) illustrated a hierarchical arrangement of concepts that allows each level to be prerequisite to the subsequent level. Concepts are taught at increasing levels of complexity and abstraction in a continuous thread through the curriculum.

Constructivist Theories: Learning Styles

More than a decade of continuing research on student learning styles has revealed that, when taught through methods that complemented their learning characteristics, students at all levels became increasingly motivated and performed better academically. Essentially, learning style can be defined as a consistent pattern of behavior that gives general direction to learning. However, rather than simply looking at learning styles in isolation, teachers need to understand styles as they are exhibited in the classroom, interacting and influencing one another in a variety of ways.

Rita Dunn and Kenneth Dunn identified 18 elements of learning style that they further subdivided into four stimuli areas: environmental, emotional, sociological, and physical (Dunn & Dunn, 1992a, b). These are shown in Figure 1.

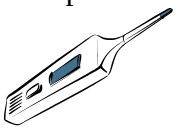
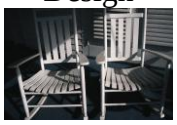
Stimuli	**Elements**			
Environmental	Sound 	Light 	Temperature 	Design 
Emotional	Motivation 	Persistence 	Responsibility 	Structure 
Sociological	Peers 	Self 	Pair 	Team 	Adult 	Varied 
Physical	Perceptual 	Intake 	Time 	Mobility 

Figure 1. Elements of learning style.

Emotional elements. Motivated, persistent, responsible students need to be told what they are required to learn, what resources to use, how to demonstrate their acquired knowledge, and where to get help if needed. They welcome praise and feedback when the assignment has been completed. The unmotivated, less persistent, less responsible students require short assignments, frequent feedback, a lot of supervision, and praise as they are working.

Structure is another vital element of learning style. Students who require specific directions, sequential tasks, frequent feedback, and continuing support usually achieve well using programmed learning – if they are highly visual or visual-tactual and able to work alone. If youngsters are tactual-kinesthetic and also peer oriented, programmed material may not hold their attention. If they need structure, are tactual-kinesthetic (but not highly auditory or visual), and find learning difficult, they may do better with multisensory instructional packages.

Learners who tend to be creative, self-structured, or responsive to making choices appear to perform best when using a Contract Activity Package (CAP). Teachers experienced in the effective use of CAPs can decrease the amount of flexibility and the number of options provided, thus making contracts suitable for youngsters who require imposed structure.

Sociological elements. Some students learn best alone. For them, depending on whether they are auditory, visual, tactual, and kinesthetic as well as on whether they need structure, a CAP, a program, an instructional package, or various tactual-kinesthetic resources (task cards, learning circles, or electroboards) should be prescribed.

Other learners achieve best when among their peers. For these students, Circles of Knowledge, cooperative learning groups, case studies, brainstorming exercises, and other small-group techniques tend to facilitate learning

Youngsters who require interaction with an adult will benefit from lectures, discussions, or teacher-directed studies. However, it should be determined whether the relationship that is sought is authoritarian or collegial before suggesting whether large or small groups would be more effective.

Physical elements. During the past few years, researchers have found that only about 20 to 30% of school-age children appear to be auditory. Approximately 40% are visual, and the remaining 30 to 40% are either tactual-kinesthetic, visual-tactual, or some combination of these four senses (Dunn & Dunn, 1992a, b).

Other elements that either permit or inhibit learning are the need to eat or drink, the time of day, and the ability to remain stationary for longer or shorter periods of time. Teachers mistakenly label some students "hyperactive" when they are either light sensitive or require a great deal of mobility. Many of these students can learn well when they are assigned tasks that require them to move from area to area, or when they are permitted to take frequent breaks.

Most of the 18 elements of learning style can be accommodated easily by developing students' awareness of their own styles, permitting some flexibility, and then gradually developing the types of resources that complement learning styles.

Conclusion

In this article, I examined three broad categories of learning theories: critical thinking, cognitive, and constructivist theories. Critical thinking shifts classroom design from a model that largely ignores thinking to one that renders it pervasive and necessary. Cognitive theorists consider learning to occur when students are able to learn by doing through experiences or are able to add new concepts to their cognitive structure by recognizing a relationship between their prior knowledge and what they are learning. Constructivists believe that students construct knowledge for themselves—each learner individually (and socially) constructs meaning through the learning process.

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