APM Perspectives

The Association of Professors of Medicine (APM) is the national organization of departments of internal medicine at the US medical schools and numerous affiliated teaching hospitals as represented by chairs and appointed leaders. As the official sponsor of The American Journal of Medicine, the association invites authors to publish commentaries on issues concerning academic internal medicine.

For the latest information about departments of internal medicine, please visit APM's website at www.im.org/APM.

Overview of Current Learning Theories for Medical Educators

Dario M. Torre, MD, MPH,[a] Barbara J. Daley, PhD,[b] James L. Sebastian, MD,[a] D. Michael Elnicki, MD[c]

[a]Medical College of Wisconsin, Milwaukee, [b]University of Wisconsin – Milwaukee, and [c]University of Pittsburgh Medical School, Penn.

Medical education is in the midst of a major transformation that will require medical educators to reassess standard teaching practices and develop innovative strategies to optimize student and resident learning. New training standards from the Accreditation Council for Graduate Medical Education (ACGME),[1] the changing nature of the health care delivery system, and the integration of evidence-based medicine, point-of-care learning, and continuous quality improvement into daily medical practice are some of the forces that have coalesced to create renewed interest in the process of learning. What teaching and learning practices can best assist medical educators to meet the current challenges? Are there aspects of learning theory that can help medical educators thrive in this climate of change?

A working knowledge and understanding of key learning theories can help inform teaching practice by providing a rational basis for the selection of specific instructional strategies, fostering the articulation of important learning objectives, and facilitating the implementation of evaluation strategies that are well matched to curricular goals. This article describes several key learning theories and provides concrete examples of how specific educational methodologies are linked to these learning approaches. The 5 learning theories discussed in this article are based on the work of Merriam and Caffarella[2] and include behaviorist, cognitivist, humanist, social learning, and constructivist orientations to learning. The strength of understanding learning theory from multiple perspectives is that it provides medical educators with different teaching strategies that can be retrieved from their educational "tool boxes," depending on the specific learning outcomes that are desired.

BEHAVIORIST ORIENTATION

The behaviorist learning orientation is particularly useful for the development of competencies and for demonstrating technical or psychomotor skills. This learning theory is most advantageous when a change in behavior is the desired outcome of an educational intervention.

Learning Theory

The behaviorist model involves a teacher-centered approach in which the educator's role is to manipulate the environment for learners to elicit a specific response. Behavioral change in a desired direction is the main goal of this learning orientation. The locus of learning in the behaviorist approach lies in how various stimuli are presented or arranged in the external environment.[2]

Behaviorism is rooted in 3 basic assumptions: observable behavior is the focus of learning, environment shapes behavior, and reinforcement is central to the learning process.[3] Behaviorism focuses on the mastery of prerequisite steps before moving to subsequent steps; this learning orientation is aimed at reinforcing what the teacher wants the learner to perform.[4]

Portions of this work were previously presented at the Clerkship Directors in Internal Medicine National Meeting in Portland, Oregon in October 2005.

Requests for reprints should be addressed to Dario M. Torre, MD, MPH, Medical College of Wisconsin, Froedtert East Clinic Building, 9200 West Wisconsin Avenue, Milwaukee, WI 53226.

E-mail address: dtorre@mcw.edu

0002-9343/$ -see front matter
doi:10.1016/j.amjmed.2006.06.037

Table A Typical Behaviorist-based Educational Practice: Design of Behavioral Objectives

Behavioral Objective Should Include:
The performance or behavior (what the learner will be able to do, what behavior will be performed);
Conditions (which are necessary for the performance or under which the performance must be performed);
Criteria (what measure or criteria defines unacceptable performance).
For example: Given a simulated patient with CHF and a third heart sound(S3) (**condition**), learner will identify an S3 (**performance**), with 80 percent accuracy (**criteria**).

Implications for Medical Education

A behaviorist approach is useful when developing learning objectives or designing competency-based curricula. Specific behavioral objectives allow the student to know exactly what behavior will be learned, the conditions under which it will be performed, and the criteria with which it will be evaluated. By delineating learning objectives in this fashion, the teacher is able to clearly spell out the level of competency that is expected for each element of the curriculum (Table).

The behaviorist approach to medical education is frequently used in the development and evaluation of clinical skills instruction and simulated case scenarios. In the area of clinical skills instruction, teachers demonstrate specific desired behaviors, learners observe the exact manner or technique in which a clinical skill or behavior should be performed, and some scoring rubric (checklists, rating forms, direct observation) is used to evaluate performance and provide reinforcement. A third-year clerkship director interested in teaching medical students about smoking cessation might develop a simulated case scenario with standardized patients to provide students with an opportunity to practice and perform specific counseling techniques under controlled circumstances.

COGNITIVIST ORIENTATION

The locus of learning in the cognitivist orientation is the learners' internal environment and cognitive structures. In this framework, the learner uses cognitive tools, such as insight, information processing, perceptions, and memory, to facilitate learning by assigning meaning to events.

Learning Theory

The cognitivist approach is characterized by the creation of meaningful learning through which learners seek to understand the structure of knowledge. In contrast to behaviorism, the locus of learning in the cognitivist model is on the individual learner and on his or her thought processes rather than on the external environment. The teacher's role in this framework is to facilitate cognitive processing by helping the learner "learn how to learn."[5] As such, the goal of the cognitivist approach is to develop the learner's capacity and skills for more effective self-directed learning. The cognitivist orientation facilitates the acquisition of knowledge and the development of learning skills that are applicable in other learning situations regardless of the topic or context.

Within the cognitivist learning orientation, Ausubel believes that individuals think and learn with concepts.[6] He defines concepts as "objects, events, situations, or properties that possess common criteria/attributes and that these are designated by some sign or symbol."[6] In Ausubel's view, meaningful learning results from relating new knowledge to what is already known. This philosophical approach advocates the creation of learning strategies that link concepts together in unique ways so that the learner understands the structure of knowledge.

Developing critical thinking through reflection is one of the most important components of the cognitivist learning orientation.[7] According to Boud and Walker, the reflective process has 3 stages: returning to and replaying the experience, attending to the feelings that the experience provoked, and reevaluating the experience.[8] This process of reflection may occur during or after the experience in question. Reflection *on* action is thinking through a situation after it has happened. Reflection *in* action is thinking about actions as they are performed.[9]

Implications for Medical Education

Two manifestations of the cognitivist learning theory that are directly applicable to medical education include the construction of concept maps and the development of reflective thinking.

Concept maps, cognitivist learning strategies developed by Novak and Gowin, are graphic devices that are useful for representing the relationships between multiple concepts.[5] The Figure provides an example of a concept map created by a medical student during her third-year internal medicine clerkship at the Medical College of Wisconsin. By working through the process of creating a concept map, learners identify key issues, draw relationships between concepts, and identify connections with linking words. The intent of this exercise is for learners to connect new concepts to what they already know. Within medical education, concept maps can be used to facilitate acquisition and recall of ideas and meanings about a topic; depict complex relationships among ideas; extract core concepts from a textbook, journal article, or clinical case study; plan a paper or presentation; or simply function as an aid to brainstorming and sharing ideas with other learners.

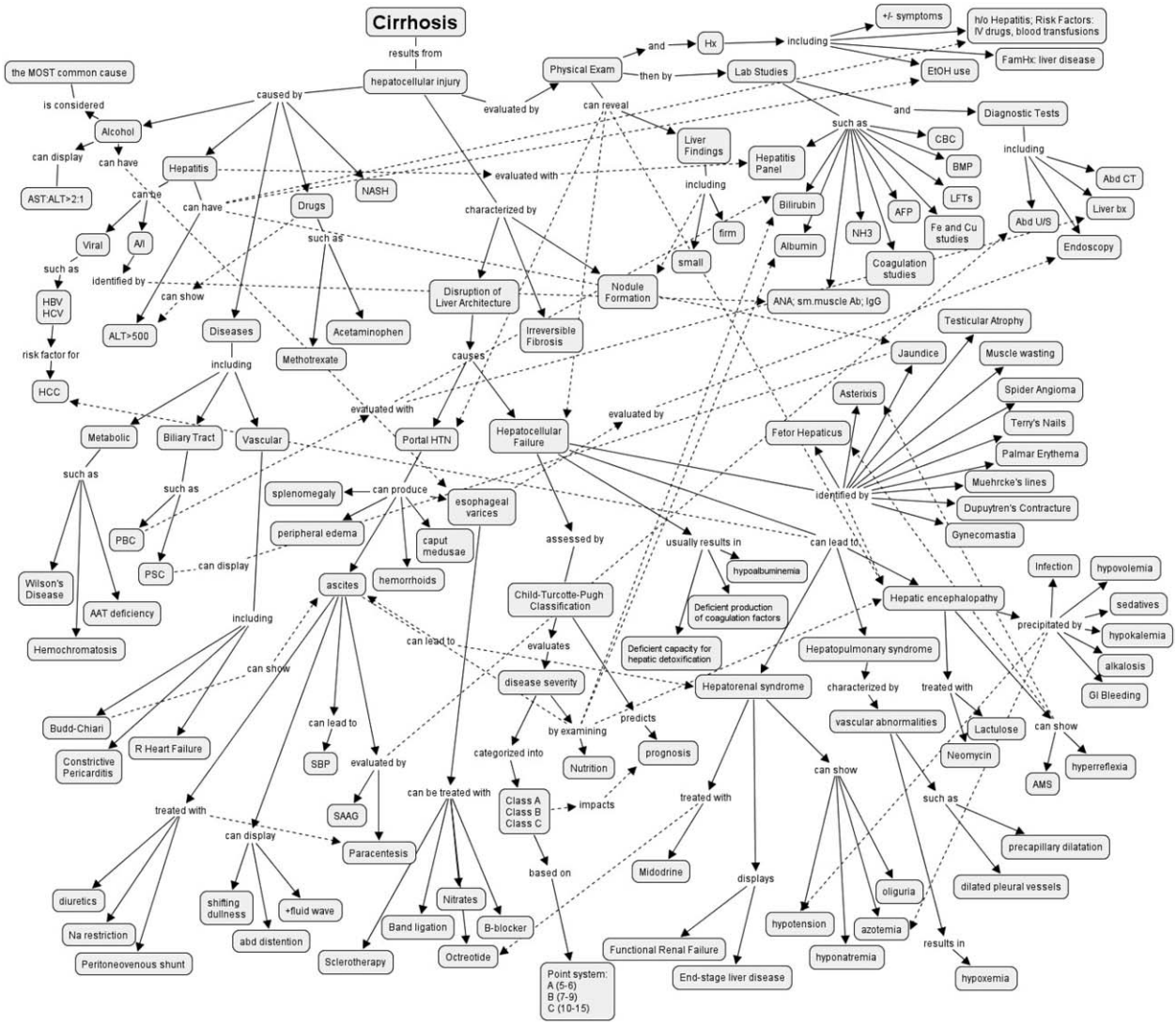

Figure Example of a concept map developed by a third-year medical student rotating through a medicine clerkship.

To help learners develop reflective thinking, medical educators often begin by asking them to identify a significant clinical experience. After the learner has had a chance to recall the clinical encounter (event), he or she is asked to describe what happened (reflection), summarize what was learned from this experience, and speculate on what could have been done differently. Reflective thinking as a cognitivist learning strategy can be used in a wide variety of teaching environments including hospital wards, lecture halls, small group sessions, or simulated environments with standardized or virtual patients. An example of reflection *in* action would be to ask team members to articulate the key learning points of a particular case while the patient is still actively receiving care.[10] An example of reflection *on* action would be to ask students or residents to describe their most memorable patient care experience during the preceding month.[11]

HUMANIST ORIENTATION

Within the humanist framework, learning is viewed as a personal act necessary to achieve the learner's full potential. The goal of this approach is for the learner to become autonomous and self-directed.

Learning Theory

The locus of learning within a humanist orientation relates to the needs of the person, with the ultimate need being that of self-actualization and self-fulfillment. In essence, the learner's motivation to learn is fueled by a desire to become all that he or she is capable of becoming. Learning that stems from this approach has several characteristic features, including personal involvement of the learner, learning that is self-initiated and that comes from within, and learning that is evaluated by the learner.[12] All of these features culminate in the development of an autonomous learner. The role of

the teacher in this framework is to facilitate the growth and development of the overall person.

Self-directed learning is one of the most important and well-known educational principles of the humanist orientation. Self-directed learning also can be viewed as a process, in which learners plan, carry out, and evaluate their own learning experiences. By means of this approach, the learner ultimately develops self-direction as a personal attribute.

Implications for Medical Education

Given the current climate of technology-based and computer-assisted instruction, self-directed learning is becoming a particularly important and appropriate learning orientation. Well-designed technology-based learning experiences can encourage learners to assume responsibility for their own education at the same time they are developing and applying the skills necessary for managing and assessing their own learning.[13] In addition to computer-assisted simulations, self-directed learning methodologies may be manifest in problem-based learning scenarios, drill and practice exercises with immediate feedback, and role-playing exercises that emphasize self-directedness and self-evaluation; the latter may be particularly important in helping learners to understand their specific role as part of the health care team.

SOCIAL LEARNING ORIENTATION

Observation and modeling are key characteristics of the social learning orientation. Within the context of the social learning theory, learners assimilate new information and assume new roles that require role modeling, behavioral rehearsal, and attending to observed behaviors.

Learning Theory

Within the social learning framework, learning is embedded in the interactions with, and observations of, others in a social context. For learners to acquire new knowledge or skills, they must imitate and reinforce the observed behavior by rehearsing it.[14] As opposed to a strict behaviorist approach, social learning theory incorporates a cognitive component that is represented by the idea that learning may occur by observation alone, without the need for rehearsal and imitation of the observed act. The social learning construct hypothesizes that learners acquire a cognitive representation of a modeled or observed experience, form and store an image of that modeled behavior, and retrieve that image when the learner is motivated to act. In this framework, the learning process is viewed as an interaction with, and observation of, others in a social context. The locus of learning in the social model is on the interaction between the person, the learning environment, and the desired behavior. Based on social learning theory, the teacher is responsible for modeling new roles, guiding behaviors, and providing learners with opportunities to practice these new roles and behaviors.

Implications for Medical Education

Common applications of social learning theory to medical education include role modeling/mentoring, collaborative/cooperative learning, and teaching with case studies. The process of role modeling incorporates many of the characteristic features of social learning. For example, learners may observe the key characteristics of a master teacher (how an excellent bedside clinician listens to the heart to identify a particular murmur) and use these observations to create a memorable model of the desired behavior (remember what the teacher did and how he or she did it). The learner must then be able to reproduce the desired behavior (listen to another patient using the same technique as the master teacher) and ultimately receive feedback on his or her performance (requires observation and reinforcement of correct behaviors). In many respects, role modeling has long been the backbone of teaching clinical medicine to students and house officers. Physicians-in-training learn to perform specific tasks in a certain way by emulating their teachers who are supervising hospital ward teams or precepting in the outpatient clinic. Physicians have always learned in the social context by observing each other's techniques and behaviors. The unique aspects of social learning theory combine role modeling behavior with cognitive learning to deepen the learner's understanding of how, why, and for what purpose the role model performs a specific task in a certain way.

CONSTRUCTIVIST ORIENTATION

The constructivist learning theory is one of the newest and most unique learning frameworks. Constructivists believe that knowledge is formed within the learner by integrating learning activities and experiences into knowledge and beliefs. Because constructivists believe that individuals learn by creating meaning from experiences, it follows that the locus of learning in this framework is on developing meaning, achieving understanding, and assigning significance to experiences.

Learning Theory

Within a constructivist framework, the learning process involves construction of meaning from experiences through critical reflection on the learners' assumptions. Educators who use a constructivist approach assist learners in understanding how they developed certain assumptions and question learners as to whether those assumptions remain valid. The locus of learning in a constructivist orientation is internal and involves creat-

ing new schemes to change perspectives and deepen understanding. The role of the teacher in this framework is to foster critical reflection and negotiate meaning with learners.

Implications for Medical Education

A number of medical education strategies, such as reflective journaling, writing practice narratives, and developing course portfolios, can be used to foster a constructivist learning orientation. For example, writing practice narratives has the potential to assist learners in understanding their practice as a physician in new ways. Typically, learners are asked to use a 3-column approach to construct a practice narrative. In column 1, the learner describes a particular case, and in column 2 the learners articulate their thoughts and feelings about the case. At a later date, the learner completes the third column of the practice narrative by reflecting on what they have learned. Once this activity is complete, small groups of learners come together to discuss similarities and differences in their cases and to describe what their cases mean to them. The group process helps learners to unearth assumptions and discover meanings that may be framing their clinical practice.

CONCLUSIONS

This article has presented multiple learning orientations and described their applications in medical education. Given the current climate of change, medical educators need to become conversant with different learning theories to create appropriate learning environments and optimize learning. If educators want a learner to perform a new skill, then choosing a behavioral approach makes sense. If educators want students and postgraduate trainees to develop critical thinking and clinical problem-solving skills, then a cognitivist approach may be the best choice. If educators want learners to assume responsibility for their own continued professional development, then a humanistic approach with a focus on self-directed learning may help achieve this goal. If educators want a learner to initiate best practices in a clinical setting, then social learning approaches in which learners model expert behavior may be the preferred strategy. Finally, if educators want a learner to understand physician-patient relationships or the meaning of family dynamics, then a constructivist approach might help uncover underlying meaning and unmask embedded assumptions.

In conclusion, learning theory provides medical educators with multiple approaches that form the philosophical basis for curriculum design and evaluation of learning activities. Ultimately, the artfulness of the teacher will determine which strategy and approach is best for each learner and each situation.

ACKNOWLEDGEMENTS

The authors thank E. Fallon, Junior Medical Student at the Medical College of Wisconsin, for providing her concept map.

References

1. ACGME Outcome Project. Online. http://www.acgme.org/Outcome. Accessed March 15, 2006.
2. Merriam S, Caffarella R. *Learning in Adulthood*. San Francisco, CA: Jossey-Bass, Inc., 1999.
3. Skinner BF. *About Behaviorism*. New York, NY: Knopf, 1974.
4. Grippin P, Peters S. *Leaning Theory and Outcomes*. Lanham, MD: University Press of America, 1984.
5. Novak J, Gowin DB. *Learning How to Learn*. New York, NY: Cambridge University Press, 1984.
6. Ausubel DP. *Educational Psychology: A Cognitive View*. New York, NY: Holt, Rinehart & Winston, 1968.
7. Brookfield S. *Becoming a Critically Reflective Teacher.* San Francisco, CA: Jossey-Bass, Inc., 1995.
8. Boud D, Keogh R, Walker D. Boundaries of adult learning. In *Promoting Reflection in Learning: A Model*. New York, NY: Routledge, 1996.
9. Schon DA. *The Reflective Practitioner: How Professionals Think in Action*. New York, NY: Basic Books, 1983.
10. Arseneau R. Exit rounds: A reflection exercise. *Acad Med*. 1995; 70:684-687.
11. Lichstein PR, Young G. My most meaningful patient: Reflective learning on a general medicine service. *J Gen Intern Med*. 1996; 11:406-409.
12. Rogers CR. *Freedom to Learn for the 80's.* Columbus, OH: Merrill, 1983.
13. Driscoll M. *Web-Based Training: Creating e-Learning Experiences, Second Edition*. San Francisco, CA: Jossey-Bass, 2002.
14. Miller NE, Dollard JC. *Social Learning and Imitation.* New Haven, CT: Yale University Press, 1941.