

# How Can Physicians' Learning Styles Drive Educational Planning?

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## Abstract

As changes in health care delivery systems and in the global burden of disease call for a reassessment of how tomorrow's physicians should be educated—indeed, for a reconsideration of the diversity of roles the physician should play—there is an immediate need to produce continuing medical education (CME) programs with real impact. Curriculum planners are questioning both the content of medical education and the methods of instruction and training. The product, or content, and the mechanism for its delivery have been defined and discussed, but a significant

body of literature has shown that new knowledge does not necessarily lead to new behavior. Ample evidence exists in the CME literature to support the implementation of more active and self-directed learning strategies to promote the desired change in behaviors. The question, then, that is the focus of this article is how educational planning might be better guided by an understanding of how physicians learn within the continuing medical education domain. Revisiting the principles of David Kolb's Learning Styles Inventory, the authors propose applying his experiential learning

model to overall curriculum design work. The authors argue that promoting the application of all learning styles in sequence in an educational encounter is a most desirable approach, and that this approach to learning could extend far beyond individual learners to influence how every component of medical education is designed, from the individual lecture or class activity to entire courses or programs.

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**A**s the corpus of knowledge basic to medicine continues to grow exponentially, physicians today find themselves operating in a complex environment marked by shifts in health care delivery, and challenged to ensure patient safety while accommodating the conditions of increasingly busy and cost-conscious practices. Educators, too, are working to ensure that the academic mission—from the definition of its core principles to the way it is pursued—is aligned with the evolving demands of this health care environment. These efforts can be seen on a global scale in the emergence of new medical schools, a resurgence of curriculum reform activities within established medical faculties, and increased efforts to define curricula for postgraduate training. And while changes in health care delivery systems and in the global burden of disease call for a reassessment of how

tomorrow's physicians should be educated—indeed, for a reconsideration of the diversity of roles the physician should play—there is an immediate need to produce continuing medical education (CME) programs with real impact.

Attempts to address these fundamental issues, and the significant pressure on leaders in academic medicine, are well documented. Curriculum planners are questioning both the content of medical education (“What should be included in the curriculum?”) and the methods of instruction and training (“How should this knowledge be delivered?”). A third area of research has focused on connecting content and teaching through an understanding of how learning occurs (“Why design curricula that foster active

learning?”). The product, or content, and the mechanism for its delivery have been defined and discussed, but a significant body of literature has shown that a learner's new knowledge does not necessarily lead to new behavior. Ample evidence exists in the CME literature to support the implementation of more active and self-directed learning strategies to promote the desired change in behaviors.<sup>1</sup> Yet the lecture still stands as the central component of the majority of CME programs, despite the fact that lecture-based CME programs have proved inadequate, statistically, for altering the behavior of participants.<sup>1</sup> CME is thus the rare industry where a significant gulf—backed up by data that continue to accumulate—exists between consumer and demand and the product developed to support that demand.\* The question, then, that is the focus of this article is how educational planning might be better guided by an understanding of how physicians learn within the CME domain. Revisiting the principles of David Kolb's Learning Styles Inventory (LSI), we propose applying his experiential learning model to overall curriculum design work.

Respectful of the years of research that precede our modest effort, we limited our work, described below, to an examination of the learning style preferences of

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\*We do not wish to ignore the economic rationale for lecture-based CME versus programs that incorporate active, hands-on experimentation. Obviously the latter style introduces complexities for CME providers, by challenging them to rethink the intellectual and physical resources and the time required to deliver a CME program. However, the feasibility of different kinds of program activities for CME providers is a topic for another article. As advocates of experiential learning, we would argue that given the data supporting physicians' preference for active learning over the more traditional didactic exercises, CME providers that do not develop activities with this preference in mind must question whether their programs are serving the mission of changing physicians' behavior.

physicians in practice. In the rest of this article, we first describe the Kolb learning styles, then review the findings of previous studies using the Kolb Learning Styles Inventory, and contrast our findings with those obtained over the past 40 years to examine consistency in findings. Later, we offer a set of concrete examples of how Kolb's experiential learning theory may be applied to the design of curricular activities.

### Background: The Kolb Learning Styles

In the early 1970s, David Kolb, then a PhD student at Harvard University conducting research on the psychology of learning, theorized that differences in the way people learned had to do with the way they perceive and then process an experience. Kolb's emphasis on experience as the central role in the learning process differentiated the experiential approach from those of other learning theories.<sup>2</sup> He summarized the characteristics of the experiential learning process with a working definition of learning: "Learning is a process whereby

knowledge is created through the transformation of experience."<sup>3</sup>

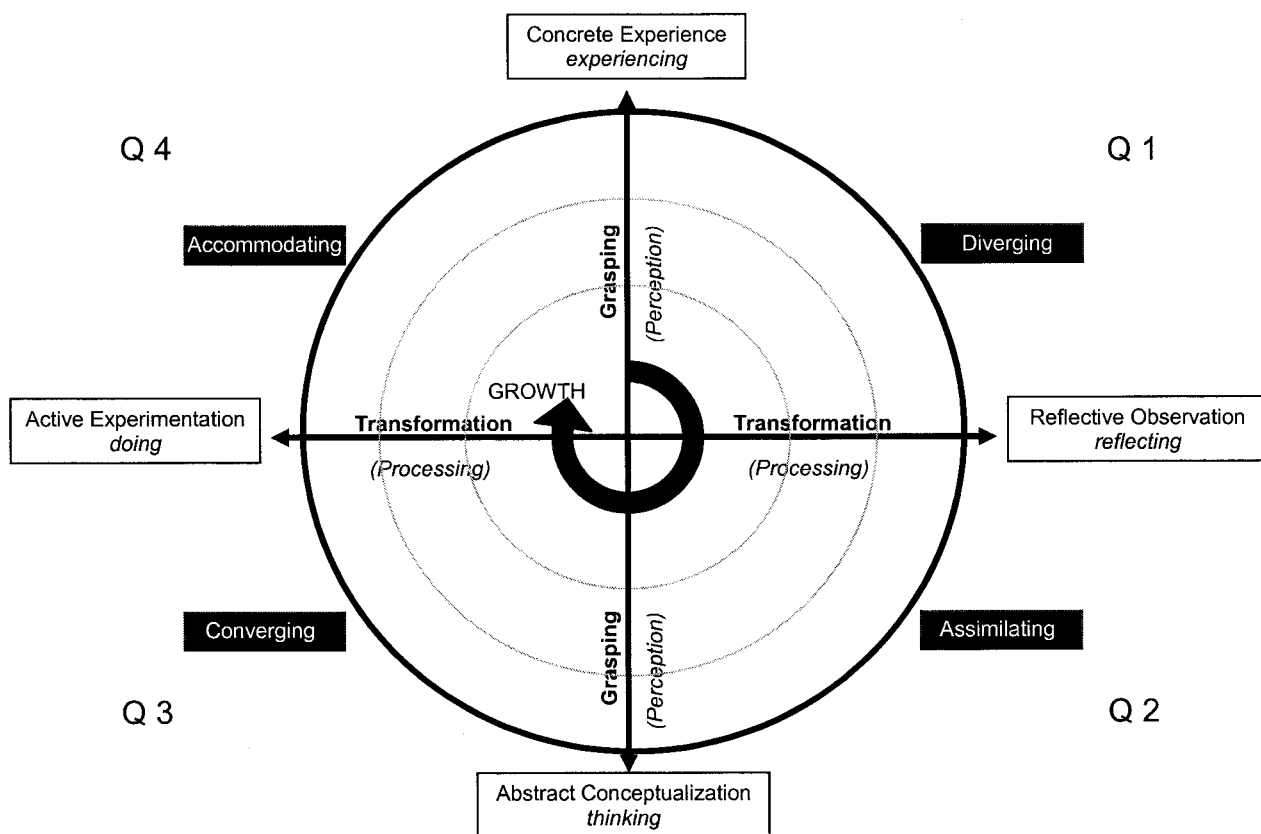
According to Kolb, two dimensions are necessary for learning to occur. The first dimension is described as a grasping, or perceiving, medium, and the second one as a transformation, or processing, medium. Learning results from the way people perceive and then process that information, making it their knowledge. The two mediums can be conceptualized as axes with continuum dimensions, as shown in Figure 1.

In the figure, the vertical axis represents perception and may have an event or interaction ("concrete experience") on one extreme or an idea or theory ("abstract conceptualization") on the other. The horizontal axis transforms an experience by reflecting on it ("reflective observation") to the one extreme or processes it by acting upon it ("active experimentation") to the other extreme. Hence, either a concrete experience or a theory is "grasped," to use Kolb's terminology. For the learner who,

encountering an experience, opts for active experimentation, the act of "doing" transforms the experience into something new—that is, personal knowledge that did not exist before. The learner who chooses to reflect upon the experience similarly adds something new to it, thus transforming the experience into new personal knowledge.

The two axes with continuum dimensions describe four quadrants with four different learning styles. If a concrete experience leads the learner to reflect upon it, then the learner has what Kolb defined as a "diverging" learning style. If an abstract concept leads one to actively experiment with it, then the learner has a "converging" learning style. Similarly a concrete experience transformed through active experimentation suggests an "accommodating" learning style, and a theory processed through reflection will result in an "assimilating" learning style.

Ideally, a learner should be able to use each of the four different kinds of abilities



**Figure 1** The four basic learning styles: diverging, assimilating, converging, and accommodating, each in its own quadrant (e.g., "diverging" is in quadrant 1). The quadrants are formed by two axes, the vertical one representing the continuum of perception (from experiencing to thinking), and the horizontal one representing the continuum of transformation of an experience, from acting to reflecting. See Figure 2 for a concrete curriculum planning framework based on the concepts in this figure. (Adapted from Kolb DA. *Experience as the Source of Learning and Development*. Englewood Cliffs, NJ: Prentice Hall, 1984:42, with permission.)

in order to gain the most effective learning results for every particular situation. However, influenced by nature and nurture and different experiences and demands in the past and present, learners tend to develop preferences in one or more of the four learning style quadrants. Based on experiential learning theory, Kolb developed a learning styles inventory to measure an individual's preferential learning mode. Since then, the Kolb LSI has been an instrument for a number of studies on the learning styles and career choices of physicians, medical students, and health care professionals.<sup>4-6</sup>

Designers of CME offerings for practicing physicians must consider a number of factors: individuals' preferred learning styles, their previous education, the problem to be solved, and the available professional support for learning.<sup>7</sup> As Kolb writes, "Any educational program, course design or classroom session can be viewed as having degrees of orientation toward each of the four learning modes."<sup>3</sup> Utilizing and promoting the application of all learning styles in sequence in an educational encounter is the most desirable. The experiential learning model is most effectively supported when educational planning creates an environment in which all styles are accommodated and fostered in a sequence moving from a definition of personal meaning and needs to the acquisition of new knowledge, followed by practical application and then synthesis and extension.<sup>2</sup>

### Implications of Experiential Learning Theory

In the medical education literature, the Kolb LSI has been used for several U.S. studies that have produced varying conclusions. For example, Plovnick<sup>8</sup> suggested a correlation between medical students' learning styles and medical specialty choices. Wunderlich and

Gjerde,<sup>9</sup> however, concluded that learning style and career choice in medicine are not associated.

Contradictory results may certainly be explained with varying methodologies, different physician epidemiology, or different publication years. However, irrespective of the medical specialty choice and varying methodologies, most studies' findings suggest that medical students and physicians would prefer the learning styles of either accommodators or convergers (quadrants 3 and 4).<sup>10-13</sup>

In 2003 and 2004 we administered the Kolb LSI to participants in Harvard Medical International's (HMI's) professional development programs for physicians and scientists actively engaged in educating future physicians.<sup>†</sup> Participants were asked to voluntarily complete the Kolb LSI online as a preassignment to their courses, in preparation for a session whose objective was to design curricula that utilize the styles represented in Kolb's four quadrants. This course preassignment represented work in Kolb's first quadrant; completing the LSI provided the participants with an experience they could discuss and reflect upon during the opening of the teaching session on creating effective curricula. We collected all responses anonymously, reviewed the data, and summarized the results. The summarized datasets for previously held courses, along with each cohort's group results, were given to the participants. Each participant also received personal results immediately after completing the survey online. Thirty-seven percent of the 372 participants were identified as convergers; another 22% were accommodators. Thus, the majority (59%) of these physicians' learning styles were more toward the left side on the transformation axis, indicating their preference for active experimentation with newly acquired knowledge. These findings were consistent with the data from the studies mentioned before.

### Implications for Designing Educational Programs

While knowledge of an individual's learning style may be of interest to a mentor, advisor, study coach, and that individual, it is usually of little use to the faculty member planning an educational encounter with a class in which, typically, all styles are represented. However, compilation of this information about

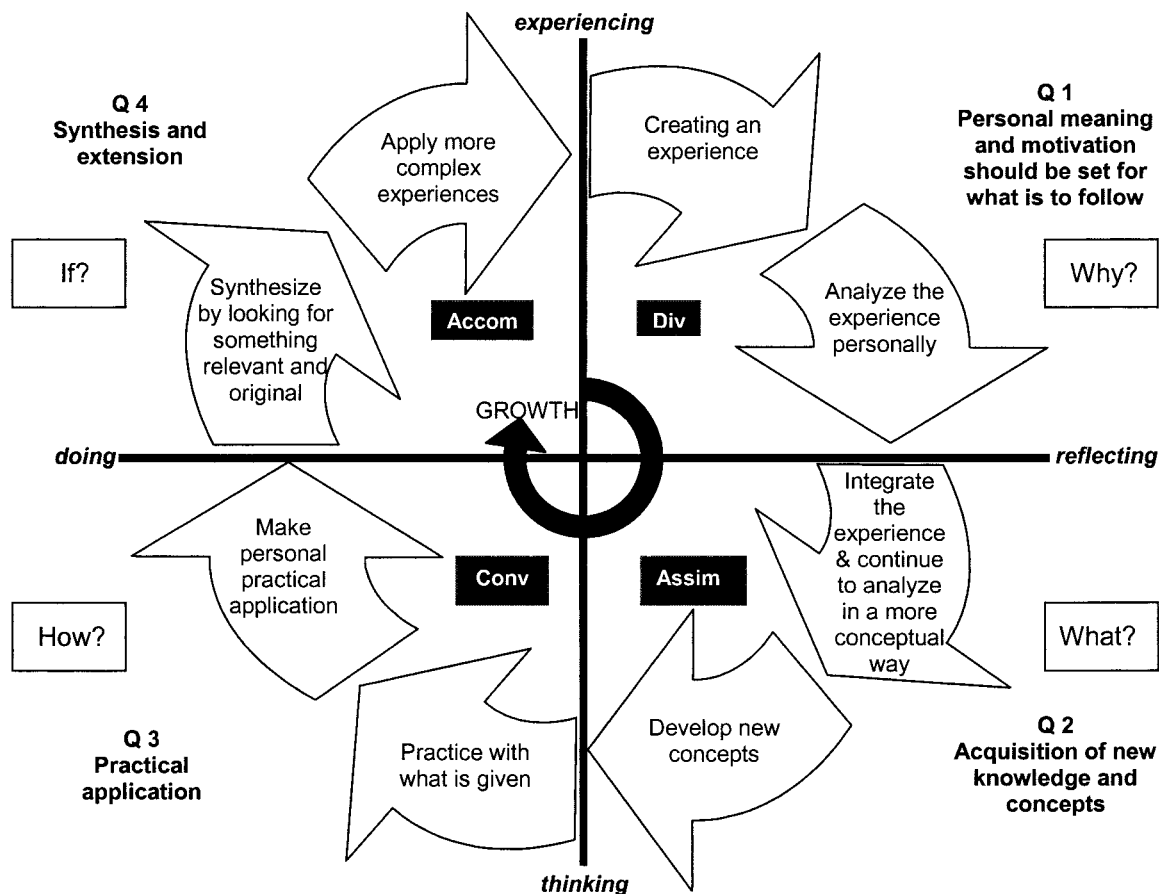
individuals into a group composite would indicate to faculty the necessity of offering learning formats conducive to the majority of learners, who sometimes will have learning styles that differ from the preferred style of the instructor.<sup>14</sup>

The extension of Kolb's experiential theoretical framework to an understanding of the learning process in general is also helpful to the curriculum planner. In the ideal learning process, learners start with a concrete experience and involve themselves fully, openly, and without bias. Then they reflect upon it and observe it from many perspectives. They make comparisons with existing theories and create concepts that integrate their observations into logically sound theories. Then they actively test these theories and use them to make decisions and solve problems. They are then motivated to undertake new experiences and thereby restart the cycle.<sup>3</sup> In other words, the best design for learning requires all learners to work in each style in a sequence moving from quadrants 1 to 4. McCarthy translated Kolb's recommendation into a concrete curriculum planning framework, the "4MAT system."<sup>2</sup> Figure 2 represents this application of the framework, reflecting the four learning styles in the sequence in which teachers should employ them.

While there have been contradictory research findings regarding the usefulness of matching instructional techniques to the learning style of an individual in medical education, we propose only to use experiential learning theory in designing curricula for groups. Curriculum and course designers should, therefore, employ all learning modes, while remaining cognizant of the predominance of physicians' learning styles. If the majority of physicians prefer to transform that which they experience through active experimentation, then our learning environments should be designed to maximize possibilities for that. We are not suggesting that instructional strategies be adapted to match the learning styles of individual learners. Rather, we should encourage all learners to go through all four modes for maximum learning impact.

We employ this framework in the professional development courses we design for physicians seeking to develop their skills as leaders of educational

<sup>†</sup>Twelve separate courses were held in the United States, Canada, United Kingdom, India, Germany, Japan, and Singapore. Participants were health care professionals with the majority being physicians. For more information about these and other courses offered by Harvard Medical International (HMI), visit the organizational Web site at (<http://www.hms.harvard.edu/hmi/newindex.html>). HMI, a nonprofit subsidiary of Harvard Medical School, creates programs and partnerships around the world with the goal of raising the standard of health care delivery, medical education, and research.



**Figure 2** A concrete curriculum planning framework and how it should be applied, based on the concepts in Figure 1. Every learning experience should begin at quadrant 1 and move through the cycle shown in the figure to its natural conclusion in quadrant 4.

programs in multiple health care environments. In this framework, learning begins with the learner's reflecting on prior experience and anticipating new activities—the fundamental principle of Kolb's first quadrant—and moves through the four quadrants to the point where the learner is implementing new knowledge in his or her practice and is restarting the cycle by returning through reflection to quadrant 1. We, therefore, engage all learners to participate in the four styles of learning, as explained below.

#### **Quadrant 1: Activate prior knowledge.**

Any effective educational encounter begins with the learner. In our professional development courses, the participants bring questions, goals, issues, and real-world projects that set the stage for learning to be anchored in tasks and goals the learner has defined. We use surveys about needs and goals to establish a baseline at the beginning of these courses, and ask participants to create a biosketch, which enables us, as the course's instructors, to understand the

experience base of our audience. These group and individual exercises both provide a clear starting point for the learning process and also help the learners clarify what they hope to accomplish and why they should actively engage in the course work. This creates an environment that places the learner at the center. The teacher gets to know and care about the participants as individuals. Through activating, articulating, and reflecting what they already know and value, the participants ready themselves to listen to and evaluate the new information the course provides.

**Quadrant 2: What is the new knowledge?** Second, we use readings reviewed in journal clubs and lectures to bring new information, data, and principles to the learner to enrich and expand the existing fund of knowledge required to address the learner's needs or meet his or her goals. In teaching through the second quadrant, learners move from reflection on concrete experiences to thinking, whether reviewing relevant literature, analyzing new data, or

beginning to develop principles that are drawn from evidence they gather in structured observations. Most traditional programs that are heavily lecture-based begin and end in this quadrant without ever moving beyond the delivery of information.

**Quadrant 3: Try it out.** Kolb's third quadrant calls for a shift from thinking to doing, moving from theory to practice. The idea is to create opportunities for physicians to experiment with their new knowledge in a safe environment, to put new ideas and skills to the test. This practice can take the form of a case-discussion in which a solution to a problem is sought. The learner benefits from articulating and analyzing existing beliefs, and exploring new concepts that challenge those beliefs. Preparation for a case-discussion requires individuals to analyze a problem scenario and come to class ready to summarize their assessment and proposed solution. During discussion, the learner is made aware of additional possibilities and is required to actively listen and contribute to a class

synthesis of the case through the class members' integration of the group's knowledge.

Simulations also effectively allow for practice in the classroom laboratory. Role-plays, table exercises, and microteaching are extensively used to offer opportunities to experiment with new concepts. Finally, there is always time set aside for work on personal goals and projects brought to the course. By offering opportunities for applying new learning to the real-world issues that created the original motive for taking the course, we hope to ensure that new actions can be tested in the safety of the classroom environment. The classroom is a laboratory.

**Quadrant 4: Just do it!** The culmination of this four-part process is a commitment by the learner to put a new behavior into practice in his or her own setting, and articulate this commitment in a written action plan that will guide the learner's new work. This new behavior, once implemented and ingrained, thus becomes the "prior knowledge" that is the baseline on which the learner will reflect when the learning cycle, which is really continuous, is begun again.

#### CME and Beyond

The four-part educational design described above honors the preferred style of each learner while maximizing the potential for learning that results in changed behaviors. It is important to note that this framework can be used at multiple levels: by course planners and curriculum designers, as well as by faculty planning individual sessions or modules. Grounded in experiential learning theory,

this four-stage curricular planning framework promotes active learning through reflection and practice.

Kolb's LSI has been a useful tool for analyzing how doctors across the spectrum of medicine approach problems, determine actions, and build upon their repository of knowledge. As long as the LSI data continue to show that the majority of doctors prefer active experimentation with newly acquired knowledge, then CME providers should strive to develop education programs that provide those kinds of opportunities.

In this article we have proposed a framework based on experiential learning theory that is consistent with the mounting evidence that learners in CME courses prefer that kind of learning. We are not arguing that active experimentation, grounded in goal-setting, practice, and reflection, be the sole basis for designing courses. However, we strongly believe that this framework provides learners the opportunity to establish goals, practice with new knowledge, implement and test what they have learned, and reflect upon the experience. This approach to learning could extend far beyond individual learners to influence how every component of medical education is designed, from the individual lecture or class activity to entire courses or programs.

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