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Chapter 3

LEARNING STYLES AND LEARNING SPACES: A REVIEW OF THE MULTIDISCIPLINARY APPLICATION OF EXPERIENTIAL LEARNING THEORY IN HIGHER EDUCATION

Alice Y. Kolb and David A. Kolb

ABSTRACT

Using the concept of learning style and learning space to describe the interface between learners and the learning environment in higher education, in this chapter we review studies addressing how learning style information and the experiential learning model have been applied to improve teaching and learning in sixteen different academic fields and professions. Studies suggest that experiential learning affords educators a way to design and implement teaching and learning strategies conducive to creating a learning environment beneficial for both faculty and students with possibilities for institutional wide dissemination of its core principles and practices. Drawing from the findings generated from the studies, we propose guiding principles for creating growth promoting learning spaces throughout higher education.

INTRODUCTION

Since its first appearance in 1971 (Kolb, 1971; Kolb, Rubin and McIntyre, 1971) experiential learning theory (ELT) and the concept of learning styles have steadily gained acceptance and recognition as useful tools to improve teaching and learning in higher education. This acceptance is reflected in the number of scholarly research studies that has been conducted across diverse academic fields using ELT and the learning style inventory (LSI) in the United States and around the world. The most recent bibliography on ELT and the LSI (Kolb and Kolb 2005a) includes 1880 studies across a wide spectrum of scholarly research from theoretical contributions to ELT, the use of the LSI as a framework for educational innovation, examination of LSI psychometrics, critiques of ELT, and pragmatic

applications of ELT in the work setting such as training design, management development, and career development.

What caused such an increase in interest in experiential learning in recent years? One key contributing factor is an increased sense of urgency for improvement in learning in higher education, articulated by the National Research Council (Bransford, Brown, and Cocking, 2000), the American Psychological Association (1997), and by other scholars (Baxter Magolda 1999; Boyatzis, Cowen and Kolb 1995; Keeton, Sheckely and Griggs 2002; King 2003; Light 2001; Mentkowski and Associates 2000, Zull 2002) who urged administrators, scholars, and educators to create educational initiatives that enhance student learning. Furthermore, a growing body of research points to the limitations of traditional teacher-centered pedagogy in fostering a holistic education that respects the students' intellectual and emotional integrity and capacity to become independent learners (Freire, P., 1973; Komives, S. R, Woodard, Jr., D. B., and Associates, 2003; Palmer, 1998; Terenzini, 1994).

There is a significant change in education from the teacher-centered, knowledge-transfer approach to a focus on the learner as an active participant in the learning process. To cite few examples of such studies, Frontczak (1998) documents the overall shift in marketing education from the traditional, knowledge-transfer approach to the experiential, interactive methods of learning rich in variety and scope of experiential activities "limited only by the imagination of the professor" (Frontczak 1998: 25). Fleming et al. (2003) reports a similar trend in dental education where there is a growing recognition that traditional lecture-based instruction is efficient when comparing the measurement of the knowledge itself, and deficient where the measurement focus is on retention of knowledge, problem-solving skills, or ability to transfer the newly acquired knowledge to a clinical situation. Carland et al. (1994) introduced experiential learning strategies to design a Principle of Accounting course after having experienced "tremendous frustration in striving to make sophomores literate in accounting." (Carland 1994: 224). The change in teaching paradigm, the authors report, led to a successful increase in students' rate of learning and significant reduction in failure and withdrawal from the course.

While studies reveal diverse reasons and circumstances as to why such a shift from traditional teaching paradigm to an experiential approach has taken place in various academic communities, one common theme that permeates across disciplinary fields is the increased perception of the inadequacy and limitation of equating academic performance to learning. This common perception has prompted many educators and institutions to embrace experiential learning as a practical model to design and implement programs and curricula that promote maximization of student learning and more holistic, experiential modes of assessment.

In this chapter we review studies from numerous academic disciplines that have used ELT and the LSI to improve teaching and learning in higher education; using the concepts of learning style and learning space (Kolb and Kolb 2005b) to describe the interface between learners and the learning environment in higher education. The chapter will unfold as follows: in the first section, *experiential learning theory*, we will present the conceptual foundation of experiential learning theory, learning styles, and the concept of learning spaces; section two, *learning spaces in academic fields: the application of experiential learning in higher education*, will review studies addressing how learning style information and the experiential learning model have been applied to improve teaching and learning in sixteen different academic fields and professions. The concluding section, *future directions for experiential*

learning in higher education, will integrate the findings generated from various academic fields described in section two and propose guiding principles for creating growth promoting learning spaces throughout higher education.

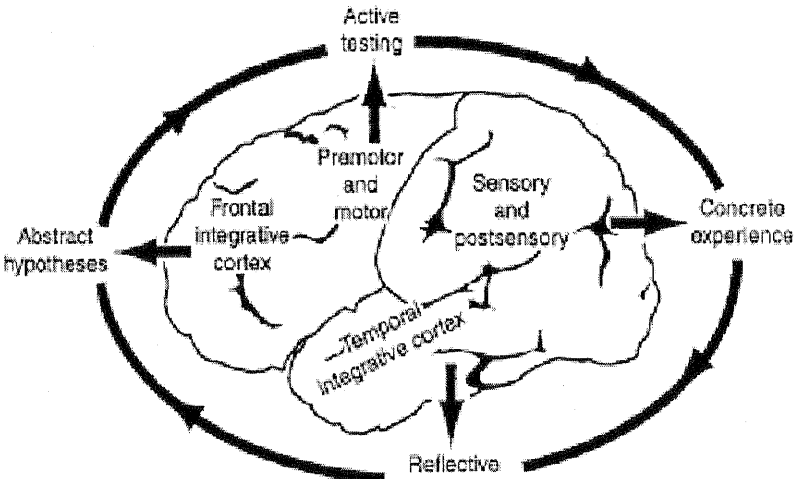
EXPERIENTIAL LEARNING THEORY

Experiential learning theory draws on the work of prominent 20th century scholars who gave experience a central role in their theories of human learning and development—notably John Dewey, Kurt Lewin, Jean Piaget, William James, Carl Jung, Paulo Freire, Carl Rogers and others—to develop a holistic model of the experiential learning process and a multi-linear model of adult development (Kolb 1984). The theory is built on six propositions that are shared by these scholars.

1. Learning is best conceived as a process, not in terms of outcomes. To improve learning in higher education, the primary focus should be on engaging students in a process that best enhances their learning – a process that includes feedback on the effectiveness of their learning efforts. "...education must be conceived as a continuing reconstruction of experience: ... the process and goal of education are one and the same thing." (Dewey 1897: 79)
2. All learning is relearning. Learning is best facilitated by a process that draws out the students' beliefs and ideas about a topic so that they can be examined, tested and integrated with new, more refined ideas.
3. Learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world. Conflict, differences, and disagreement are what drive the learning process. In the process of learning one is called upon to move back and forth between opposing modes of reflection and action and feeling and thinking.
4. Learning is a holistic process of adaptation to the world. It is not just the result of cognition but involves the integrated functioning of the total person—thinking, feeling, perceiving and behaving.
5. Learning results from synergetic transactions between the person and the environment. In Piaget's terms, learning occurs through equilibration of the dialectic processes of assimilating new experiences into existing concepts and accommodating existing concepts to new experience.
6. Learning is the process of creating knowledge. ELT proposes a constructivist theory of learning whereby social knowledge is created and recreated in the personal knowledge of the learner. This stands in contrast to the "transmission" model on which much current educational practice is based where pre-existing fixed ideas are transmitted to the learner. ELT defines learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb 1984:41). The ELT model portrays two dialectically related modes of grasping experience—Concrete Experience (CE) and Abstract Conceptualization (AC) –and two dialectically related modes of transforming

experience—Reflective Observation (RO) and Active Experimentation (AE). Experiential learning is a process of constructing knowledge that involves a creative tension among the four learning modes that is responsive to contextual demands. This process is portrayed as an idealized learning cycle or spiral where the learner "touches all the bases"—experiencing, reflecting, thinking, and acting—in a recursive process that is responsive to the learning situation and what is being learned. Immediate or *concrete experiences* are the basis for observations and *reflections.* These reflections are assimilated and distilled into *abstract concepts* from which new implications for action can be drawn. These implications can be *actively tested* and serve as guides in creating new experiences.

In *The art of changing the brain: Enriching teaching by exploring the biology of learning,* James Zull a biologist and founding director of CWRU's University Center for Innovation in Teaching and Education (UCITE) sees a link between ELT and neuroscience research, suggesting that this process of experiential learning is related to the process of brain functioning as shown in Figure 1. "Put into words, the figure illustrates that concrete experiences come through the sensory cortex, reflective observation involves the integrative cortex at the back, creating new abstract concepts occurs in the frontal integrative cortex, and active testing involves the motor brain. In other words, the learning cycle arises from the structure of the brain." (Zull 2002: 18-19)



Note: From Zull 2002. Reprinted by permission.

Figure 1. The experiential learning cycle and regions of the cerebral cortex

The concept of learning style describes individual differences in learning based on the learner's preference for employing different phases of the learning cycle. Because of our hereditary equipment, our particular life experiences, and the demands of our present environment, we develop a preferred way of choosing among the four learning modes. We resolve the conflict between being concrete or abstract and between being active or reflective in patterned, characteristic ways.

ELT as defined by Kolb posits that learning is the major determinant of human development and how individuals learn shapes the course of their personal development. His previous research (Kolb 1984) has shown that learning styles are influenced by personality type, educational specialization, career choice, and current job role and tasks. Yamazaki (2002, 2003) has recently identified cultural influences as well. The ELT developmental model (Kolb, 1984) defines three stages: (1) *acquisition,* from birth to adolescence where basic abilities and cognitive structures develop; (2) *specialization,* from formal schooling through the early work and personal experiences of adulthood where social, educational, and organizational socialization forces shape the development of a particular, specialized learning style; and (3) *integration* in mid-career and later life where non-dominant modes of learning are expressed in work and personal life. Development through these stages is characterized by increasing complexity and relativism in adapting to the world and by increased integration of the dialectic conflicts between AC and CE and AE and RO. Development is conceived as multi-linear based on an individual's particular learning style and life path—development of CE increases affective complexity, of RO increases perceptual complexity, of AC increases symbolic complexity, and of AE increases behavioral complexity.

LEARNING STYLE ASSESSMENT

Much of the research on ELT has focused on the concept of learning style using the Learning Style Inventory (LSI) to assess individual learning styles (Kolb 1971, 1985, 1999). While individuals tested on the LSI show many different patterns of scores, previous research with the instrument has identified four learning styles that are associated with different approaches to learning—Diverging, Assimilating, Converging, and Accommodating. The following summary of the four basic learning styles is based on both research and clinical observation of these patterns of LSI scores (Kolb, 1984, 1999a).

An individual with a diverging style has CE and RO as dominant learning abilities. People with this learning style are best at viewing concrete situations from many different points of view. It is labeled "Diverging" because a person with it performs better in situations that call for generation of ideas, such as a "brainstorming" session. People with a Diverging learning style have broad cultural interests and like to gather information. They are interested in people, tend to be imaginative and emotional, have broad cultural interests, and tend to specialize in the arts. In formal learning situations, people with the Diverging style prefer to work in groups, listening with an open mind and receiving personalized feedback.

An individual with an assimilating style has AC and RO as dominant learning abilities. People with this learning style are best at understanding a wide range of information and putting into concise, logical form. Individuals with an Assimilating style are less focused on people and more interested in ideas and abstract concepts. Generally, people with this style find it more important that a theory have logical soundness than practical value. The Assimilating learning style is important for effectiveness in information and science careers. In formal learning situations, people with this style prefer readings, lectures, exploring analytical models, and having time to think things through.

An individual with a converging style has AC and AE as dominant learning abilities. People with this learning style are best at finding practical uses for ideas and theories. They

have the ability to solve problems and make decisions based on finding solutions to questions or problems. Individuals with a Converging learning style prefer to deal with technical tasks and problems rather than with social issues and interpersonal issues. These learning skills are important for effectiveness in specialist and technology careers. In formal learning situations, people with this style prefer to experiment with new ideas, simulations, laboratory assignments, and practical applications.

An individual with an accommodating style has CE and AE as dominant learning abilities. People with this learning style have the ability to learn from primarily "hands-on" experience. They enjoy carrying out plans and involving themselves in new and challenging experiences. Their tendency may be to act on "gut" feelings rather than on logical analysis. In solving problems, individuals with an Accommodating learning style rely more heavily on people for information than on their own technical analysis. This learning style is important for effectiveness in action-oriented careers such as marketing or sales. In formal learning situations, people with the Accommodating learning style prefer to work with others to get assignments done, to set goals, to do field work, and to test out different approaches to completing a project.

LEARNING SPACES

To elaborate further the complex, dynamic nature of learning style and its formation through transactions between the person and environment we introduce the concept of learning space. The concept of learning space builds on Kurt Lewin's field theory and his concept of life space. For Lewin, person and environment are interdependent variables, a concept Lewin translated into a mathematical formula, B=f(p,e) where behavior is a function of person and environment. As Marrow puts it, "the life space is the total psychological environment which the person experiences subjectively." (Marrow 1969: 35) Life space includes all facts that have existence for the person and excludes those that do not. It embraces needs, goals, unconscious influences, memories, beliefs, events of a political, economic, and social nature, and anything else that might have direct effect on behavior. The various factors in a given life space are to some degree interdependent, and Lewin strongly maintains that only the dynamic concepts of tension and force can deal with these sets of interdependent facts. This is what led him to define psychological needs as tension systems and their topological representation as vectors to denote motion. He postulates that the particular organization of a person's life space were determined by a field of forces, both internal needs and external demands that positioned the individual in a life space composed of different regions. Using map-like representation the life space could be depicted topologically. Life spaces can vary in a number of dimensions including extension, differentiation, integration and level of conflict. Lewin introduced a number of concepts for analysis of the life space and a person's relationship to it that are applicable to the study of learning spaces, including position, region, locomotion, equilibrium of forces, positive and negative valence, barriers in the person and the world, conflict, and goal.

Three other theoretical frameworks inform the ELT concept of learning space. Urie Bronfrenbrenner's (1977, 1979) work on the ecology of human development has made significant sociological contributions to Lewin's life space concept. He defines the ecology of

learning/development spaces as a topologically nested arrangement of structures each contained within the next. The learner's immediate setting such as a course or classroom is called the *microsystem,* while other concurrent settings in the person's life such as other courses, the dorm or family are referred to as the *mesosystem.* The *exosystem* encompasses the formal and informal social structures that influence the person's immediate environment, such as institutional policies and procedures and campus culture. Finally, the *macrosystem* refers to the overarching institutional patterns and values of the wider culture, such as cultural values favoring abstract knowledge over practical knowledge, that influence actors in the person's immediate microsystem and mesosystem. This theory provides a framework for analysis of the social system factors that influence learners' experience of their learning spaces.

Another important contribution to the learning space concept is situated learning theory (Lave and Wenger 1991). Like ELT situated learning theory draws on Vygotsky's (1978) activity theory of social cognition for a conception of social knowledge that conceives of learning as a transaction between the person and the social environment. Situations in situated learning theory like life space and learning space are not necessarily physical places but constructs of the person's experience in the social environment. These situations are embedded in communities of practice that have a history, norms, tools, and traditions of practice. Knowledge resides, not in the individual's head, but in communities of practice. Learning is thus a process of becoming a member of a community of practice through legitimate peripheral participation (e.g. apprenticeship). Situated learning theory enriches the learning space concept by reminding us that learning spaces extend beyond the teacher and the classroom. They include socialization into a wider community of practice that involves membership, identity formation, transitioning from novice to expert through mentorship and experience in the activities of the practice, as well as the reproduction and development of the community of practice itself as newcomers replace old-timers.

Finally, in their theory of knowledge creation, Nonaka and Konno (1998) introduce the Japanese concept of "ba", a "context that harbors meaning", which is a shared space that is the foundation for knowledge creation. "Knowledge is embedded in *ba,* where it is then acquired through one's own experience or reflections on the experiences of others." (Nonaka and Konno 1998:40) Knowledge embedded in *ba* is tacit and can only be made explicit through sharing of feelings, thoughts and experiences of persons in the space. For this to happen, the *ba* space requires that individuals remove barriers between one another in a climate that emphasizes "care, love, trust, and commitment". Learning spaces similarly require norms of psychological safety, serious purpose, and respect to promote learning.

In ELT the experiential learning space is defined by the attracting and repelling forces (positive and negative valences) of the two poles of the dual dialectics of action/reflection and experiencing/conceptualizing, creating a two dimensional map of the regions of the learning space. An individual's learning style positions them in one of these regions depending on the equilibrium of forces among action, reflection, experiencing and conceptualizing. As with the concept of life space, this position is determined by a combination of individual disposition and characteristics of the learning environment. The LSI measures an individual's preference for a particular region of the learning space, their home region so to speak. The regions of the ELT learning space offer a typology of the different types of learning based on the extent to which they require action vs. reflection, experiencing vs. thinking thereby emphasizing some stages of the learning cycle over others.

The ELT learning space concept emphasizes that learning is not one universal process but a map of learning territories, a frame of reference within which many different ways of learning can flourish and interrelate. It is a holistic framework that orients the many different ways of learning to one another. As Lewin put it, "Actually, the term learning refers to a multitude of different phenomena. The statement, 'Democracy, one has to learn' autocracy is imposed on the person,' refers to one type of learning. If one says that the spastic child has to learn to relax one is speaking of a different type of learning. Both types probably have very little to do with learning French vocabulary, and this type again has little to do with learning to like spinach. Have we any right to classify learning to high-jump, to get along with alcohol, and to be friendly with people under the same term, and to expect identical laws to hold for any of these processes?" (Cartwright 1951: 65)

The process of experiential learning can be viewed as a process of locomotion through the learning regions that is influenced by a person's position in the learning space. One's position in the learning space defines their experience and thus defines their "reality". Lewin stresses the importance for education of defining the learning space in terms of the learner's experience, "One of the basic characteristics of field theory in psychology, as I see it, is the demand that the field which influences an individual should be described not in 'objective physicalistic' terms, but in the way that it exists for that person at that time... A teacher will never succeed in giving proper guidance to a child if he does not learn to understand the psychological world in which that child lives...To substitute for that world of the individual the world of the teacher, of the physicist, or of anybody else is to be, not objective, but wrong" (Cartwright 1951: 62).

Learning Spaces in Academic Fields: The Application of Experiential Learning in Higher Education

From Lewin's life space perspective, learning takes a multitude of forms and meaning depending on the unique academic culture, knowledge creation process, and the skill requirement of each academic field. Thus, the primary goal of the education is to socialize students into various communities of practice through the successful acquisition of knowledge and set of skills required by the profession. While the learning space in the sciences may place stronger emphasis on abstract formulation of theory and concepts thus requiring the mastery of symbolic complexity in their students, in the Arts learning may take a very different meaning. The conception of knowledge and skill requirement in an arts discipline may require students to concentrate their time and effort in developing their affective and perceptual complexities at a greater length (Eickman, Kolb, and Kolb, 2004; Kolb, 1984). ELT posits that while specialization is a necessary process of becoming a legitimate member of a particular community of practice, career demands continue to evolve and change over a lifetime (Kolb, 1981). Thus, students' successful entry into a profession and the continued growth thereafter will be greatly enhanced if the educational process gives greater care and attention to the development and integration of all learning modes, the affective, perceptual, symbolic, and behavioral modes of adaptation (Kolb, 1984).

In this section we will review studies examining how learning style information and the experiential learning model have been used to improve teaching and learning in sixteen

different academic fields and professions. From the most recent Bibliography of Research on Experiential Learning (Kolb and Kolb 2005) we reviewed approximately 300 journal articles and books that offered practical recommendations on how to apply experiential learning in their profession or discipline. There are two main streams of application that emerged from those studies. The first stream includes research on the assessment of student learning styles to grasp the nature of the students' individual differences and how it can be used to impact teaching and learning in the classroom. The second stream is related to the design and delivery of courses based on experiential learning model. Typically educators who fall into this category have structured their course goals and activities to fit the four modes of the learning cycle to raise students' awareness to the distinct process involved in each stage of the cycle. We have not included here research that applies ELT and the LSI in web based education. There is a growing body of studies that suggest the importance of understanding the impact of learning style differences in various online learning environments and the usefulness of experiential learning model to examine the effectiveness of learning strategies used by faculty in preparing for the online delivery of instruction (Alon and Cannon, 2000; Bolan, 2003; Broughton, 1998; Garland, 2002; Friedman, 2003; Manochehri, 2001; Minasian-Batmanian, 2002; Oleks, 2004; Terrell and Dringus, 2000). A future study will be devoted to the analysis of the implication of experiential learning in the online environment.

Using Learning Style Information in Teaching and Learning

How can educators use the learning style information to increase teaching effectiveness and maximize student learning? This question can be examined from three distinct and yet inter-related perspectives with significant implication for the improvement of students' overall academic performance, knowledge acquisition and skill development. The first perspective is related to the relationship between the student learning style and the learning environment of a specific academic field and its implication for the overall academic and professional development of their students. The second perspective is associated with the understanding of the students and faculty learning style differences and how this information can be used to implement curricula and instructional methods appropriate to individual's style of learning. The third perspective deals with differences in the student level of academic performance and skill development by learning styles.

Learning Style Differences in Academic Learning Environments

Earlier in the chapter we introduced the concept of learning space to describe the complex and dynamic nature of learning style and its formation through transactions between the person and the environment. The content as well as the learning process that define the nature of this transaction differs significantly among academic disciplines. The learning space configuration of academic disciplines shows variations among their knowledge structure,

technologies and products, criteria for academic excellence and productivity, teaching methods, research methods, and methods for recording and portraying knowledge. Disciplines even show socio-cultural variation-differences in faculty and student demographics, personality and aptitudes, as well as differences in values and group norms. For students, education in an academic field is a continuing process of selection and socialization to the pivotal norms of the field governing criteria for truth and how it is to be achieved, communicated, and used. The result is an educational system that emphasizes specialized learning and development through the accentuation of the student's skills and interests. The student's developmental process is a product of the interaction between his or her choices and socialization experiences in academic disciplines. That is, the student's dispositions lead to the choice of educational experiences that match those dispositions. And the resulting experiences further reinforce the same choice dispositions for later experiences. Over time the socialization and specialization pressures combine to produce increasingly impermeable and homogeneous disciplinary culture and correspondingly specialized student orientations to learning. What is the impact of the specialization process on student performance and learning in a particular field or profession? How does learning style disposition of the students interact with environmental demand of the academic field?

Overall, studies show that student learning style distributions differ significantly by academic fields and within the specific area of specialization of their choice. These findings are congruent with Kolb's (1981) assertion that individuals tend to choose academic fields and careers whose learning environment prizes and nurture their own style of learning. Disciplines of humanities and social sciences are based in the concrete experience and reflective observation, the natural sciences and mathematics in reflective observation and abstract conceptualization, the science based professions in abstract conceptualization and active experimentation. Current research on learning styles and educational specialization shows a similar variation in learning style preferences (Figure 2, Kolb and Kolb 2005c).

Researchers and educators contend that such understanding of the distribution of learning styles in one's field of discipline and sub-specialty is crucial for the improvement of the quality of instructional strategies that respond to the individual needs of the learner as well as the optimal level of competency and performance requirement of each profession (Baker, Simon, and Bazeli, 1986; Bostrom, Olfman, and Sein, 1990; Drew and Ottewill, 1998; Fox and Ronkowski, 1997; Kreber, 2001; Laschinger, 1986; McMurray, 1998; Rosenthal, 1999; Sandmire, Vroman, and Sanders 2000; Sims, 2002, Sims, 1983).

In medicine, for example, several studies report variability in learning styles by medical specialty. In nursing, studies reported a predominant trend of accommodating and diverging learning styles in sample of nurses and nursing students (Christensen, Lee, and Bugg, 1979; Hodges, 1988; Huch, 1981; Johanson, 1987; Laschinger, 1986; Laschinger and Boss, 1984; Laschinger and Boss, 1989; Marcinek, 1983). A study on learning style preferences in anesthesia residents suggest that majority of the students prefer accommodating style of learning (Baker, Wallace, Cooke, Alpert, and Ackerly, 1986; Baker Wallace and Cooke, 1987; Baker, Cooke, Conroy, Bromley, Hollon and Alpert, 1988; and Baker, and Marks, 1981). Sadler, Plovnick, and Snope (1978) found that 40 % of the primary care residents were accommodating learners whereas pharmacy students learning styles as reported by Garvey, Bootman, and McGhan, (1984) indicates that 50% of the students prefer converging mode of learning.

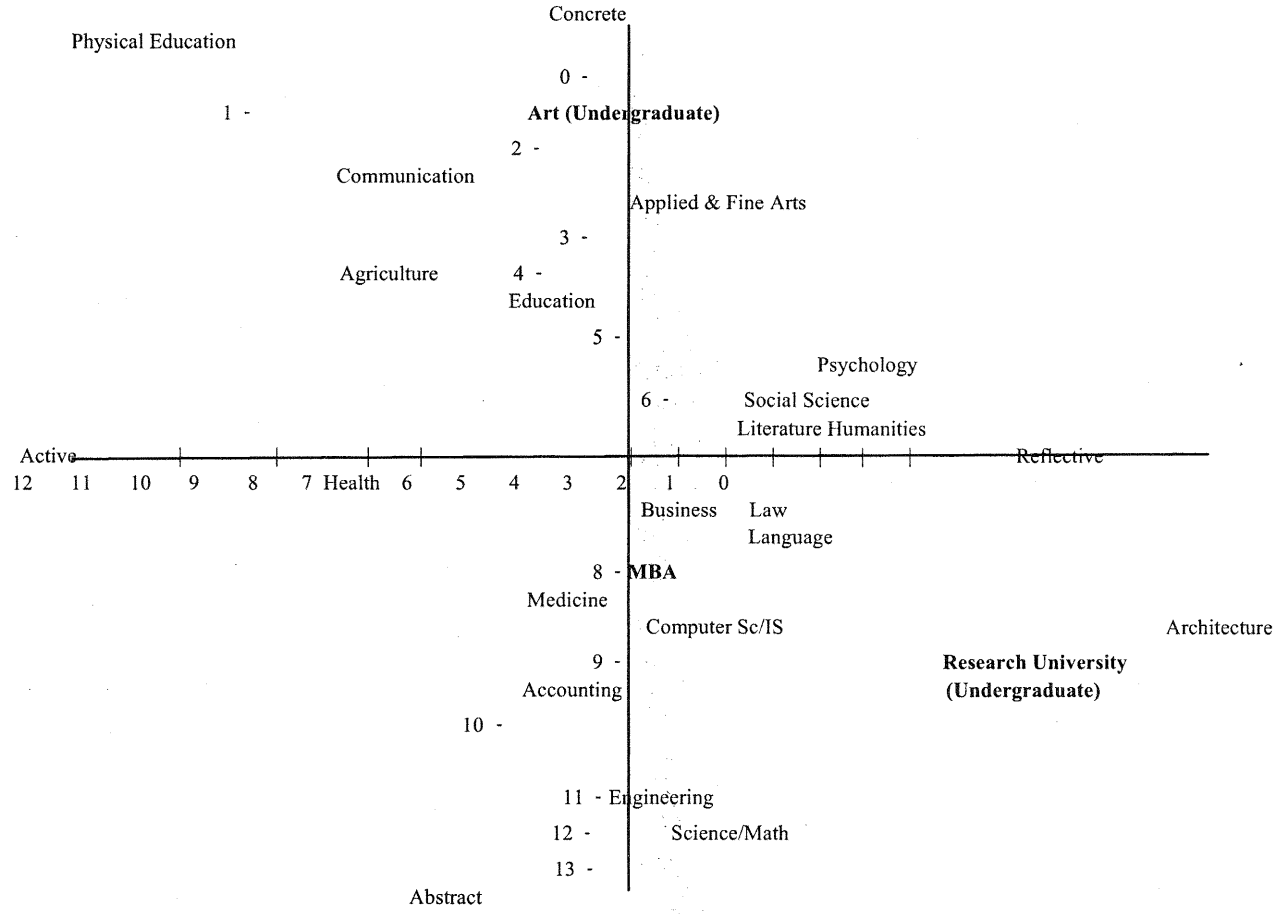


Figure 2. KLSI 3.1 Scores on AC-CE and AE-RO by Educational Specialization (Adapted from: Kolb, A., & Kolb, D. A. (2005). The Kolb Learning Style Inventory 3.1. Technical Specifications. Boston, MA: Hay Resources Direct.)

In the business field, Biberman and Buchanan (1986) found that business majors are evenly distributed among all four learning style types suggesting that business major tend to come from diverse backgrounds. In a similar study, Brown and Burke (1987) found that while accounting majors were evenly distributed across four learning styles, finance majors showed a tendency to prefer abstract mode of learning and marketing majors gravitated toward the concrete. In his study of learning styles of engineering students Wyrick (2003) found that the majority of their students are converging learners.

Nulty and Trigwell (1996) found that student' learning styles also show variation within sub-specialties in academic fields, cautioning that the learning style grouping should not be taken as absolute representation of a particular student population. Their study also suggests that learning styles are related to the stage the students are in their studies. While students in the first third of their studies adopted learning styles that were similar to each other irrespective of the disciplines, learning styles of students in the final third of their studies tended to be related to the learning requirement of their academic major.

There is cross-cultural as well as the disciplinary sub-specialty factors that influence variation in students learning styles in a particular field. In the field of geography for example, Kolb (1984) identified geography students as predominantly of an assimilative learning style, whereas Nulty and Trigwell (1996) found that Australian geography students tend to be predominantly accommodating learners. Bradbeer (1999) found that the British geography students learning style distribution showed a similar pattern of that of Australian students. Healey and Jenkins (2000) suggest that the students learning styles may further vary according to the areas of specialization in geography. Physical geographers would have similar learning styles to the earth and natural scientists (predominantly assimilative learners), while human geographers would have greater similarities with students in the social sciences (predominantly accommodative learners). He further underscores the importance of acknowledging the plurality of approaches that exist in the study of geography today, making it more relevant for students to develop a flexible approach to learning.

The distinct value systems and educational goals of each educational institution also exert significant influence on the differences in students' learning styles. The academic programs and the curricular structures tend to focus on those academic requirements dictated by the larger institutional goals thus increasingly emphasizing one specific mode of learning over others.

In order to investigate the relationship between the ways a major is structured and student outcomes, Ishiyama and Hartlaub (2003) conducted a comparative study of two different political science curricular models at two Universities measured by student learning styles. The results indicate that while there was no statistically significant difference between student learning styles in underclass students, there was a significant difference in mean AC-CE scores among upper-class students between the two universities. Students taking the highly structured, concept-centered political science curriculum at the Truman State University demonstrated higher abstract reasoning skills than did students enrolled in the flexible, more content-oriented major at Frostburg State University. The authors suggest that Truman State program better facilitates the academic requirements recommended by Association of American College and University (AACU) to promote abstract reasoning skills and critical thinking skills necessary for the rigors of professional and graduate education than the flexible curriculum structure at Frostburg State.

In a cross-cultural comparison of learning styles of undergraduate business students between the US, India, and Korea, Jaju, Hyokjin, and Zinkhan (2002) found that US students prefer the diverging mode of learning, whereas Indian students prefer the converging mode of learning and Korean students assimilating mode of learning. As the demand of the global business world becomes increasingly diverse and complex, this study reflects the need for creation of business curricula, instructional design, and teaching methods that prepare diverse students to meet the demand of an ever-changing global business environment.

FACULTY AND STUDENT LEARNING STYLE DIFFERENCES

How do faculty and student learning style differences impact students' overall learning outcomes? Studies from diverse fields indicate that educators need to adapt their teaching styles and instructional methods to facilitate the learning process by offering a variety of learning opportunities appropriate to different student learning styles and to different subject matters (Baker, Simon, and Bazeli, 1986; Buch and Bartley, 2002; Cartney, 2000).

Several studies report the impact of incongruent learning styles among faculty and student in learning situations. In their study of learning style differences among pediatric residents and faculty, Kosower and Berman (1996) found that that while most residents preferred accommodating or diverging styles (81%) most faculty preferred either converging or assimilating learning strategies (73%). A longitudinal study comparing undergraduate nursing students' learning styles and faculty learning styles reports similar results: nursing students preferred concrete thinking (59%) over abstract thinking (41%), however, their faculty preferred abstract thinking (82%) over concrete thinking (18%) (Kalsbeek, 1989).

Kruzich, Friesen, and Soest (1986) conducted a study of student and faculty learning styles in social work at two universities and two private colleges and found significant learning style differences among undergraduate students, graduate students, field instructors, and social work faculty. Overall, faculty most often had converging learning styles whereas the majority of graduate students and field instructors were diverging learners. The undergraduate students were mostly accommodating learners, suggesting preference for action.

In a similar study conducted in the field of social work, Raschick, Mypole, and Day (1998) found that students whose learning styles were similar to their field supervisors along the active experimentation-reflective observation continuum would rate their field experience with them higher. The authors suggest that the finding is most relevant for the supervisors at the beginning point of the learning cycle, when matching their teaching techniques to their students' preferences presents with added benefits to encourage students to move through the rest of the learning cycle.

In their study of differences and similarities of perception of learning among internal medicine residents and faculty, White and Anderson (1995) found that one of the restraining factors that prevented learning from occurring was related to the discrepancies in what residents and faculty perceived to be the most relevant aspect of the learning process. In most situations, faculty tended to focus on abstract and reflective modes of the learning process while residents emphasized the concrete mode of learning.

Sadler, Plovnick, and Snope (1978) report some of the difficulties of teaching in an environment in which the learning style of the faculty and the students differ. Their study suggests that faced with such a situation, instructors may be required to use instructional methods valuable to the students but not necessarily appealing or intellectually rewarding to the instructors themselves.

To help students deal with difficulties caused by faculty/student learning style differences, John Reese at the University of Denver Law School conducts "Connecting with the professor" workshops in which students select one of four teaching styles based on the four predominant learning styles that they have difficulty connecting with. The workshop gives multiple examples of remedial actions that the learner may take to correct the misconnection created by differences in teaching/learning styles. Peer group discussions among law students give an opportunity to create new ideas about how to get the most from professors with different learning/teaching styles (Reese, 1998).

Concerning whether faculty member are capable of learning to teach in ways that are incongruent with their own learning styles, Kosower and Berman (1996) argues that, "because we all engage in all of the strategies to some degree, it seems to be more a matter of willingness to learn rather than ability."(Kosower 1996: 217) Baker, Simon, and Bazeli (1987) contend that teaching is an art requiring the instructor to select from among a wide variety of instructional strategies to reach students with a diversity of learning preferences.

One of the core underlying principles of experiential learning is the active roles students play in the entire learning process. As the students' roles become an integral part of the education and the learning environment more student-centered, there is also a substantial shift in the roles instructors play in the experiential classrooms. While such a shift will ultimately benefit both teachers and the students in the forms of increased teaching effectiveness and learning outcomes, it require instructors to re-evaluate their attitudes and behaviors as well as their long held pedagogical stance toward teaching and learning. Studies indicate that challenges may come in many different forms.

Harrelson and Leaver-Dunn (2002) suggest that experiential learning requires that teachers assume a facilitator mind set, which might be a difficult mind-set for some. Lipshitz (1983) underscores the complexity of the role of an experiential teacher who needs to have a firm grasp of the relevant conceptual material, and develop sensitivity and skill in managing students' emotional reactions to the learning process.

McGoldrick, Battle and Gallagher (2000) indicate that the less control instructors exert on the students' experiences the more effective the learning outcome will be. However, instructors may run the risk of losing control over course structure as well as failing to keep the learning activities bounded within a specific time frame. Most of the risks associated with the experiential method, contend the authors, can be mitigated through careful planning, unambiguous course structure, establishing of clear expectations and firm deadlines for each class activity. Furthermore, students will have differing level of interest as well as difficulties with certain stages of the learning cycle. It is incumbent upon the instructor to grasp the diverse needs of the students and be aware of the challenges certain students will face in the various phases of the cycle. Students may also react to the shifting role of the instructors in the experiential classrooms from that of a knowledge purveyor to one that creates the learning environment and facilitated the holistic learning process. For example, November (1997) describes how difficult it was for many of his students to accept that he had a different role:

I had stopped using the textbook. Instead I used lecture time for looking at common problems or for experiential activities. Rather than being the fount of knowledge who dispensed what needed to be learned to get through this course, I had become a 'reaming facilitator.' I created the situations from which students could learn if they wished. Some students did not see it this way, particularly in the early weeks of struggle, and they did not keep their views to themselves. Here is a quotation about me from one of the journals:

This lecturer is a sadistic bastard. (N.M.) (November 1997: 293)

The following case study illustrates how instructors can adjust their teaching style to match the students' individual learning preferences. The case study is based on the instructor's experience using the knowledge of learning style in a small group teaching and clinical supervision conducted in a primary care internal medicine residency program in the University of Minnesota (Leonard and Harris, 1979). The case is presented as a series of vignettes describing faculty-resident interaction in a clinical session. Each vignette as described by the first author of this study is illustrative of how a particular pattern of interaction is influenced by resident clinician's learning style preference and how learning can be enhanced or hindered as a function of faculty response to each learner's preferred mode of learning. What follows is a sample vignette that illustrates the author's interaction with a student of an assimilating learning style:

LEARNING STYLE OF THE ASSIMILATOR

In the middle of a case presentation by a resident, Dr. L. R. interjects a question: "What was the serum alkaline phosphatase level?" "It was 135 units," replies the presenter. Then, silence...fidgeting...the "smell" of unresolved tension in the air with blank and questioning facial expressions evident. Nothing else happens. The presenter resumes. After rounds were over, I asked Dr. L. R. why he asked that question. He said that he'd thought, after the first few minutes of presentation, that the patient had ascending cholangitis, and he wanted the laboratory results to substantiate his theory. The teacher can capitalize on these questions by explicitly asking the questioner why he or she asked for these results. Kolb suggested that, in facts vs. theory arguments, the accommodator discards theories that are not supported by the facts. The assimilator behaves in the opposite manner. Dr. L.R., an assimilator, has hypothesized a theory early in the presentation and he was most likely assessing each fact to see if it matched his theory; if not, "out it goes." He saw a possible relationship between his hypothesis concerning the resolution of the problem and the serum alkaline phosphate level; hence, his question. Analytical and reflective learners, such as Dr. L. R., tend not to feel the need, voluntarily, to do anything more than ask the question in the manner stated here. They tend not to immediately and explicitly divulge to the group the rationale for their questions or the conclusions to which the response lead them.

How can the instructor or other members of the group handle such questions for maximum learning? I've observed that, although group members may be confused by the seemingly irrelevant question and the questioner's lack of response, they tend not to solicit the motive for the question for fear of appearing to ask a "dumb question." The instructor can, in fact, explicitly ask the assimilator to share with the group the reasons for his questions and the process of inquiry to which they are contributing, so that the entire group can benefit from

the assimilator's strength, which is analysis. If the instructor consistently uses this strategy, three payoffs are likely to result, as follows: (1) other group members will begin to do the same when these questions arise; (2) the questioners begin to voluntarily prefer or follow their remarks with explanations; and (3) the instructor can more effectively use the assimilator's comments to assess strengths and deficiencies and to diagnose problems.

As the case exemplifies, the knowledge of learning style can be effectively used to recognize distinct patterns of behaviors, attitudes, and reactions learners exhibit in a given learning context and flex one's teaching approach to fit the learner's immediate learning needs. It is also important to point out that in his clinical session, the instructor has been equally effective in creating learning situations in which the student can function within the safety of his preferred learning mode but also challenged to recognize the weaknesses associated with his learning styles.

This case study brings us to the subject of matching instructional methods to students' learning styles. What are the key factors to consider in matching instructional strategies and learning styles? ELT posits that effective learners are able to flex their learning styles according to the demand of different learning tasks. To the extent that the individual learning preferences are respected and recognized, it is also important for the students to be exposed to diverse learning situations where their abilities and competencies can be stretched beyond the comfort of their preferred learning modes.

Some studies suggest that the identification of learning strategies best suited for different learning styles may increase the learning effectiveness of each individual student and conversely, increase students' adaptive flexibility to alter their learning styles to respond to the learning demand of a specific environment (Brenenstuhl and Catanello, 1979; Curry, 1999; Fritzsche, 1977; Lynch, Woelfl, Steele, and Hansen, 1998).

The important consideration for experiential educators is to recognize the dialectical nature of the learning process regardless of the situations in which the learning takes place. As previously mentioned, understanding individual learning styles can be considered as the entry point through which learners enter a particular learning space and continue to actively move around the space toward acquiring increasingly complex knowledge and skills and capacity to adapt to the demand of a given learning environment. Several studies suggest that in fact students shift their learning strategies to match the learning demands of a particular discipline (Cornett, 1983; Entwistle, 1981; Kolb, 1984; Ornstein, 1977).

Jones, Reichard, and Mokhtari (2003) examined the extent to which community college students' learning style preferences vary as a function of discipline. They found significant differences in students' learning style preference across four different subject-area disciplines: English, math, science, and social studies. The results indicate that 83% of the 103 participants switched learning styles for two or more disciplines suggesting that students are capable of flexing their learning strategies to respond to the discipline specific learning requirements.

Stutsky and Lashinger (1995) examined the effect of the preceptorship experience on the learning styles, adaptive competencies, and environmental press perception of senior baccalaureate nursing students to investigate the nature of learning style/learning environment interaction in nursing education. The results, according to the authors, support Kolb's (1984) assertion that an effective learner is able to apply skills from each of the learning modes in whatever combination the learning is required. The study also suggests that students' successful learning experience is dependent upon careful design and selection of instructional

strategies that allow them to demonstrate mastery of knowledge and skills associated with each learning mode.

Lengnick-Hall and Sanders (1997) designed a learning system in the graduate and undergraduate level management courses structured around the learning cycle to give students a variety of ways to master each segment of the course material. Results indicate that despite the wide variety in their learning styles, experiences, academic levels, and interests, students demonstrated consistently high levels of personal effectiveness, organizational effectiveness, ability to apply course materials, and satisfaction with both course results and learning process. The study also showed learning style differences in student ratings of various outcome measures; divergent learners rated their personal effectiveness higher than the non-divergent learners, while assimilating learners rated the lowest on the same outcome measure. Converging learners on the other hand, rated their ability to apply course material significantly higher than did the non-converging learners, an indication of their tendency to seek out opportunities to apply what they have learned. Looking at the positive learning outcomes generated by the courses, the authors contend that high–quality learning systems are the ones in which extensive individual differences are matched with a variety of options in learning methods thus creating opportunities for student behavioral, emotional, and intellectual transformation of a lasting impact.

LEARNING STYLES, ACADEMIC PERFORMANCE, AND SKILL DEVELOPMENT

The studies reviewed thus far indicate that the diverse learning style composition of students in any given learning environment suggests a need for an equally diverse learning processes and strategies for the successful acquisition of knowledge and skills. In the studies that follow, researchers found that there are learning style differences in student performance outcomes associated with various learning strategies, highlighting the importance of understanding learning style information to effectively evaluate the level and quality of student acquisition of knowledge and various skills.

Lynch, Woelfl, Steele and Hanssen (1998) explored the relationship between learning style and three different academic performance measures in a third-year surgery clerkship in a medical school. Two cohorts of third-year medical students were asked to take United States Medical Licensing Examination step1 (USMLE 1), the National Board of Medical Examiners (NBME), and NBME computer-based case simulations (CBX). The USMLE 1 and NBME subject examination rely on a single best answer, multiple-choice question format to assess performance, whereas CBX is a complex computer simulation intended to measure clinical management skills:

Of the 227 participants in the study, 102(45%) were converging learners, 59(26%) assimilating, 48(21%) accommodating, and 18(8%) were diverging learners. The result indicates that converging and assimilating learners scored significantly higher on the two multiple–choice performance measures, the USMLE 1 and the NBME surgical examination, whereas no learning style difference was found on the CBX computer simulation. The authors concluded that the results support Kolb's (1984) and Newland's (1992) assertion that converging and assimilating learners may have a performance advantage on objective, single-

best answer multiple choice examination. They also concluded that the absence of relationship between learning style and the CBX simulation suggests that multiple choice examination and clinical case simulations measure different capabilities and achievements. Clinical management may require not only an abstract orientation supporting the acquisition, organization, and synthesis of preclinical basic science data, but also a concrete orientation such as pattern recognition and instinct. The data demonstrate the importance of evaluating learning outcomes by applying more than one type of examination format. Multiple-choice examinations favor abstract learners, however, clinical performance requires additional cognitive skills and abilities, and behaviors that are not adequately reflected in objective measures of performance.

Brenenstuhl and Catalanello (1979) conducted a study to investigate the association between the learning style and measures of academic performance within three distinct laboratory learning environments in a management course: discussion group, experiential, and simulation methods of instruction. Approximately 500 college juniors and seniors participated in the study and all students were evaluated using 11 traditional testing instruments regardless of laboratory section types. The study results indicate that in experiential sections, converging learners outperformed the three other learning styles on all eleven measurement categories, whereas in simulation sections accommodating learners did better than the rest of the learning styles on eight categories. In the discussion section, convergent learners were outperformed by the rest of the learning styles on all measurements except for one category.

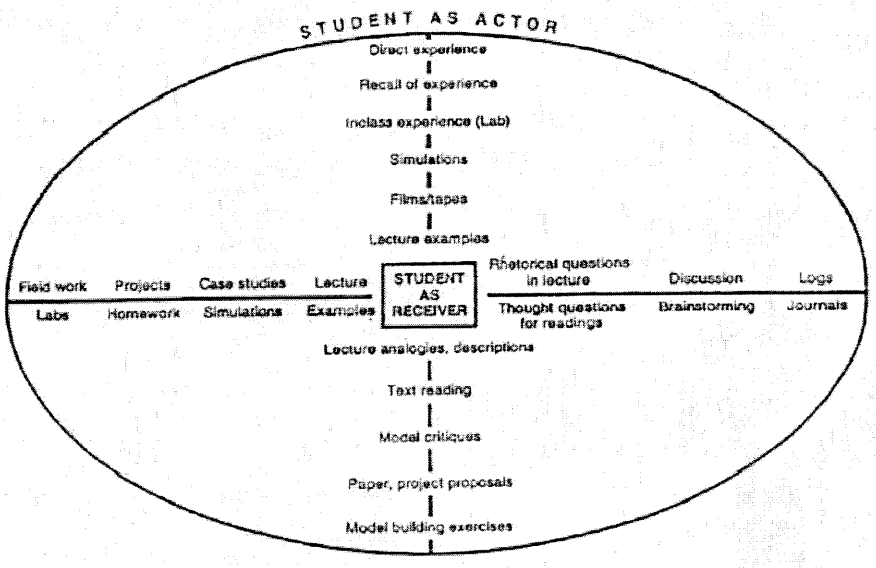
Oughton and Reed (2000) measured the relationship between graduate students' learning styles and performance outcome in a hypermedia environment in which students are required to structurally map out the acquired knowledge and grasp the interrelationships among various ideas and concepts. The results show that assimilating and diverging learners were the most productive on their concept maps. This result, concluded the authors, can be attributed to the common traits shared by the two learning styles: the ability to see many perspectives and the ability to generate many ideas.

Holley and Jenkins (1993) examined the relationship between accounting students learning styles and performance on four different accounting examination formats: multiple choice theory, quantitative multiple-choice, open-ended theory, and quantitative open-ended. The results indicated that there was a significant performance difference by learning style for all but the quantitative multiple choice format. Active students performed significantly better on multiple choice theory and open-ended quantitative formats. Abstract students performed significantly better on open-ended theory format. The authors concluded that learning style may influence different levels of performance associated with exam format, therefore learning style differences and performance cannot be generalized for similar subject if the assessment format varies.

Overall, studies suggest that the relationship of learning style with academic performance appears to be determined by the way learning is assessed. The implication of this finding is particularly significant in experiential learning classrooms where several learning strategies are used to target acquisition of skills associated with four different learning modes. In such learning environments, a multidimensional assessment is necessary to adequately evaluate students' overall competency and performance levels. For example, while single answer multiple-choice test format may be suited to measure analytical skills, a simulation format is more adequate to evaluate competencies and capabilities that require pattern recognition skills, organization skills, and synthetic skills.

THE EXPERIENTIAL LEARNING MODEL AS A GUIDE FOR CURRICULUM DEVELOPMENT

For the past three decades, educators have utilized experiential learning as a guide to design new curriculum and instructional strategies that best serve the purpose of teaching and learning in their disciplines. While scholars and educators point to the success of the experiential learning approach to improve academic performance and skill acquisition, they also note that there are challenges associated with adoption and implementation of experiential methods in the classrooms. Most frequently encountered challenges are associated with the integration of experiential learning methods into the instructors' current teaching strategies and practices (Hickcox, 2002). Experiential learning methods require that teachers devote equal attention and care to the content taught and to the learning process involved in the acquisition of various knowledge and skills. As a consequence, in comparison to a more traditional course format, experiential learning methods require a considerable amount of time and commitment in preparation of courses. They may also require smaller class sizes in order to deliver various experiential activities, and they call for a holistic assessment method that adequately evaluates all facets of student learning experiences (Mellor, 1991; Sprau, 2001).

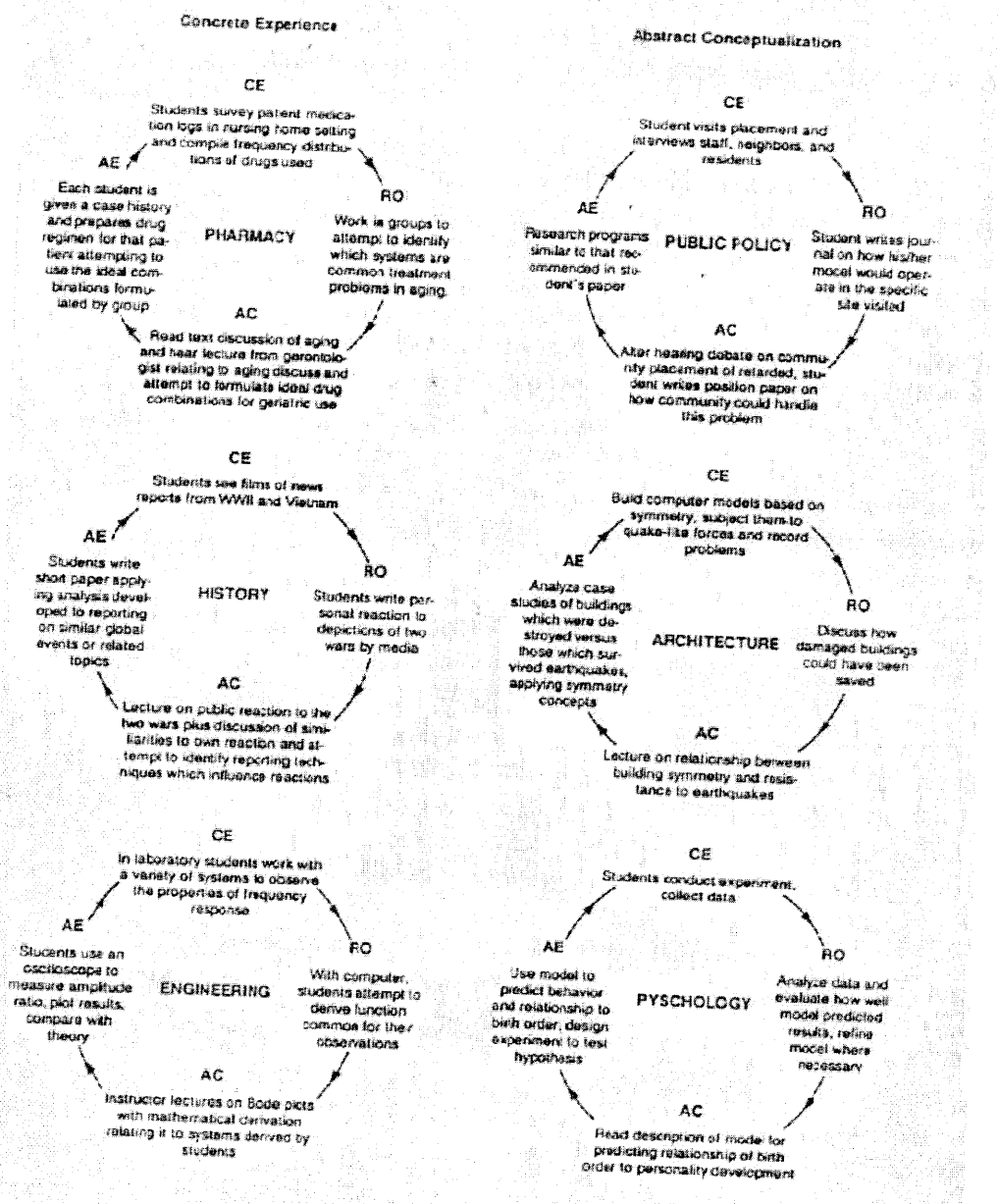


Adapted from: Svinick, M. D., & Dixon, N. M. (1987). The Kolb model modified for classroom activities. *College Teaching, 35*(4), 141-146.

Figure 3. Degree of direct student involvement in various teaching methods

In 1987, Svinicki and Dixon published an influential paper describing a comprehensive instructional model to deal with the constraints and challenges instructors and students encounter in the face of adopting experiential learning as the instructional design framework. The authors' contribution to the application of experiential learning in classrooms is

significant in at least three important ways. First, it offers an instructional design model that incorporates a broad range of classroom activities that leads students through the full cycle of learning, thus giving instructors a rich array of instructional choices as well as the benefit of offering students a more complete learning experience gained from multiple perspectives (Figure 3).



Adapted from: Svinick, M. D., & Dixon, N. M. (1987). The Kolb model modified for classroom activities. *College Teaching, 35*(4), 141-146.

Figure 4. Sample instructional sequences

Second, it broadens the scope of application of experiential activities to a wide range of academic fields by illustrating possible course design options suited to the learning objectives of different disciplines (Figure 4). Third, it offers a useful model that responds to one of the key challenges of the experiential methods: the understanding of the role of the student in the learning process. As the model in figure 3 suggests, instructors are able to design their classroom activities based upon how much student involvement would be appropriate given the time constraint most instructors face. Activities at the outer rim of the learning cycle allows for a greater student involvement, while those close to the center involve limited student participation.

The Svinick and Dixon instructional model serves as an integrative framework for application of experiential learning methods in different academic learning environments. As we will discuss later in the section, the model has been successfully applied in various academic fields such as Geography (Healey and Jenkins, 2000), Theatre (Grassler, 2002), and Political Science (Brock and Cameron, 1999) and affords instructors great flexibility in designing courses based on the specific educational goals, knowledge and skill demand of their academic disciplines.

In this section we review case studies of experiential learning methods applied in sixteen different professions and academic disciplines in higher education. The studies reported here cover a broad range of applications of experiential learning models in various educational settings. Some educators have conducted an experimental design study comparing the effectiveness of the experiential learning method with a more traditional course format, whereas others have developed and implemented an assessment method of teacher-student interaction in a particular experiential learning setting. While instructional strategies and methods were designed to fit the academic requirement within a specific field, many of the experiential activities reported in the studies can be broadly applied to different fields with adequate modifications.

ACCOUNTING

Siegel, Khursheed and Agrawal (1997) conducted a controlled field experiment to test the effectiveness of video simulation as a way to integrate experiential learning theory in the teaching of auditing in their accounting course. The videotape used in the experiment followed the principles of experiential learning in teaching the fundamental steps in auditing.

The experiment involved four sections of an undergraduate course in auditing. Two sections were used as control groups and the other two as the experimental group. The instructor presented the videotapes at various times during the semester to the experimental group while no videotape presentation was made to the control group. Both groups were given identical assignments, problems, and lecture material covering audit procedures and concepts. The results of the experiment indicated significantly higher examination scores for the experimental groups supporting the value of experiential learning for improving effectiveness in teaching auditing.

Specht (1991) examined the effect of an experiential learning method in student learning in an undergraduate accounting course compared to another class conducted using a traditional lecture method. The results were measured by quizzes in both classes to compare

the students' knowledge of concepts, both specific and general, directly after the class and 6 weeks after the learning activities have taken place. The results revealed no significant differences in short-term learning between the two course formats; however, the experiential class demonstrated retention of knowledge over a 6-week period whereas a significant decrease in the scores of the lecture class was observed. The authors concluded students in the experiential learning classroom may have formed a better understanding of the concepts thus successfully retaining knowledge better than students in the lecture class.

In applying experiential learning in his accounting course Umapathy (1985) underscores the importance of the role of the experiential instructor for a successful adoption and implementation of experiential learning curricula. Experiential exercises have proven to be effective in generating considerable student involvement and participation in the learning process with increased student capacity to retain knowledge for a longer period of time. However, for the experiential curricula to be effective the instructors need to be properly trained in the design and delivery of the experiential activities if both instructors and students are to benefit from the experience.

Business Management

Certo (1976) designed a series of experiential training activities for an undergraduate management course based on the four dimensions of the learning cycle. In conducting those activities, the instructor assumed the role of an experiential facilitator by "encouraging high levels of student participation; creating a learning environment conducive to learn new behaviors; providing theoretical clarification; and emphasizing both content and process" (Certo 1976: 22). In a later study he further articulates the value of experiential learning as a methodology of education that focuses on the whole person and emphasizes the critical role of the facilitator as an active experiential instructor who blends with a proper balance of experience, reflection, conceptualization, and action in the classroom activities (Certo, 1977).

In order to respond to mounting criticism of the inadequacy of business education Sims and Sauser (1985) proposed experiential learning model as a theoretical basis to design management curricula intended to develop managerial competencies in business students. The authors offer seven core principles that need to be in place if such curricula are to be successfully implemented: 1) ability to face new situations and problems; 2) emphasis on both theory and practice; 3) opportunity to have a direct managerial experience; 4) relevant and reliable assessment methods; 5) effective feedback; 6) increased self-knowledge; and 7) reflection and integration as a key final step in the acquisition of competency. In designing his organizational communication course, Pace (1977) emphasizes the relevance of experiential pedagogy that gives primacy to learners' experience, action, and opportunity for the students to test out their newly learned concepts and theories.

In his organizational behavior course McMullan and Cahoon (1979) applied Kolb's (1971) experience–based learning evaluation instrument. The Personal Application Memo (PAM) was designed to raise student awareness of the distinct learning process involved at each step of the learning cycle. For example, students often have difficulty in differentiating objective experiences from personal reactions to those experiences. Similarly, individual's tendency to focus only on personally useful concepts makes it difficult for students to

discriminate between abstract conceptualization and active experimentation in a given situation. By discriminating between the abstract conceptualizing and the active experimentation students will be forced to clarify the implicit assumptions and values that guide their actions. The PAM requires students to rigorously evaluate their own learning process and encourage behavioral patterns that lead to meaningful and purposeful actions. Such rigorous examination of one's learning process was foreign to most of the students and consequently frustrating to many. PAM activities made the familiar and obvious way of learning uncertain and problematic for most of them. As the authors suggest, "such a situation is ripe for learning, challenging students to move beyond the safety of their predictable and familiar ways of learning" (McMillan and Cahon, 1979: 457).

Lipshitz (1983) designed and implemented an experiential behavioral science course in the Israeli Military Academy focused on the development of problem-solving, decision-making, and crisis-management in their officers. The aims was to use the experiential learning model to counter the organizational environment of the Israeli Defense Force characterized by overall, "lack of proper training, job pressures such as uncertainty and overload, competitiveness coupled with high regard for results, preference of action coupled with dislike of reflection, and preference for the concrete coupled with distrust of the abstract" (Lipshitz 1983: 125). A key finding of the experiential course was that the success of the course was largely a function of the instructor, as students' reactions ranged from enthusiasm to deep disappointment. The instructors skilled in integrating the content of the course and the learning process were able to generate a high level of satisfaction and achievement in their students. In those successful courses, there was a shift from student tendency to analyze a case study purely in terms of its outcome to a more careful and thoughtful attention given to the problem solving and decision making process embedded in the case.

Gopinah and Sawyer (1999) developed a computer-based enterprise simulation based on experiential learning in a business course to bridge the gap between knowledge and its application in the business world. The results of the simulation show that the recursive nature of experiential learning promotes strategic decision-making and group behavior consistent with long-term strategy.

MARKETING

Dissatisfied with the application of experiential methods in the business classrooms, Dyer and Schumann (1993) developed an experiential learning laboratory classroom applied to their marketing course:

> We believe that, to date, the application of experiential methods in the business classroom has frequently been incomplete and has therefore diluted the promise of experiential process. Educators have spent their time "parroting" the instructional approaches of other teachers rather than "partnering" experience and knowledge as intended by experiential learning models and the traditional laboratory method. (Dyer and Schumann 1993: 32)

Table 1. Knowledge/Experience Integration Learning Model: An Advertising Promotion Application

Level	Knowledge	Experience	Integration
Level1: first cycle	Lecture: Financial end of advertising. Feedback: Class discussion, office hours, case evaluation.	Case study: Budgeting focus, Cable News Network.	Combining preexisting knowledge and experience with new knowledge/experience Level 1
Level 2: second cycle	Lecture: Targeting/market communications. Feedback: Class discussion, office hours, project evaluation.	Project: Segmentation.	Combining Level 1 and Level 2
Level 3: third cycle	Lecture: Targeting/market communication. Feedback: Class discussion, office hours, case evaluation.	Case study: Targeting focus, Phoenix Suns.	Combining Level 2 and Level 3
Level 4: fourth cycle	Lecture: Motivation/processing of communications. Feedback: Class discussion, office hours, project evaluation.	Project: Fisher Price Purchaser/User Simulation.	Combining Level 3 and 4
Level 5: fifth cycle	Lecture: Motivation/processing of communications. Feedback: Class discussion, office hours, case evaluation.	Case study: Assessment focus, Outward Bound.	Combining Level 4 and 5
Level 6: sixth cycle	Lecture: Promotion. Feedback: Class discussion, office hours, project evaluation.	Project: Strategic application exercise.	Combining Level 5 and 6
Level 7: seventh cycle	Lecture: Media. Feedback: Class discussion, office hours, case evaluation.	Case Study: media selection, Heinz Ketchup.	Combining Level 6 and 7
Level 8: eight cycle	Lecture: Advertising research. Feedback: Class discussion, office hours, project evaluation.	Project: Promotion effectiveness interviews with retailers and practitioner researchers.	Combining Level 7 and 8
Level 9: ninth cycle	Lecture: Consumer issues. Feedback: Class discussion, office hours, project evaluation.	Project: Client advertising plan.	Combining of all previous levels with level 9.

Adapted from: Dyer, B. and Schumann, D. W. (1993). Partnering knowledge and experience: The business classroom as laboratory. *Marketing Education Review*. 3: 32-39.

In order to create a true laboratory experience in marketing classrooms, the authors developed the Knowledge/Experience Integration Learning Model (table 1) in the senior-level marketing advertising/promotion class. In this class, the text assignments and lectures were integrated with experiences generated from two types of learning tasks, multiple group projects and multiple individual case studies. The traditional performance evaluations (multiple choice and essay exams) were eliminated altogether to give central focus on the recursive cycle of lecture, discussion, feedback, and hands on experiences. At the completion of the course students reported increased level of critical thinking abilities and capacity to apply and connect theoretical knowledge with real-life business application.

EDUCATION

As part of a counseling curriculum, Pelsma and Borgers (1986) developed an experience-based ethics course around the experiential learning cycle with focus on the "how" rather than "what" of learning. The authors suggest that the emphasis on four modes of the cycle promotes learning and development of skills for a responsible, ethical reasoning. McGlinn (2003) used the experiential learning cycle in the teacher education program emphasizing the reflective component of the cycle to overcome students' lack of reflection on their teaching. The author claims that the experiential learning model is effective in promoting change and development in students' self-knowledge about their teaching practices by providing time for reflection. Similarly, Hatcher and Bringle (1997) report the effectiveness of the learning cycle to design reflection activities in the service learning settings. Sugarman (1995) promotes the usefulness of the experiential learning model for curriculum planning, implementation, and evaluation in the counseling field. The experiential learning framework, the author contends, helps students expand their repertoire of learning skills thorough the conceptualization of the total learning process.

NURSING

Stienborg, Zaldivar and Santiago (1996) conducted a pre-test post-test quasi-experimental design study to assess the comparative effectiveness of didactic teaching and experiential learning in HIV/AIDS training for nursing students in the Philippines. The program focused on improvement of the HIV/AIDS knowledge levels and attitudinal change toward HIV/AIDS patients. The authors hypothesized that experiential learning would yield significantly higher knowledge levels and favorable attitude changes in the students than didactic teaching. Three groups of nursing students participated in the study: the first group received didactic teaching in the form of lectures, while the second group had training with an experiential learning approach. Both groups included participation by a person with HIV/AIDS. The third group served as a control group that did not receive any formal HIV/AIDS training.

Both didactic and the experiential groups covered the same contents including AIDS epidemiology, infection control, socio-ethical issues related to HIV infection, and nursing care of patients in the hospital and community. The didactic group had a 2-hour presentation

by the instructors, followed by a 30-minute Q and A session on the presentation. The session finished with 30 minutes with an AIDS patient. The experiential learning group had the presentation and discussion of a number of short case situations and a number of role-plays with student participation. The session ended with 30 minutes with an AIDS patient.

Knowledge post-test scores indicate that both the didactic and experiential learning approach caused a significant increase in the students' knowledge levels. However, the experiential learning group achieved a significantly higher knowledge level than the didactic group. While both groups reduced fear of attracting HIV (an indication of a positive attitude change), only the experiential learning group showed a consistent positive change on all attitudinal scales.

The authors concluded that the experiential learning approach was more effective than the didactic approach for the knowledge acquisition in five significant ways: first, the problem-posed approach prompted students to get actively involved in the learning process through role-play. Second, it emphasized personal involvement through reflection. Third, the cases reflected the real world and encouraged integration of theory/policy and their practical application. Fourth, the experiential learning session was flexible and learner centered. Fifth, the participation of an AIDS patient formed an integral part of the experiential learning session whereas in the didactic session, the lecture, the question and answer session, and the patient's testimonial were kept as separate parts with no opportunity for integration.

MEDICINE

Cleave-Hogg and Morgan (2002) designed an anaesthesia simulation based on experiential learning for undergraduate medical students. Students reported a high level of satisfaction with the anaesthesia simulation experience based on three grounds: 1) it provides opportunity to activate relevant prior knowledge and raise awareness of the gaps in their knowledge, 2) offers a learning context that closely resembles a real life anaesthesia practice, and 3) provides freedom to integrate their knowledge, to improve their skills and exercise their judgment without endangering a patient. The authors contend that the results of the study support the value of integrating the experiential simulation exercise in the anaesthesia undergraduate curriculum.

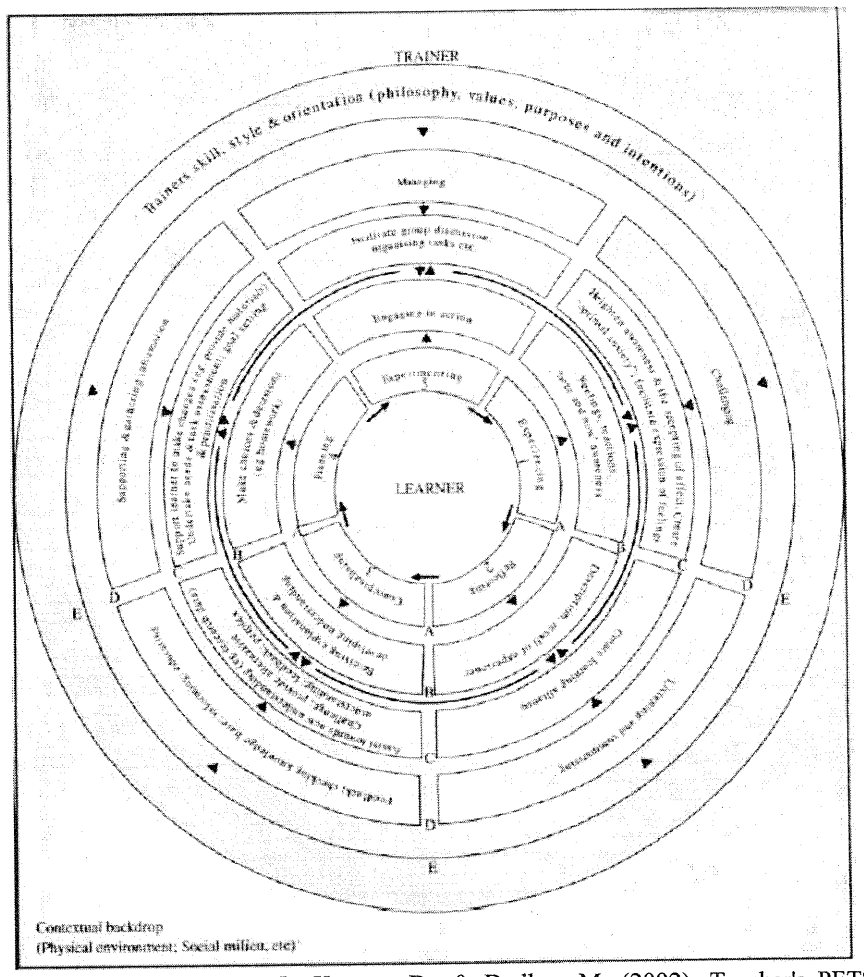
Sandmire and Boyce (2004) investigated the performance of two-person collaborative problem-solving teams in an allied health education anatomy, physiology, and pathology course. They compared a group of high abstract/high concrete student pairs with a group of abstract pairs and a group of concrete pairs. The abstract/concrete pairs performed significantly better on a simulated clinical case than the abstract pairs and slightly better than the concrete pairs, indicating the value of integrating the abstract and concrete dialectics of the learning cycle. However, a similar study by Sandmire, Vroman, and Sanders (2000) investigating pairs formed on the action/reflection dialectic showed no significant performance differences.

PSYCHIATRY

Milne, James, Keegan and Dudley (2002) developed an empirical method of assessing effectiveness of mental health trainers' transaction patterns and their impact on student learning. The instrument, Teacher's PETS (Process Evaluation of Training and Supervision) was derived through operationalization of the experiential learning theory with the main purpose of providing empirically valid and reliable data on the trainers' behaviors during training sessions.

As the model in figure 5 shows, the instrument was designed around four dimensions of the learning cycle and "is an explicitly transactional one in which learners play an essential role in relation to the trainers, who will be at times responsive and at times proactive" (Milne, James, Keegan, and Dudley, 2000: 189) in any given learning situation. The key feature of the model, the authors suggest, is the fluid, dynamic transactions that occurs between the levels of the model as learners move backward and forwards between different learning modes, and trainers using several methods to move the learner on to a new mode of the experiential learning cycle.

The study was conducted to assess one trainer's performance in an 8-day in service workshop on psychosocial interventions for severe mental illness held at psychiatric hospital in UK. Participants of the workshop were 31 mental health professionals who were allocated to two different training groups. The workshops lasted for three months, and were scheduled in four blocks of 2 days each. There was a 2-month interval between the workshops that were attended by the two groups. The study was conducted in three distinct phases: a baseline phase where the workshop leader served as his own control, the intervention phase consisted of consultancy where the leader received feedback on his performance based on the PETS instrument followed by discussion and modeling of alternative teaching techniques, and finally, the maintenance phase where the consultancy was withdrawn from the training session. The workshop was video-recorded for the duration of the study. A random selection of segments of the training was analyzed using PETS. Four baseline sample sessions, followed by two from intervention, and one from the maintenance period were selected for analysis. The relevant behaviors of the trainers and the participants were coded from the tapes. The results of the study indicate that during the baseline phase, the observed teaching method was primarily didactic in nature and accounted for the greatest impact (46.4%) on learner behavior in the reflection mode of the learning cycle, followed by smaller overall impacts on the remaining phases of the cycle (range from means of 12.2% for abstract conceptualization to 5.7% for active experimentation). In the intervention phase by contrast, the greatest impact of the trainer's behavior on learners' was on the concrete experience (59. 5%), followed by reflective observation (33%), and active experimentation (4.5%) phases of the learning cycle.



Adapted from: Milne, D., James, I., Keegan, D., & Dudley, M. (2002). Teacher's PETS: a new observational measure of experiential training interactions. *Clinical Psychology and Psychotherapy, 9*, 187-199.

Figure 5. Experiential learning model of effective training

The authors conclude that the intervention phase produced trainer's behaviors that promote learners' ability to take advantage of the full range of the experiential learning cycle thus maximizing their learning outcomes. Finally, PETS yielded a good inter-rater reliability as well as adequate empirical and concurrent validity indicating its effectiveness as an observational instrument in educational settings. As such, PETS serves as an exemplary model for assessing and enhancing trainers' skills in mastering experiential learning methods that is applicable in diverse teaching and training situations.

ENGINEERING

In order to revitalize the engineering education, in 1989 the College of Engineering and Technology at Brigham Young University initiated a faculty training program based on the

experiential learning model (Harb, Terry, Hurt, and Williamson, 1995). Volunteer faculty members were introduced to the concepts of the experiential learning model and methods of teaching to four different learning modes and asked to implement experiential methods in their courses. Volunteers were encouraged to visit each others classes, individual teaching was videotaped for a later review, and follow up support was offered through peer discussions about the successes and problems encountered in their teaching. The benefits of the program have been many. Several faculty members redesigned their courses to reach the full spectrum of the experiential learning cycle using a variety of teaching strategies. Furthermore, there was a renewed interest and enthusiasm toward teaching throughout the engineering school and students responded positively to the new learning strategies used.

The School of Engineering at Murdoch University, Australia decided to include a section on 'understanding your learning styles' in the newly developed Foundation units in the first year with the aim of empowering the students in their pursuit of the university and life long learning requirements. Due to the broad interdisciplinary nature of the Foundation units, the school decided that students needed to master some fundamental meta-cognitive skills to succeed in various courses (Fowler, McGill, Armarego, and Allen, 2002).

Several engineering scholars have criticized the inadequacy of the engineering education environment for student learning and development (Astin 1993; Felder, Woods, Stice, and Rugarcia 2000; Rugarcia, Felder, Woods, and Stice 2000; Wulf, 1998). For example, Stice (1987) argues that the low knowledge retention rate of the engineering students can be attributed to the ineffective teaching methods used by most faculty in the engineering courses. The most frequently used teaching methods rely heavily on abstract ideas and concepts without providing opportunities to test the practical value of a theory. As an alternative teaching strategy, the author designed a mathematics course on differential equations to use all four stages of the learning cycle beginning with lecture (RO); followed by the students' thinking about the ideas presented (AC); completing homework assignment (AE); and closing the cycle with demonstration (CE). At the end of the experiment Stice concluded, "the rewards are sizeable: students learn more and derive intellectual satisfaction from the experience" (Stice, 1987: 296).

Engineering educators have also paid close attention to the impact of dialectical tension created by the diverse learning style composition of the student teams and have capitalized on the differences to broaden students' skill levels and competencies associated with learning in teams. Halstead and Martin (2002) found that engineering student teams that were formed randomly to include all learning styles performed better than self-selected teams. Furthermore, in her studies of engineering students, Sharp stated, "Classroom experience shows that students can improve teamwork skills with Kolb theory by recognizing and capitalizing on their strengths, respecting all styles, sending messages in various ways, and analyzing style differences to resolve conflict and communicate effectively with team members" (2001, F2C-2).

MATHEMATICS

Travers (1998) investigated the impact of experiential learning methods on students' self-regulation of their own learning process in mathematics. The author contends that the critical

difference between academically low and high-achieving students resides on the capacity to self-regulate their learning by actively processing and controlling information, affect, and behavior to acquire critical knowledge and skills. The purpose of the study was to examine whether the treatment group taught mathematics through an experiential learning method demonstrated higher level of self-regulation compared to the control group that was taught mathematics through a traditional lecture format. The results indicate that experiential learning group demonstrated a higher level of self-regulation. The difference was explained by how the two groups regulated the learning outcomes. Students in the traditional lecture format were taught rule-based learning, in which the rules given by the teacher were the only guide to deal with the new experiences. In the rule-based learning students are only given information as to what they are to do, but not how to deal with unexpected situations when things do not work the way they should. Students taught experientially, on the other hand, were exposed to a variety of situations from which to compare a new experience with previous ones, thus developing the ability to critically evaluate what works and doesn't work in a given learning situation.

POLITICAL SCIENCE

Building on the Svinick and Dixon model, Brock and Cameron (1999) developed instructional sequences for a political science course based on the experiential learning cycle. The authors contend that teaching to all learning modes is crucial for students' acquisition of higher order thinking and problem solving skills. They offer as an illustrative example, how each phase of the cycle can be designed as a process of exploration of the experience of involvement in a political campaign. During the CE phase, students could explore their reactions about the various experiences during the election: Did they vote on policy or personality? Was the ballot clear or confusing? If discrimination and representation are key themes of the course, the instructor can encourage students to consider what role the race, gender, sexual orientation, or religion of the candidates and the voters played in the determining the outcome of the election. In the RO phase of the class, discussion, brainstorming sessions, and journals can be used to encourage reflection about the political situations or policies. The AC phase of the learning process can be devoted to intellectual modeling by the instructors in lectures. It is very important, emphasize the authors, that students observe the instructor "thinking out loud", for it is by seeing the instructor's mind at work that students learn how to think like political scientists. When instructors only present conclusions or solutions to problems, students' ability to develop higher order thinking can be substantially diminished. Finally, in the AE phase of the learning cycle, students could be asked to project the outcome of the election in a specific district using the data generated by the polling firms or an analysis of socio-political and income profile of the target area. Next, they could track the fortunes of the parties following the development of the campaign, adjust their model, and offer final predictions on voting day. The cycle can be re-started when the election results were known (CE phase), students are encouraged to reflect on the election outcomes (RO phase) and analyze the strength and weakness of their prediction model.

The authors concluded that, while there is a great merit in following the four-stage learning cycle, the purpose of the model is not to set a rigid learning pattern that takes away

spontaneity and flexibility from both students and instructors. As November (1997) pointed out, the main objective of the experiential learning is "to help students to identify and develop their own experiential learning processes rather than slavishly adopt Kolb, or any other system" (November 1997: 297).

GEOGRAPHY

Healey and Jenkins (2000) applied the Svinick and Dixon model to the teaching of a geography course. In their view, there are two central practical applications of the experiential learning theory relevant to different types of learning environment, be it a lecture course or a seminar- based course: (1) how a session, or a whole course can be designed to take students systematically around the learning cycle, and (2) selection of teaching methods appropriate to different stages of the cycle. The cycle initiates with the concrete experience phase where students read materials that describes aspects of living in suburbia. In the reflective observation phase, in groups of 3-4, students consider key questions and reflect back on the readings. In the abstract conceptualization stage, the instructor gives a 15-minute lecture on how gender theorists have analyzed suburban landscape. Finally, in the active experimentation stage, students choose a theoretical position and present a poster session that illustrates how the theory explains aspects of suburbia.

In the next class session, the cycle starts anew, as each group display their posters for others to view (concrete experience), discuss questions that require them to reflect on the posters and the theoretical positions presented (reflective observation), followed by a teacher-led plenary session linking various theoretical positions to the reality of suburbia (abstract conceptualization), and finally, the cycle completes with an individual or group assignment to write an analysis based on the theoretical positions of their choice (active experimentation).

ECONOMICS

McGoldrick, Battle and Gallagher (2000) developed a managerial economics course based on experiential methods applied to one form of service learning, student-based instruction. They offer an example as well as an evaluation of the cost and benefit of this experiential activity. Service learning is an example of experiential activity many educators have embraced as a valuable venue to link the theory and its application to the real world (Rubin, 2000; Stanton and Grant, 2000). While service learning creates powerful learning opportunities for students outside of the classrooms it also introduces new challenges to properly assess those learning experiences and outcomes. This particular service learning case attempts to bridge the advantages and disadvantages of the experiential learning activity conducted outside of the classroom.

The service learning course was aimed at engaging business students in a student-based instruction project as an opportunity for them to master some fundamental economic concepts through the teaching of these concepts to the second and third grade elementary school children. The project was highly structured to respond to the high degree of coordination needed between faculty, students, and grade school teachers. Students were required to form

teaching groups, choose their economic topic and lesson, coordinate a teaching time and location, complete their lesson plan, turn in all required materials, and were asked to follow a strict deadline for the completion of each component of the project. As a source of outside support, the help of the local Center for Economics in Education was sought out to assist on various aspects of the project by providing lesson plans, matching students with teachers in local classrooms, and gathering feedback from teachers and students at the end of the course.

As a way to assess the impact of student-based instruction on the economics student, each individual student was required to complete a two to five page reflective summary of their teaching experience consisting of two main components: (1) a description of the lesson and the teaching environment, (2) a presentation of their opinion on the "success" of the project.

In addition to students' reflective summaries, each teacher was asked to complete an evaluation form to assess the overall performance of each individual student as well as to offer their perspective on the quality of the experience for the children.

As an experiential activity outside the classroom, student based-instruction has a number of positive learning outcomes for students, teachers, and faculty, concluded the authors. The students need to master the basic economic concepts as well as develop lesson plans appropriate to the intellectual level of their young audience. The teachers benefit from an exposure to alternative lesson topics to teach young children and take advantage of the resources available to support their classroom activities. The school children gain knowledge about the world in which they live through examples of the economic decision making process drawn from the most basic aspects of everyday life. Finally, by expanding their learning activities into the real world college professors can enrich their students' experiences that cannot be replicated in the classrooms. The main challenge to the student-based instruction project is the significant start up costs involved. Still the project is worth the effort, contend the authors, given the support that can be drawn from outside organizations and "the potential for self perpetuation once a network of local school teachers are enlisted" (McGoldrick, Battle, and Gallagher 2000: p. 49).

ENGLISH

In her undergraduate course on Shakespeare, Rustici (1997) recounts a note one student had left in her mail box at the end of the semester:

> "I did want to mention that I really like the concept of experiential learning. After reading the sonnets I just had a natural impulse to want to create one of my own. The reading left a rhythm in my head that my mind naturally sought words to fill out with meaning. I am sure that this is not an uncommon experience..."

The student's "uncommon experience" was a byproduct of the author's sonnet writing course which experientially guided the students through the learning cycle: Students were invited to draw upon their own personal stories, attitudes, and emotions to compose their sonnets (concrete experience); they were asked to shift their perspective from poet to critic and describe the connections between the form and content of their sonnets (reflective observation); students were asked to grasp the precise metrical an rhythmic pattern of the sonnets through the systematic planning and manipulation of symbols (abstract

conceptualization); and attempt to create something unfamiliar and determine the intended effect for their sonnet (active experimentation).

Expanding on Kolb's (1984) observation that "all learning is relearning... Thus one's job as an educator is not only to implant new ideas but also to dispose of or modify old ones," the author often encourages students to move beyond the pre-conceived ideas about poetry by several forms of modeling: adopting himself playful languages students are asked to try out, employing culinary metaphor to explain "how to whip up sonnet," and offering some of the best essays from previous semesters as a guide.

HISTORY

Sprau and Keig (2001) contend that "for many undergraduates, history courses are inherently uninteresting and the required papers are boring" (Sprau and Keig 2001: 101). According to the authors, students overall lack of interest in history can be attributed to the way courses are generally taught. History educators have typically relied on lectures, note-taking, textbooks, tests, and term papers as the main teaching methods in the history course. What often is lacking is the mechanism that allows for students' emotional as well as intellectual engagement in the learning process. As they suggest, "appealing to students' hearts and their minds both deserve consideration by history teachers; teaching devoid of emotion is quite dull, not to mention virtually impossible" (Sprau and Keig 2001: 103).

In his attempt to create an intellectually stimulating as well as emotionally appealing learning experience, the author introduced films in the history survey courses based on experiential learning model. The film served as a tool for the students to distinguish between historical fact and fiction, reflect upon its themes and characters, research an issue from it, and write an analysis paper based on those reflections and research. The author recommends that the experiential learning model can best serve the students' interests if instructors envision the learning cycle not as simple stages to be followed sequentially but as a conical structure, so that students are guided to acquire higher order thinking skills to deal with subsequent learning experiences.

THEATRE

In his book, "*Theatre as the essential liberal art in the American University*", Gressler (2002) makes a compelling argument that theatre is the only liberal arts discipline that is almost entirely based on an experiential learning approach to education. It requires students, whether working individually or in groups, to integrate all its part in order to communicate the end result to the audience:

Fortuitously, nearly every theatre course and production activity I can think of disallows passivity; nearly every course and activity follows the active-based, experiential learning patterns proposed by Kolb and others. For example, the acting student has 1) personal involvement with a script, 2) reflects on its meaning by searching for internal and external evidence, 3) decides logically as well as intuitively how it should be played and, 4) offers these conclusions to the class or audience. Their responses or non-responses and critiques

help inform the next scene or play that student reads/and or acts. The costume design student experiences a play in a manuscript form, reflects on its meaning by investigating internal and external sources, draws logical conclusions as to the form, color, line, and texture that will most accurately reflect to new an more informed perceptions, or to an audience or critic whose response indicates whether or not those conclusions were logical, acceptable and valid. (Gressler 2002: 79-80)

For those who want to adopt experiential learning methodologies in the classrooms, Gressler has one important message to share. Experiential learning methodologies take more time because there is more active exploration, testing, and discovering, and hypothesizing involved in the learning process. However, they are likely to produce higher retention rates, a higher degree of motivation, and more potential for integrating new ideas into a learner's store of knowledge (Gressler, 2002: p. 84).

ARTS EDUCATION

In her work dedicated to building a bridge between art inquiry and student processes of self-understanding, Rasanen (1997) developed a model of experiential art interpretation in which students reflect and construct aesthetic meaning through an integration of art history, criticism, and aesthetics guided by the experiential learning model. The author suggests that "the experiential art interpretation increases students' expressive skills and results in products that are meaningful both to their makers and others" (Rasanen 1997: 9).

We are often approached by faculty in the arts disciplines who express ambivalence about applying experiential learning methods in their classrooms. Is it possible to teach a 17th century history class experientially? How can an English instructor guide students through the learning cycle in a poetry class? Educators in the arts who may hold such views and concerns are likely to equate experiential methods more closely with science based disciplines and question the effectiveness of experiential learning in arts classrooms. Studies conducted in various arts disciplines suggest that experiential learning methods can be equally effective in the arts, generating significant learning experience for the students as well as for the instructors themselves.

CONCLUSION: FUTURE DIRECTIONS FOR EXPERIENTIAL LEARNING IN HIGHER EDUCATION

The purpose of this chapter was to assess the current state of the art of the application of ELT and the LSI higher education. Drawing from the studies reviewed, in this final section we offer our reflections on the current state of application of experiential learning in higher education and reflect on the promises and challenges the future holds. Our review shows that there is a growing body of evidence supporting experiential learning as an effective educational approach to promote teaching and learning in higher education. Most significantly, experiential learning affords educators a way to design and implement teaching and learning strategies conducive to creating a learning environment beneficial for both

faculty and students with possibilities for institutional wide dissemination of its core principles and practices.

While study findings suggest that over the years, experiential learning has been widely accepted as a standard educational practice in many institutions, there are potential pitfalls associated with the dissemination and implementation of experiential learning practices. The critical challenges come mainly in three forms: The first challenge is related to the preservation of the integrity of the philosophy and the practice of experiential learning in a manner that honor the core principles and the tradition of experiential education.

The second challenge is associated with the assessment of the experiential learning education. Contrary to a more traditional pedagogical method with established standard evaluation procedures, the experiential learning pedagogy requires alternative methods of evaluation congruent with its philosophy of education and the multidimensional approach to teaching and learning. The critical question to be addressed here is whether the system of higher education currently in place is prepared to support the need for a significant change in assessment methods to ones that adequately measure the learning outcomes of experiential education.

The third challenge is the requirement of an institutional wide support system that encompasses curriculum development, faculty development, administrative/staff development, and resource development, for the successful implementation of experiential learning in higher education (Boyatzis, Cowen, and Kolb, 1995; Hickcox, 2002; Kolb and Kolb, 2005). Institution wide support will ultimately strengthen and broaden the community of practice of experiential learning within institutions.

PRESERVING THE INTEGRITY OF EXPERIENTIAL LEARNING

Studies across diverse academic fields indicate the effectiveness of experiential learning in promoting students' meta-cognitive abilities, capacity to apply the acquired skills and knowledge in the real world, and the ability to become self-directed learners. Awareness of student and faculty learning style differences contributes to a better teacher-learner relationships, providing faculty with necessary tools to understand students' specific learning needs as well as the ability to broaden their potential beyond their familiar modes of learning.

The experiential learning model allows instructors greater flexibility and creativity in designing courses and curricula applying a multidimensional approach to teaching and learning. The multiplicity and richness of experiential learning strategies enhance students' ability to critically evaluate their own learning process and capacity to create knowledge increasingly at a higher level of sophistication and complexity.

While the growing sophistication in research and application of experiential learning opens the opportunity to further apply new findings to the educational process in various academic environments, we are also facing a critical juncture in which reflection and re-assessment of the practice of experiential learning is needed if it is to generate educational quality of an enduring impact. While studies point to the effectiveness of experiential learning to improve learning, they also raise concerns with regard to the application of ELT and the LSI in a mechanical fashion that undermines the humanistic principles that are at the core of experiential learning tradition (Kolb and Kolb, 2005). There is a tendency to treat the

concepts of learning style and experiential learning model as techniques rather than processes based on the holistic and humanistic foundation of ELT. This tendency may partly stem from the pressure experiential educators face in legitimizing experiential learning methods in light of growing demand for institutional accountability related to performance and learning outcomes.

To meet this challenge requires an effort to create optimal learning spaces that meet the learning needs of each learner while preserving the integrity of theory and the practice of experiential learning. The creation of a growth promoting learning space must always begin with the respect for the learners and their experience. A growth producing experience in the philosophy of experiential learning refers not just to a direct experience related to a subject matter under study but to the total experiential life space of the learner. This includes the physical and social environment and the quality of relationships. We refer to this as the Cheers/Jeers experiential continuum. At one end learners feel that they are members of a learning community who are known and respected by faculty and colleagues and whose experience is taken seriously, a space "where everybody knows your name". At the other extreme are "mis-educative" learning environments where learners feel alienated, alone, unrecognized and devalued. Learning and growth in the Jeers environment "where nobody knows your name" can be difficult if not impossible.

Another critical component that must be present in any learning space is an opportunity for the learners to discover the joy of creating knowledge from their own experience of the subject matter. Rustici's (1997) undergraduate course on sonnet writing is an exemplary case in which the instructor provided a space for such a transformative experience to occur in the life of the learner. To learn experientially one must first of all own and value their experience. Students will often say, "But I don't have any experience." meaning that they don't believe that their experience is of any value to the teacher or for learning the subject matter at hand. An effective teacher builds on exploration of what students already know and believe, on the sense they have made of their previous concrete experiences. Beginning with these or related concrete experiences allows the learner to re-examine and modify their previous sense-making in the light of new ideas.

In their teaching of a History course, Sprau and Keig (2001) address the critical importance of engaging learners' feeling and emotions in the learning process by appealing equally to students' hearts as well as to their minds. It seems that educational institutions tend to develop a learning culture that emphasizes the learning mode most related to their educational objectives and devalues the opposite learning mode. Yet, Damasio (1994, 2003), LeDoux (1997), Zull (2002) and others offer convincing research evidence that reason and emotion are inextricably related in their influence on learning and memory. Indeed it appears that feelings and emotions have primacy in determining whether and what we learn. Negative emotions such as fear and anxiety can block learning, while positive feelings of attraction and interest may be essential for learning. To learn something that one is not interested in is extremely difficult.

Many students enter higher education conditioned by their previous educational experiences to be passive recipients of what they are taught. Making space for students to take control of and responsibility for their learning can greatly enhance their ability to learn from experience. The major aim of education is to guide students through the process of constructing one's own knowledge vs. passively receiving knowledge from others.

ASSESSMENT OF EXPERIENTIAL LEARNING

Critics of experiential learning initiatives tend to question its pedagogical methodologies and the validity of the teaching and learning experiences they provide (Hickcox, 2002). Furthermore, those who hold a more traditional view of education may question the structure, the process, and the learner-centered philosophy espoused by the experiential learning theory. Such criticism that puts into question the legitimacy of the experiential learning approach will inevitably affect the assessment component of experiential education.

In contrast to a lecture-based traditional education which relies primarily on the evaluation of the abstract dimension of the students' performance outcomes, experiential learning conceives learning as a holistic process in which evaluation of the learning outcomes need to be based upon students' effective integration of affective, perceptual, cognitive, and behavioral dimensions of learning. The multidimensional teaching and learning strategies applied in experiential classrooms require equally diverse assessment methods that adequately evaluate students' integrated functioning in the learning process. A single multiple-choice test by itself is hardly a sufficient measure to assess the wide spectrum of activities students engage in experiential classrooms. In fact, in their marketing course, Dyer and Schumann (1993) decided altogether to eliminate the standard performance evaluation comprised of multiple-choice test and essay exams and give central focus on the experiential learning process of feedback, discussion, lecture, and hands-on experiences.

However, in most cases, experiential educators find themselves pressured to respond to a larger institutional accountability requirement based on the traditional performance evaluation standards and procedures. While the experiential learning approach to education needs to demonstrate its effectiveness to the various stakeholders through a transparent and legitimate evaluation of student learning outcomes, the current evaluation methods favored by most institutions of higher education are not only deficient in responding to the experiential learning pedagogy, they are inadequate in measuring learning outcomes of any educational pedagogy currently in practice.

One of the main reasons educators decide to move away from traditional teaching methods and adopt experiential learning in classrooms is because of the possibilities it offers in providing their students with an optimum learning experience and higher levels of performance and learning. The lack of institutional support and commitment to accommodate the assessment requirements of experiential learning methods in the current evaluation system will have a crippling effect on the motivation of the faculty to design and deliver high quality experiential courses and curricula.

Is the system of Higher Education prepared to face the need for a fundamental change in the assessment philosophy currently in place? This question poses a significant challenge to the implementation of experiential learning in higher education and its implication goes beyond the assessment component of the experiential curricula. The holistic nature of experiential education requires a broad institutional wide support system for the successful implementation and dissemination of its philosophy and practice.

PROMOTING LEARNING IN HIGHER EDUCATION THROUGH INSTITUTIONAL DEVELOPMENT

In the last chapter of *Innovation in Professional Education* titled "What if Learning Were the Purpose of Education," Boyatzis, Cowen and Kolb (1995) proposed five principles to help educational institutions focus on the promotion of learning:

1. Evaluation of educational structures and processes against promotion of learning criteria.
2. Longitudinal outcome studies to determine learning value added.
3. Becoming a learner centered institution.
4. Continuous research and inquiry about the learning process.
5. Becoming a learning organization through continuous stakeholder conversation.

The application of these principles requires a holistic program of institutional development that includes curriculum development, faculty development, student development, administrative /staff development, and resource development. Programs in these areas need to be coordinated around an institutional vision and mission to promote learning. Such a coordinated institutional approach can provide the synergy necessary for dramatic organizational change, while fragmented approaches in one area are often frustrated by lack of interest or understanding in others. One can not develop a state of the art learning focused curriculum that is doomed to failure if faculty members are not on board with it philosophically and technically. If administrative leadership has priorities focused on income and ratings, the resources for learning promotion will not be available in other developmental areas.

The institutional development program to promote experiential learning initiated by Case Western Reserve University (Case) provides an example of this holistic approach. In October 2000 the Case President and Provost created the President's Commission on Undergraduate Education and Life. The Commission's report recommended that Case adopt a philosophy of experiential learning articulating its vision that a transformative education is best accomplished through experience. Building on the Commission report university faculty developed an experimental undergraduate curriculum called SAGES (Seminar Approach to General Education Studies). SAGES was designed to foster in students breadth as well as specialized knowledge by exposing them to a wide range of disciplines within three major divisions within the college: Natural Sciences and Mathematics, Arts and Humanities, and Social Sciences in addition to their major field of study. Such learning objectives are to be accomplished through a small class size of a maximum of 15 students, intense one-to-one advising, and exposure to diverse learning environments and teaching pedagogy across the University (A. Kolb, et. al. 2003). In 2002 the new President, Edward Hundert, embraced the Commission report, committed the funding to implement fully the SAGES curriculum beginning in the fall of 2005, and in his inaugural address articulated a vision for the future of the university. "We're going to focus all of our collective talent, attention and resources on a vision—a vision that starts with a commitment to experiential learning with rigorous scholarship in undergraduate, graduate and professional education programs to produce

educated learners—educated learners who are awake to new possibilities." (*Campus News* 2003: 2)

To support the new SAGES curriculum, Case has launched a 5-year faculty development program to be organized and delivered through the Center for Innovation in Teaching and Education (UCITE). According to the plan of this program, a total of 80 faculty members across the University will undergo an intense development on how to develop a particular course or other educational experiences based on experiential learning over the period of five years. In an effort to coordinate and support such university-wide institutional development initiatives, the new president created the Center for Institutional Research (CIR), a collaborative effort to expand institutional research support for all sectors of the university. Its primary role is to provide information about the University's students, faculty, staff, programs and environment to support decision making, policy analysis, institutional assessment and strategic planning. In summary, the Case initiative to enhance experiential learning in the undergraduate curriculum integrating institutional development activities and the case studies of three universities which embraced experiential learning into their programs and curricula serve as examples for the creation of educational learning spaces that promote learning in higher education.

Other higher education institutions have successfully implemented experiential learning into their academic programs and curricula through institutional wide coordinated efforts. Hickcox (2002) reports the key lessons learned from the experiences of three institutions, Portland State University, Marylhurst University, and Northeastern Illinois University that embraced and incorporated experiential learning within their institutional structures.

A transformative educational initiative requires communal learning spaces in which new and current faculty come together in a collective effort to promote experiential learning in teaching and learning. Additionally, an ongoing forum and training sessions aimed at providing information about experiential learning programs and models adopted elsewhere and how they can be used may ease the tension and resistance commonly associated with the fear and uncertainty caused by the new educational initiatives.

Many students unfamiliar with experiential learning processes may experience discomfort with new ways of learning. Providing a forum in which students and faculty can rationally discuss why such learning processes are beneficial to their education can ease their discomfort and criticism of experiential learning methodologies.

As with any innovative educational initiative, experiential learning will develop over time. The planning and implementation of experiential learning programs and curricula need to be carried out in developmental stages. In this way, new programs will have time to build on the experiences and take corrective actions based on the advantages and disadvantages derived from those experiences. Institutional change does not happen overnight. It follows an iterative process of experimentation, feedback, and revision of those committed to create an educational system where learning matters.

What you can do, or dream you can, begin it,
Boldness has genius, power, and magic in it.

Goethe

REFERENCES

Alon, I., and Cannon, N. (2000). Internet-based experiential learning in international marketing: The case of Globalview.org. *Online Information Review, 24*(5), 349-356.

American Psychological Association Board of Affairs. 1997. *Learner-centered psychological principles: A framework for school redesign and reform.* Retrieved from http://www.apa.org/ed/lcp.html

Astin, A.W. (1993). *What matters in College: Four critical years revisited.* San Francisco: Jossey-Bass.

Baker, J. D., and Marks, J., W. E. (1981). Learning style analysis in anesthesia education. *Anesthesiology Review,* VIII(7), 31-34.

Baker, R. E., Simon, J. R., and Bazeli, F. P. (1986). An assessment of the learning style preferences of accounting majors. *Issues in Accounting Education,* 4, 1-12.

Baker, R. E., Simon, J. R., and Bazeli, F. P. (1987). Selecting instructional design for introductory accounting based on the experiential learning model. *Journal of Accounting Education,* 5, 207-226.

Baker III, J. D., Cooke, J. E., Conroy, J. M., Bromley, H. R., Hollon, M. F., and Alpert, C. C. (1988). Beyond career choice: the role of learning style analysis n residency training. *Medical Education,* 22, 527-532.

Baker, J. D., Wallace, C. T., Cooke, J. E., Alpert, C. C. and Ackerly, J. A. (1986). Success in residency as a function of learning style. *Anesthesiology*, 65 (3A), A472.

Baker, J. D., Wallace, C. T., and Cooke, J. E. (1987). Learning style distribution: A consistent relationship between faculty and residents. *Anesthesiology*, 65 (3A), A564.

Baxter-Magolda, M. B. (1999). *Creating contexts for learning and self-authorship.* Nashville:Vanderbilt University Press

Biberman, G., and Buchanan, J. (1986). Learning style and study skills differences across business and other academic majors. *Journal of Education for Business*, April, 303-307.

Bolan, C.M. (2003). Incorporating the ELT (Experiential Learning Theory) into the Instructional Design of Online Courses. *Nurse Educator,* 28(1), 10.

Bostrom, R. P., Olfman, L., and Sein, M. K. (1990). The importance of learning style in end-user training. *MIS Quarterly,* 14(1), 101-119.

Boyatzis, R. E., Cowen, S. S., and Kolb, D. A. (1995). *Innovation in professional education: Steps on a journey from teaching to learning*. San Francisco: Jossey-Bass.

Bradbeer, J. (1999). Barriers to interdisciplinarity: Disciplinary discourses and student learning. *Journal of Geography in Higher Education,* 23(3), 381-396.

Bransford, J. D., Brown, A. L., and Cocking, R. R. (2000). *How people learn: Brain, mind experience, and school.* Washington D. C.: National Academy Press.

Brenenstuhl, D. C., and Catalanello, R. F. (1979). Can learning styles be used as curriculum aids? *Journal of Experiential Learning and Simulation,* 1, 29-37.

Brock, K. L., and Cameron, B. J. (1999). Enlivening political science courses with Kolb's learning preference model. *Political Science and Politics,* 32(2), 251-256.

Bronfrenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist.* July, 513-530.

Bronfrenbrenner, U. (1979). *The ecology of human development.* Cambridge, MA: Harvard University Press.

Broughton, P. J. (1998). *Examination of learning strategies used by community college faculty in preparing for the online delivery of instruction.* Unpublished doctoral dissertation, North Carolina State University.

Brown, H. D., and Burke, R. C. (1987). Accounting education: A learning-styles study of professional-technical and future adaptation issues. *Journal of Accounting Education,* 5, 187-206.

Buch, K., and Bartley, S. (2002). Learning style and training delivery mode preference. *Journal of Workplace Learning,* 14(1), 5-10.

Campus News. (February 6, 2003) "Edward M. Hundert Inaugural" P. 1-2

Carland, J. W., Carland, J. C., and Dye, J. L. (1994). Accounting education: A cooperative earning strategy. *Accounting Education,* 3(3), 223-236.

Cartney, P. (2000). Adult learning styles: Implications for practice teaching in social work. *Social Work Education,* 19(6), 609-626.

Cartwright, D. (Ed.) (1951). *Field theory in social science: Selected theoretical papers by Kurt Lewin.* New York: Harper Torchbooks.

Certo, S. C. (1976). The experiential exercise situation: A comment on instructional role and pedagogy evaluation. *The Academy of Management Review,* 1(3), 113-116.

Certo, S. (1977). *Stages of the Kolb-Rubin-McIntyre experiential learning model and perceived trainee learning: a preliminary investigation.* Paper presented at the Academy of Management Proceedings.

Chirstensen, M. G., Lee, P. and Bugg, P. (1979). Professional development of nurse practitioner as a function of need motivation, learning style, and locus of control. *Nursing Research,* 28, 51-56.

Cleave-Hogg, D., and Morgan, P. J. (2002). Experiential learning in an anaesthesia simulation centre: analysis of students' comments. *Medical Teacher,* 24(1), 23-26.

Cornett, C. E. (1983). *What you should know about teaching and learning styles.* Bloomington,IN: Phi Delta Kappa Educational Foundation.

Curry, L. (1999). Cognitive and learning styles in medical education. *Academic Medicine* (74), 409-413.

Damasio, A. (1994). *Descartes error: Emotion, reason and the human brain.* New York: Grosset/Putnam.

Damasio, A. (2003). *Looking for Spinoza: Joy, sorrow and the feeling brain.* New York: Harcourt, Inc.

Dewey, J. (1897). My pedagogic creed. *The School Journal.* LIV(3):77-80.

Drew, F., and Ottewill, R. (1998). Languages in undergraduate business education; a clash of learning styles? *Studies in Higher Education,* 23(3), 297-305.

Dyer, B., and Schumann, D. W. (1993). Partnering knowledge and experience: the business classroom as laboratory. *Marketing Education Review,* 3(Summer), 32-39.

Eickmann, P., Kolb, A., and Kolb, D. A. 2003. Designing learning. In R. Boland and F. Callopy, (Eds.), *Managing as designing: Creating a new vocabulary for management education and research.* (241-247) Stanford University Press.

Entwistle, N. (1981). *Styles of learning and teaching: An integrated outline of educational psychology for students, teachers, and lecturers.* New York: Wiley.

Felder R. M., Woods, D. R., ,J. E., Rugarcia, A. (2000). The future of engineering education. II. Teaching methods that work. *Chemical Engineering Education,* 34 (1), 26-39.

Fleming, D. E., Mauriello, Stice, S. M., McKaig, R. G., and Ludlow, J. B. (2003). A comparison of slide/audiotape and web-based instructional formats for teaching normal intraoral radiographic anatomy. *The Journal of Dental Hygiene, 77*(1), 27-35.

Fowler, L., McGill, D., Armarego, J., and Allen, M. (2002). Quantitative learning conversations: Constructivism and its application to learning in an engineering environment. *HERDSA*, 254-262.

Fox, R. L., and Ronkowski, S. A. (1997). Learning styles of political science students. *Political Science and Politics,* 30(4), 732-737.

Freire, P. (1973). *Education for critical consciousness*. New York: Continuum.

Friedman, A., Watts, D., Croston, J., and Durkin, C. (2002). Evaluating online CPD using educational criteria derived from the experiential learning cycle. *British Journal of Educational Technology,* 33(4), 367-378.

Fritzsche, D. J. (1977). *On the relationships of learning style, perceived learning, and performance in an experiential learning environment, in computer simulation and learning theory.* Austin: The University of Texas at Austin.

Frontczak, N. T. (1998). A paradigm for the selection, use and development of experiential learning activities in marketing education. *Marketing Education Review,* 8(3), 25-33.

Garland, D. K. (2003). Learning style characteristics of the online student: A study of learning styles, learner engagement and gender. *Dissertation Abstracts International Section A: Humanities and Social Sciences*, 63(12-A), 4282.

Garvey, M., Bootman, J. L., and McGhan, W. F. (1984). An assessment of learning styles among pharmacy students. *American Journal of Pharmaceutical Education,* 48(summer), 134-140.

Gopinah, C., and Sawyer, J. E. (1999). Exploring the learning from an enterprise simulation. *Journal of Management Development,* 18(5), 477-489.

Gressler, T. H. (2002). *Theatre as the essential liberal art in the American University* (Vol. 16).Queenston, Ontario: The Edwin Mellen Press.

Halstead, A., and Martin, L. (2002). Learning styles: A tool for selecting students for group work. *International Journal of Electrical Engineering Education,* 39(3), 245-252.

Harb, J. N., Terry, R. E., Hurt, P. K., and Williamson, K. J. (1995). *Teaching through the cycle – application of learning style theory to engineering education at Brigham Young University*. Provo, Utah: BYU Press.

Harrelson, G. L., and Leaver-Dunn, D. (2002). Using experiential learning cycle in clinical instruction. *Human Kinetics,* 7(5), 23-27.

Hatcher, J. A., and Bringle, R. G. (1997). Reflection. *College Teaching,* 45(4), 153-158.

Healey, M., and Jenkins, A. (2000). Kolb's experiential learning theory and its application in Geography in Higher Education. *Journal of Geography,* 99, 185-195.

Hickcox, L. K. (2002). Personalizing teaching through experiential learning. *College Teaching,* 50(4), 123-128.

Hodges, S. (1988). Individual learning styles of students nurses, their teacher and ward sisters. *Journal of Advanced Nursing,* 13, 341-344.

Holley, J. H., and Jenkins, E. K. (1993). The relationship between student learning style and performance on various test questions formats. *Journal of Education for Business*, 68 (5), 301-308.

Huch, M. (1981). Adult students locus of control, learning style and satisfaction with a baccalaureate nursing program. *Unpublished doctoral thesis*, University of Mississippi.

Ishiyama, J., and Hartlaub, S. (2003). Sequential or flexible? The impact of differently structured political science majors on the development of student reasoning. *PS online www.apsanet.org* (January), 83-86.

Jaju, A., Hyokjin, K., and Zinkhan, M. (2002). Learning styles of undergraduate business students: A cross-cultural comparison between the US, India, and Korea. *Marketing Education Review,* 12(2), 49-60.

Johanson, L. (1987). An investigation of learning style of BSN student nurses. Unpublished doctoral thesis, Northern Illinois University.

Jones, C., Reichard, C., and Mokhtari, K. (2003). Are students' learning styles discipline specific? *Community College Journal of Research and Practice,* 27, 363-375.

Kalsbeek, D. H. (1989). *Linking Leaning style theory with retention research: The trails project.* (The Association for Institutional Research 32).

Keeton, M. T., Sheckley, B. G., and Griggs, J. K. (2002) *Efficiency and effectiveness in higher education.* Dubuque, IA: Kendall/Hunt Publishing Company.

King, P. M. (2003). Student learning in higher education. In S. R. Komives, D. B. Woodward, Jr. and Associates (Eds.), *Student services: A handbook for the profession.* 234-268 San Francisco: Jossey Bass.

Kolb, A., and Kolb, D. A. (2005a). Experiential learning theory bibliography. Experience Based Learning Systems, Inc. *www.learningfromexperience.com.*

Kolb, A., and Kolb, D. A. (2005b). Learning style and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning and Education*, (June), 193-212.

Kolb, A. Y. and Kolb, D. A. (2005c). *The Kolb learning style inventory 3.1: Technical specifications.* Boston, MA: Hay Resources Direct.

Kolb, A., Murphy, V., Puerta, M., Yamazaki, Y., Godwin, L., and Simy, J. (2003). Seminar approach to general education and scholarship (SAGES). An assessment of the first year. Case Western Reserve University, Cleveland, Ohio.

Kolb, D. A. (1999a). *Learning Style Inventory, version 3.* TRG Hay/McBer, Training Resources Group. 116 Huntington Avenue, Boston, MA 02116, *trg_mcber@haygroup.com.*

Kolb, D. A., Boyatzis, R., and Mainemelis, C. (2001). Experiential learning theory: Previous research and new directions. In R. Sternberg and L. Zhang (Eds.), *Perspectives on cognitive learning, and thinking styles.*(228-247) Mahwah, NJ: Lawrence Erlbaum Associates.

Kolb, D. A.(1971). Learning Style Inventory. TRG hay/McBer, Training Resoruces Group. 116 Huntington Avenue, Boston, MA 02116. Retrieved from trg_mcber@ haygroup.com.

Kolb, D. A. 1985. Learning Style Inventory. TRG hay/McBer, Training Resoruces Group. 116 Huntington Avenue, Boston, MA 02116 Retrieved from trg_mcber@ haygroup.com.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development.* New Jersey: Prentice-Hall.

Kolb, D. A. (1981). Learning styles and disciplinary differences. In A. W. Chickering and Associates (Eds.), *The Modern American College*: 232-255. San Francisco: Jossey-Bass.

Kolb, D.A. (1971). Individual learning styles and the learning process. Working Paper 535-71, Sloan School of Management, Massachusetts Institute of Technology.

Kolb, D.A., Rubin, I.M., and McIntyre, J. (Eds., 1971). *Organizational psychology: An experiential approach.* Englewood Cliffs, N.J.: Prentice Hall.

Komives, S. R. (2003). *Student services*. San Francisco, CA: Jossey-Bass.

Kosower, E., and Berman, N. (1996). Comparison of pediatric resident and faculty learning styles:Implications for medical education. *The American Journal of the Medical Sciences,* 312(5), 214-218.

Kreber, C. (2001). Learning experientially through case studies? A conceptual analysis. *Teaching in Higher Education,* 6(2), 217-228.

Kruzich, J. M., Friesen, B. J., and Soest, D. V. (1986). Assessment of student and faculty learning styles: Research and application. *Journal of Social Work Education* (3), 22-30.

Laschinger, H. K., and Boss, M. W. (1984). Learning styles of nursing students and career choices. *Journal of Advanced Nursing,* 9, 375-380.

Laschinger, H. K. (1986). Learning styles of nursing students and environmental press perceptions of two clinical nursing settings. *Journal of Advanced Nursing,* 11, 289-294.

Laschinger, H. K., and Boss, M. K. (1989). Learning styles of baccalaureate nursing students and attitudes toward theory-based nursing. *Journal of Professional Nursing,* 5(4), 215-223.

Lave, J. and Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge, UK: Cambridge University Press.

LeDoux, J. (1997). *The emotional brain.* New York: Putnam.

Lengnick-Hall, C. A., and Sanders, M. M. (1997). Designing effective learning systems for management education: Student roles, requisite variety, and practicing what we teach. *Academy of Management Journal,* 40(6), 1334-1368.

Leonard, A., and Harris, H. (1979, August). Learning style in a primary care internal medicine residency program. *Archives of Internal Medicine,* 139, 872-875.

Light, R. J. 2001. *Making the most of college: Students speak their minds.* Cambridge, MA: Harvard University Press.

Lipshitz, R. (1983). Knowing and practicing: Teaching behavioral sciences at the Israel defense forces command and general staff college. *Journal of Management Studies,* 20(1), 121-141.

Lynch, T. G., Woelfl, N. N., Steele, D. J., and Hanssen, C. S. (1998). Learning style influences student examination performance. *The American Journal of Surgery,* 176(July), 62-66.

Manochehri, N. (2001). *The effects of web-based learning (WBL) versus traditional instructor-based learning (IBL) on student knowledge and satisfaction based on student learning styles*. Unpublished Doctoral Dissertation. University of North Texas.

Marcinek, M. (1983). An analysis of learning style of RN students, basic nursing students and nurse educators in a basic nursing program. Unpublished doctoral thesis. West Virginia University.

Marrow, A. J. (1977). *The practical theorist: The life and work of Kurt Lewin.* New York:Teachers College Press.

McGlinn, J. M. (2003). The impact of experiential learning on student teachers. *Clearing House,*76(3), 143-147.

McGoldrick, K., Battle, A., and Gallagher, S. (2000). Service-learning and the economics course: Theory and practice. *The American Economist,* 44(1), 43-52.

McMullan, W. E., and Cahoon, A. (1979). Integrating abstract conceptualizing with experiential learning. *The Academy of Management Review,* 4(3), 453-458.

McMurray, D. (1998). Learning styles and organizational behavior in Japanese EFL classrooms. *Journal of Fukui Prefectural University* (3), 30-45.

Mentkowski , M., and Associates.(2000). *Learning that lasts: Integrating learning, development and performance in college and beyond.* San Francisco, CA: Jossey Bass.

Mentkowski, M., and Strait, M. 1983. *A longitudinal study of student change in cognitive development, learning styles, and generic abilities in an outcome centered liberal arts curriculum.* Final Report to the National Institutes of Education from Alverno College.

Mellor, A. (1991). Experiential learning through integrated project work: An example from soil science. *Geography in Higher Education,* 15(2), 135-149.

Milne, D., James, I., Keegan, D., and Dudley, M. (2002). Teacher's PETS: A new observational measure of experiential training interactions. *Clinical Psychology and Psychotherapy,* 9, 187-199.

Minasian-Batmanian, L.C. (2002). Guidelines for developing an online learning strategy for your subject. *Medical Teacher*, 24 (6), 645-647.

Newland, J. R., and Woelfl, N. (1992). Learning style inventory and academic performance of students in general pathology. *Bulletin of Pathology Education,* (17), 77-81.

Nonaka, I. and Konno, N. (1998). The concept of "ba": Building a foundation for knowledge creation. *California Management Review,* 40(3), 40-54.

November, P. (1997). Learning to teach experientially: A pilgrims' s progress. *Studies in Higher Education, 22*(3), 289-299.

Nulty, D. D., and Trigwell, K. (1996). Transitions in students' learning styles. *Studies in Higher Education* (21), 333-345.

Oleks, J. C. (2004). *Student satisfaction and estimate of gains from online learning: examining electronic engagement and learning style.* Unpublished doctoral dissertation. University of Massachusetts, Boston.

Ornstein, R. E. (1977). *The psychology of consciousness.* New York: Harcourt Brace, Jovanovich.

Oughton, J. M., and Reed, M. W. (2000). The effect of hypermedia knowledge and learning style on student-centered concept maps about hypermedia. *Journal of Research on Computing in Education,* 32(3), 366-375.

Pace, R. W. (1977). An experiential approach to teaching organizational communication. *The Journal of Business Communication,* 14(4), 37-47.

Palmer, P. (1998). *The courage to teach.* San Francisco, CA: Jossey-Bass.

Pelsma, D. M., and Borgers, S. B. (1986). Experience-based ethics: A developmental model of learning ethical reasoning. *Journal of Counseling and Development,* 64, 311-314.

Rasanen, M. (1997). *Building bridges. Experiential art understanding: A work of art as a mean of understanding and constructing.* Helsink: Finland: Publication Series of University of Art and Design.

Raschick, M., Maypole, D. E., and Day, P. (1998). Improving field education through Kolb learning theory. *Journal of Social Work Education, 34*(1), 31- 43.

Reese, J. (1998). *Enhancing law student performance: Learning style interventions.* Unpublished report. Saratoga Springs, NY: National Center on Adult Learning. Empire State College.

Rosenthal, C. S. (1999). One experience is worth a thousand words: Engaging Undergraduates in field research on gender. *Political Science and Politics,* 32(1), 63-68.

Rubin, S. (2000). Developing community through experiential education. *New Directions for Higher Education* (109), 43-50.

Rugarcia, A., R., Felder M., Woods D. R., Stice J. E. (2000). The future of engineering education. I. A vision for a new century. *Chemical Engineering Education*, 34, 16.

Rustici, C. (1997). Sonnet writing and experiential learning. *College Teaching,* 45(1), 16-18.

Sadler, G. R., Plovnick, M., and Snope, F. C. (1978). Learning styles and teaching implications. *Journal of Medical Education,* 53, 847-849.

Sandmire, D. A., Vroman, K. G., and Sanders, R. (2000). The influence of learning styles on collaborative performances of Allied Health students in a clinical exercise. *Journal of Allied Health,* 29(3), 143-149.

Sandmire, D. A., and Boyce, P. F. (2004). Pairing of opposite learning styles among Allied Health Students. *Journal of Allied Health,* 33(2), 156-163.

Saunders, P. M. (1997). Experiential learning, cases, and simulations in business communication.*Business Communication Quarterly,* 60(1), 97-114.

Sharp, J. (2001). *Teaching team work communication with Kolb learning style theory [Session F2C1].* Paper presented at the 31st ASEE/IEEE Frontiers in Education Conference, Reno, NV.

Siegel, P. H., Khursheed, O., and Agrawal, S. P. (1997). Video simulation of an audit: An experiment in experiential learning theory. *Accounting Education,* 6(3), 217-230.

Sims, R. R. (1983). Kolb's experiential learning theory: A framework for assessing person-job interaction. *Academy of Management Review,* 8(3), 501-508.

Sims, R. R., and Sauser Jr., W. I. (1985). Guiding principles for the development of competency-based curricula. *The Journal of Management Development,* 4(5), 51-65.

Sims, R. (2002). *Teaching business ethics for effective learning.* Westport, CT: Quorum Books.

Specht, L. B. (1991). The differential effects of experiential learning activities and traditional lecture class in accounting. *Simulation and Gaming,* 22(2), 196-210.

Sprau, R. and Keig, L. (2001). I saw it in the movies: Suggestions for incorporating film and experiential learning in the college survey history course. *College Student Journal,* 35(101-112).

Stanton, F., and Grant, J. (1999). Approaches to experiential learning, course delivery and validation in medicine. A background document. *Medical Education,* 33, 282-297.

Stice, J, E. (1987). Using Kolb's learning cycle to improve student learning. *Engineering Education*, 77, 291-296.

Stiernborg, M., and Zaldivar, S. B. (1996). Effect of didactic teaching and experiential learning on nursing students' AIDS-related knowledge and attitudes. *AIDS Care,* 8(5), 601-608.

Stutsky, B., and Laschinger, H. K. S. (1995). Changes in student learning styles and adaptive learning competencies following a senior preceptorship experience. *Journal of Advance Nursing* (21), 143-153.

Sugarman, L. (1985). Kolb's model of experiential learning: Touchstone for trainers, students, counselors, and clients. *Journal of Counseling and Development,* 64(December), 264-268.

Svinick, M. D., and Dixon, N. M. (1987). The Kolb model modified for classroom activities. *College Teaching, 35*(4), 141-146.

Terenzini, P., and Pascarella, E. (1994). Living with myths: Undergraduate education in America. *Change,* (28), 28-32.

Terrell, S. R., and Dringus, L. (2000). An investigation of the effect of learning style on student success in an online learning environment. *Journal of Educational Technology Systems,* 28(3), 231-238.

Travers, N. (1998). *Experiential learning and students' self-regulation.* Unpublished Doctorate, University of Connecticut.

Umapathy, S. (1985). Teaching behavioral aspects of performance evaluation: An experiential approach. *The Accounting Review,* 60(1), 97-108.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Edited by M. Cole, V. John-Steiner, S. Scribner and E. Souberman. Cambridge, MA: Harvard University Press.

White, J. A., and Anderson, P. (1995). Learning by internal medicine residents: Differences and similarities of perceptions by resident and faculty. *Journal of General and Internal Medicine,* 10, 126-132.

Wulf, W. A. (1998). the Urgency of Engineering Education Reform. *The Bridge,* 28.

Wyrick, D. A. (2003). Understanding learning styles to be a more effective team leader and engineering manager. *Engineering Management Journal,* 15(1), 27-33.

Yamazaki, Y. (2002). Learning styles and typologies of cultural differences: A theoretical and empirical comparison. Working paper 02-1. Department of Organizational Behavior, Weatherhead School of Management, Case Western Reserve University, Cleveland, OH.

Yamazaki, Y. (2003). An experiential approach to cross-cultural adaptation: A study of Japanese expatriates' learning styles, learning skills, and job satisfaction in the United States. Unpublished PH. D. Dissertation. Case Western Reserve University, Cleveland, OH.

Zull, J. E. (2002). *The art of changing the brain: Enriching teaching by exploring the biology of learning.* Sterling, VA: Stylus.