

LEARNING STYLES AS A FUNCTION OF CLASS STANDING AT UMR

Cassandra C. Elrod, University of Missouri - Rolla
Leroy R. Cox, M.S., University of Missouri – Rolla

Abstract

Each of us has a particular learning style that facilitates how we take in and process new information. Research has shown that teaching to one of these preferred styles, at least a portion of the time, may enhance teaching and training effectiveness. Using the work of Kolb, who identified four types of learning styles, this study seeks to understand the preferred learning style of engineering management students at different class levels at UMR. Implications for classroom instruction and on-the-job training are then presented.

Introduction

As industry continues to change, education must also adapt to prepare its graduates for that which lies ahead. Intellectual adaptation has become increasingly important in both the education arena and the work force due to rapid and innovative changes in technology. Higher education professionals can meet the challenge of preparing students for these conditions by encouraging students to think on their own and solve “real-world” problems. This preparation rests on teaching concepts in a manner that will accommodate each student’s preferred method of learning. Using this technique, the instructor exposes students to situations that are similar to those encountered in job settings and the student learns to make decisions and solve potential problems individually or as a member of a team. Such instructional techniques have been shown to enhance student learning (Baker & Siryk, 1989).

In the corporate world, the emphasis has shifted from products to people as the key determinant of competitive advantage. Therefore, companies are moving to experiential learning programs to foster a new breed of workforce collaboration and cooperation. For example, at Fed Ex’s Leadership Institute, training professionals conduct experiential programs for the purpose of bridging the gap between that which is taught and how people feel so as to ensure a longer-lasting commitment to and immediate adoption of content. Similarly, 7-Eleven conducted an experiential learning retreat designed to teach corporate field consultants the value of personality styles so as to help them establish and maintain long-term relationships with franchisees (Schettler, 2002). In the workplace, experiential learning is by and large used to develop soft skills – teamwork, leadership, and group problem-solving (Schettler, 2002). Learning styles set the tone

for how individuals process information. Therefore, knowing the dispositions of individuals that must work together on teams to generate new ideas, products (and services), and technological applications can relieve tensions that normally plague group interactions (Wyrick, 2003).

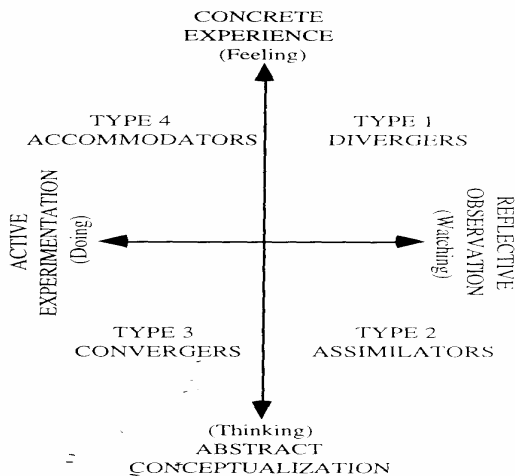
Research has shown that traditional teaching methods do not correspond well with many students’ preferred method of processing and perceiving information due to differing learning styles (McCaulley, 1983). Feldman and Silverman (1988) put forth that undergraduate education has failed to provide instruction in a manner that is consistent with prevalent learning styles of undergraduate students. Campbell (1996) and Wulf (1998) attributes this discrepancy to a high rate of attrition that engineering colleges experience in the first two years of undergraduate study. They also suggest that traditional educational paradigms have failed a significant number of students. This lack of learning continuity is one reason why students are leaving engineering and seeking other areas of study (Rutz, 2003).

This study seeks to understand the preferred learning styles of the average Engineering Management student at UMR. Because learning styles tend to remain stable over time (Cross & Faulkner, 2004), an understanding of students’ learning styles can help instructors prepare lessons that better illustrate desired concepts. Also due to consistent learning styles, this understanding can later aid in the development of corporate training initiatives when a former student enters the workplace.

Literature Review

Experiential Learning Theory and Kolb’s Learning Styles. Brandon (2002) defined experiential learning as “a process during which a person experiences an event, acquires competencies, and then compares the knowledge gained with knowledge gained in similar situations.” The experiential learning model, often referred to as Kolb’s Learning Cycle, consists of two perpendicular axes that make up four quadrants (Harb, Terry, Hurt & Williamson, 1995). The two dimensions, perceiving and processing, represented by the horizontal and vertical axes have also been proposed to be orthogonal, or independent of each other, forming four quadrants that are used to characterize learners (Henson & Hwang, 2002).

Exhibit 1. Experiential Learning Model



Concrete experience (feeling) and abstract conceptualization (thinking) exist at opposite ends of the perception, or vertical axis as shown in Exhibit 1, and represent polarized preferences of a learner. These polarized ends represent a learner’s preference to either feel or think their way through supplied information as a means of learning. Reflective observation (watching) and active experimentation (doing) exist at opposite ends of the processing, or horizontal axis as shown in Exhibit 1, represent a learner’s preference to either watch or do (actively participate) as a means of learning (Henson & Hwang, 2002). A more detailed explanation is given below.

Concrete experience. This dimension focuses on “feeling.” During this stage, the learner is surrounded by new experiences. Logic is overcast by sensing and feeling. The strategy of the learner in this dimension of the cycle is to be open, adaptable and to maximize their involvement in the present situation (Harb, Terry, Hurt & Williamson, 1995). This concept of “feeling” can also be thought to address the question of “Why?” The learner establishes a “feel” for the subject to establish a foundation for information that they will receive in Quadrant 2. In teaching, it is also the quadrant that instructors try to motivate students to desire to learn about the topic (Harb, Terry, Hurt & Williamson, 1995).

Reflective observation. This dimension focuses on “watching.” The learner will become the objective observer, separating themselves from the specific situation at hand and trying to view the situation from as many aspects as possible (Harb, Terry, Hurt & Williamson, 1995). Also, during this dimension, the answer to “What?” is sought. Preparing for the next dimension, the learner looks for facts or information needed to be able to solve the present picture (Harb, Durrant, & Terry, 1993).

Abstract conceptualization. This dimension of the cycle focuses on “thinking.” It is here that the learner addresses the question of “How?” and attempts to organize, through the use of logic, new information into concepts and theories. The learner is more focused on learning general theories rather than specific ideas or situations (Harb, Terry, Hurt & Williamson, 1995). This type of learner tosses away books and manuals, preferring to process information by applying it (Harb, Durrant, & Terry, 1993).

Active experimentation. This dimension focuses on “doing.” The question of “What If?” is addressed when the learner becomes directly involved with their environment (Harb, Durrant, & Terry, 1993). This dimension is one of “self discovery” or “hands on experience” where learner tries to apply information and ideas learned to their own lives. Their environment is tested and manipulated to produce a response. The goal of the learner in this dimension is to test and find what works and obtain practicality (Harb, Terry, Hurt & Williamson, 1995). This dimension is different from abstract conceptualization -- abstract conceptualization involves the establishment of problem solving procedures while active experimentation involves the application of these established procedures to new problems in search of a solution (Harb, Durrant, & Terry, 1993).

Kolb uses the dimensions of Exhibit 1 to put forth a cyclical model of learning. Once a learner has been exposed to an idea through a concrete experience, becomes curious about the idea through reflective observation, develops concepts through abstract conceptualization and then progresses to apply it to their own ideas through active experimentation, they become subject to their experimentation giving rise to another concrete experience to be exposed to and so the cycle continues (Svinicki & Dixon, 1987). Based on this cycle and its dimensions, Kolb established four learning styles, one to fall within each quadrant created by the processing and perceiving axes.

Claxton and Ralston (1978) described learning styles to be the manner by which students use and respond to stimuli in context of learning. Each of Kolb’s learning styles are found almost equally in our population. Trends in teaching methods are shifting from teaching the “best” method to teaching in a variety of styles to accommodate different types of learners (Harb, Terry, Hurt & Williamson, 1995). Kolb’s experiential learning model helps to provide a foundation for understanding these learning styles.

When trying to create an ideal learning situation, individual difference is an important aspect to keep in mind. In education, students respond and use stimuli very differently, in the context of the learning process (Harb, Durrant, & Terry, 1993). A learning experience for a student that incorporates all of these learning

modes results is the highest level of learning. Just like with any other cycle, in order for there to be optimality, all aspects of the cycle must be completed.

However, the average learner's ability favors or tends toward one pole of each dimension to some degree. When the 'processing' and 'perceiving' coordinates of each learner are analyzed as a whole, the learning style and its magnitude are represented within a quadrant (Harb, Terry, Hurt & Williamson, 1995). A learner is assigned to one of the four following learning styles as a result of their favored abilities.

Diverger. This learning style, as shown in the first quadrant of Exhibit 1 shows a preference toward feeling and watching. Divergers' dominant learning abilities are concrete experimentation and reflective observation. This type of learner also tends to be very imaginative and creative. Divergers can quickly identify problems and solutions; in extreme cases, they can generate a plethora of ideas but not be able to determine the proper solution (Wyrick, 2003). Divergers have been shown to be interested in people, and prefer to work in groups where they can learn with an open mind and receive personalized feedback (Kolb, Boyatzis, and Mainemelis, 2000).

Assimilator. The assimilator's dominant learning abilities are abstract conceptualization and reflective observation. They are best at understanding a wide range of information and putting it into concise, logical form. They tend to be less focused on people and are more interested in abstract ideas and concepts – it is more important to them that an idea have logical soundness than practical value (Kolb, Boyatzis, and Mainemelis, 2000). These individuals prefer lectures, exploring analytical models, and thinking things through.

Converger. The converger's dominant learning abilities are abstract conceptualization and active experimentation. As such, they are best at finding practical uses for ideas and theories, preferring to deal with technical tasks and problems than with social and interpersonal issues. Due to their particular skill at problem-solving and decision-making, these individuals prefer to learn via experimentation and simulation.

Accommodator. The accommodator's dominant learning abilities are concrete experience and active experimentation. They thrive in situations that allow them to have "hands-on" experience. They enjoy involving themselves in new and challenging experiences, and tend to act on "gut" feeling rather than logical analysis (Kolb, Boyatzis, and Mainemelis, 2000). This preference for "hands-on" experience finds them gathering the majority of their information from other people for technical analysis, to set goals, and to do field work.

Methodology

A sample of N=60 Engineering Management students was obtained. These sixty students represent approximately thirty percent of the undergraduate enrollment in this department. These individuals were enrolled in one of five classes taught on campus: Managing Information and Technology, Marketing Management, Financial Management, General Management – Design and Integration, and Industrial Marketing Systems Analysis. Thirty-five of the subjects were male, twenty-five were female, and the average age among the group members was 21.45 years. In terms of class ranking, the breakdown is as shown in Exhibit 2.

Exhibit 2. Participants by Class Level

Class Level	Number of participants
Freshman	2
Sophomore	13
Junior	15
Senior	25
Graduate	5

Each participant was asked to complete the Kolb's Learning Styles Inventory (LSI), version 3. The LSI is designed to measure the degree to which individuals display the different learning styles developed from experiential learning theory. The test is a 12-item questionnaire in which respondents rank four sentence endings that correspond to the four learning modes and describes their learning style. For example, the respondent, given the statement "when I learn," would rank order the sentence-completing statement, of four choices, that most describes them with a '4', and the statement that least describes them with a '1'. Veres, Sims, and Locklear (1991) report mean internal consistency indices for the LSI to be 0.56, and test-retest reliability for each of the four scales (concrete experience, reflective observation, abstract conceptualization, and active experimentation) to be 0.92, 0.93, 0.94, and 0.91 respectively.

Results and Discussion

Each questionnaire was scored using a template provided by Hay Resources Direct. Learning styles were coded numerically such that '1', '2', '3', and '4' corresponded to "accommodator," "assimilator," "converger," and "diverger" respectively. Means and standard deviations, based on the coded learning styles, were calculated. Exhibit 3 reports these results. The overall mean among the sixty students was 2.34.

Exhibit 3. LSI Results by Class Level

	N	Min.	Max.	Mean	Std. Dev.
Fresh.	2	1	3	2.00	1.41
Soph.	13	1	4	2.00	1.08
Junior	15	1	4	2.73	1.10
Senior	25	1	4	2.16	1.07
Grad.	5	2	3	2.80	.45

Based on this data, the average engineering management student was found to be an assimilator. There are implications here for the instructor and the employer who hires one of these engineering management students. For both individuals, traditional teaching methods that focus on one approach (i.e., lecture, laboratory, etc.) for engineers, who, overall, tend to be convergers (Cross and Faulkner, 2004; Wyrick, 2003; Svinicki and Dixon, 1987) might not be the most beneficial for the student. As assimilators, these students' strength lies in their ability to condense large amounts of information into logical form. Therefore, activities that allow them to think things through, reflect on their experiences and the experiences of others, and explore concepts and ideas (e.g., discussions, rhetorical and thought questions, lectures, projects, model building) might foster a more complete learning.

There are some limitations to this research. Freshmen students were underrepresented. This is due to the nature of the university, as all freshmen engineering students, upon acceptance to the university, participate in the Freshmen Engineering Program before beginning extensive work in their respective departments; introductory courses in their chosen departments can be taken. Only after 25 – 30 hours of coursework does the student's grade level change to that of 'sophomore.' Therefore, it is possible that the freshmen in this study were on the cusp of becoming sophomores (e.g., had completed 28 hours of coursework). Likewise, graduate students were underrepresented. Also, these 60 students represent a small number of the total number of Engineering Management students, undergraduate and graduate, enrolled at UMR.

Conclusion

This research is not meant to be prescriptive of how engineering management classes or workplace training should be conducted. Respondents in this research were categorized within all four states, so it would be counterproductive to say that students should be taught using one prescribed method. Almost everyone utilizes all learning modes to some extent (Cross and Faulkner,

2004). However, there are some educators that make the assumption that all students learn in the same manner that they do or from the same instructional techniques; such instructors may have a tendency to believe that students with different learning styles are low in intelligence, or even uncooperative (Harb, Terry, Hurt & Williamson, 1995). As mentioned before, learning styles remain consistent over time (Cross & Faulkner, 2004). Therefore, knowledge about students' learning styles can help educators and directors of workplace training to better design the presentation of subject matter for maximum learning.

Extensions of this research would include obtaining a larger sample of the school's Engineering Management students from both the undergraduate and graduate level to understand the variance in learning styles. Also, as a means of comparing these results, in terms of learning style, with other disciplines, samples could be obtained from students in some of the more "hardcore" engineering disciplines across campus. Finally, as mentioned before, learning styles tend to remain stable over time. An interesting question in this regard would be to understand whether a freshman who enters with a particular learning style maintains that learning style throughout his college career.

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About the Authors

Cassandra C. Elrod is a Masters student in the Engineering Management Department at the University of Missouri – Rolla. She holds a Bachelors degree in Engineering Management, also from UMR. Her research interests include experiential learning and individual differences and how they can impact academic learning and success.

Leroy R. Cox is a PhD student in the Engineering Management Department at the University of Missouri – Rolla. He holds Bachelors degrees in Mechanical Engineering and Engineering Management, and a Master's degree in Systems Engineering, all from UMR. He has industry experience in the areas of process improvement / reengineering and mechanical design. His research interests include organizational behavior, virtual teams, and managing people in organizations.