

An Experimental Study of Learning Styles Inventory: Implications for Human Resource Development

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This study is an inquiry into the use of the Kolb Learning Styles Inventory (KLSI) as a training tool rather than as strictly a diagnostic tool. The idea is to assess whether it is possible to alter the perception of learners on the divergence of learning styles through an appropriate conditioning process. Using an experimental design this study examines the implications of KLSI in Training & Development settings and presents findings related to research questions.

Keywords: Learning Styles, Training and Development, Learning

Kolb Learning Styles Inventory (KLSI) has been recognized as a well-established model in which learning is considered to have a four-stage cycle in a variety of disciplines including education (Jones, Reichard, & Mokhtari, 2003; Cassidy, 2004; Pedrosa de Jesus, Almeida, & Watts, 2004; Loo, 2004;), psychology (Genovese, 2004; Desmedt & Valcke, 2004), business (Sims, 1983; Swailes & Senior, 2001), and medicine (Reese, 1998; Grace, 2001). Since the beginning of the economic downfall around the globe, Training and Development (T&D) practitioners are seeking ways to address this challenge and remain strategic business partners that can contribute to the competitive edge of the organization. General cognitive ability of individuals may play a significant role in overall training outcomes (Kanfer & Ackerman, 1989; Ree & Earles, 1991; Holton, 1996). Therefore, individual learning styles may be fundamental in increasing the general cognitive ability of trainees.

Problem Statement

KLSI has a long history of use as a tool to assess the learning styles of students around the world (Kolb & Wolfe, 1981; Kolb, 1984). Many have taken it as a way to examine how they learn in an academic environment (Bacon, 2004; Desmedt & Valcke, 2004). T&D primarily focuses on individual development through continuous learning. However, some of the common failures of T&D programs include inappropriate training materials, lack of the application of adult learning theories, and specification of training (Swanson & Holton, 1999). As a result, it is important for trainers to understand KLSI and consider them during the designing stage of T&D programs to achieve increased learning and transfer of training. This is especially significant if we consider the fact that approximately two thirds of training costs are associated with trainee costs (Swanson, 1998). This study is different from previous ones in that it is an inquiry into the use of the Kolb Learning Style Inventory (KLSI) as a training tool rather than as a strictly diagnostic tool as applied to T&D practice.

Theoretical Framework

Kolb's experiential learning model which led to his Learning Styles Inventory focuses on developmental learning theory. Kolb's two-dimensional learning model includes four learning styles in which learning begins with concrete experiences acquired through observation and self-reflection. Observations are then processed into concepts and generalizations on these experiences, and provide guidance to new experiences and interactions with the world (Kolb, 1976). Kolb's two-dimensional learning model is illustrated in Figure 1.

Kolb's two-dimensional learning model led to the development of the 12-item self-reporting learning styles inventory (1976) which was improved about a decade later through psychometric assessments (1985). Figure 2 illustrates these two dimensions with four quadrants of learning styles including accommodator, diverger, assimilator, and converger (1985). Kolb describes accommodators as people who learn primarily through hands-on and gut-feelings; divergers learn best from viewing concrete situations from multiple perspectives; assimilators learn

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mainly through understanding a wide range of information that is presented in a concise and logical format; and finally, convergers learn best by applying the ideas and theories into practical uses (1985).

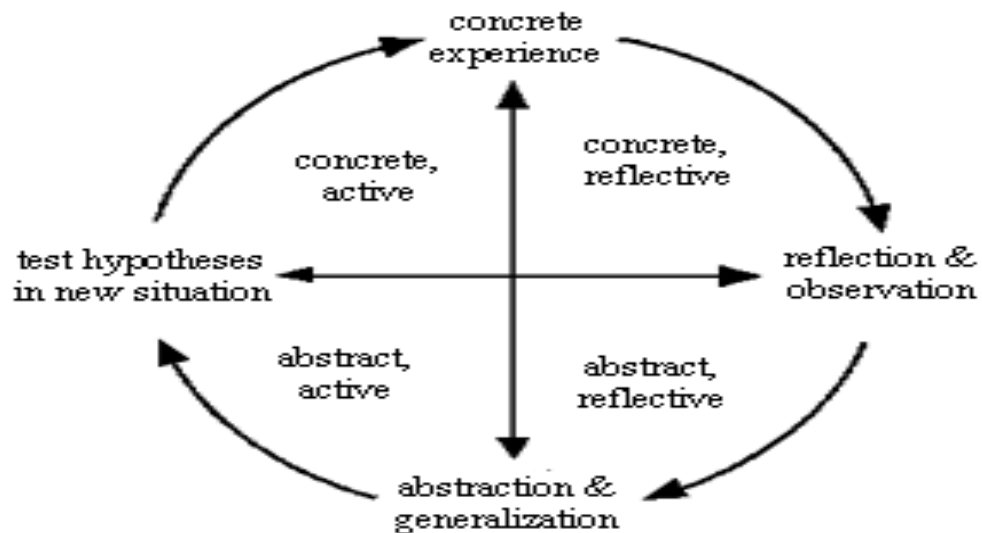


Figure 1. *Kolb's Two-Dimensional Learning Model*

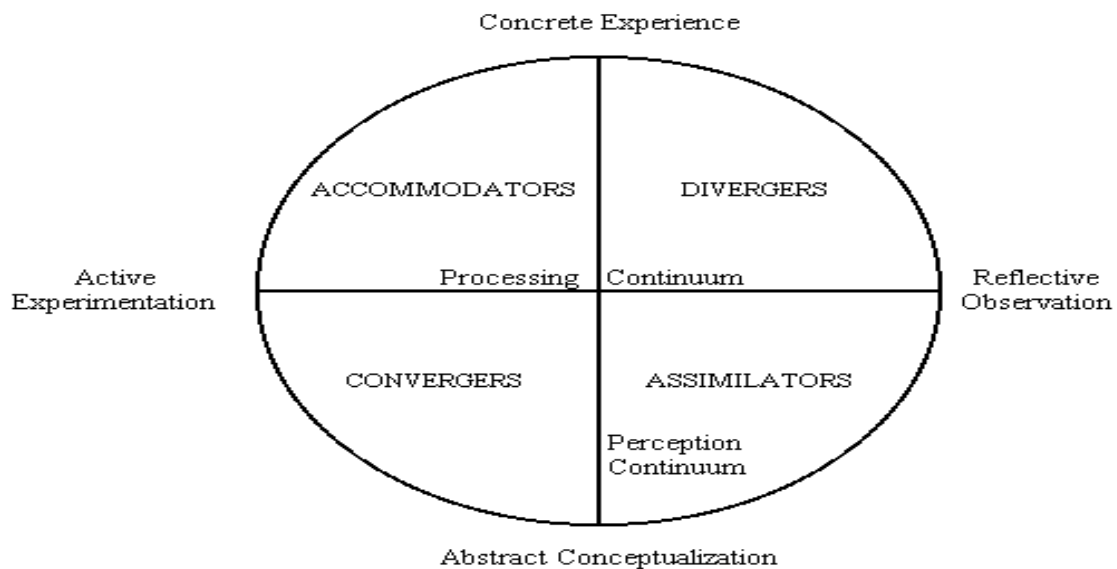


Figure 2. *Kolb LSI-1985*

Research Questions

Given the initial administration of the KLSI and the experimental treatment of one class, the inventory was administered to both classes at the end of the semester and the comparisons below are based on those students who participated in both offerings. The hypotheses developed for the study were:

1. The average scores for the class will be unchanged from the initial administration of the KLSI for both the experimental and control groups.
2. The variance of score by class for the experimental group will be increased over the initial/starting variance of the group.
3. The variance of scores by class for the control group will be unchanged from the initial offering of the instrument.

The purpose of these hypotheses was to assess whether the students' knowledge of KLSI in the experimental group and the reported demonstration of the instruments would generate a broader perspective and awareness of learning possibilities among these students (Black, 2004). The question is based on the possibility that knowledge would "soften the edges" of individual perceptions and attitudes toward learning, making them more flexible and accepting of different ways of learning as it pertains to T&D, thereby expanding their learning horizons. If the hypotheses were supported, this effort of using the KLSI as training too rather than a diagnostic tool should both promote the "learning experience" and the use of this instrument to develop and enhance T&D approaches.

Method

This is an experimental design study. The inquiry involves the assessment of two—and the conditioning of one—of these large ($n \approx 115 \times 2$) introductory Human Resource Management (HRM) classes at a large Midwestern university. One class was treated as an experimental group and the other as a control group. The classes are specifically designed to include a variety of activities which reflect differences in learning styles. That is, a litany of instructional methods were used which are directed toward the variety of learning styles possible (Bacon, 2004; Loo, 2004). The idea was for these students to experience the classroom material through a variety of learning methods with one class being conditioned as to why this was being done and what this meant to the learning process.

Data Collection & Data Analysis

Each of these HRM classes was giving the KLSI at the beginning of these classes in January 2005. All students attending these courses fit into the category of adult learner. The forms were entered into a database providing information on individual learning styles and college of enrollment. The KLSI results were then returned to the students and the results and applications discussed in both classes. There was no extra credit or other reward offered for participating in this study; the ideas and issues of learning styles were deemed to be of sufficient reward to make any other inducements inappropriate.

During the remainder of the semester, the classes were treated differentially with respect to learning styles, reflecting differences in sensitivity to student learning styles (Rosenfeld & Rosenfeld, 2004). The experimental class was repeatedly told of the "rationale" behind the various exercises and training activities they are experiencing. Thus, the group would be told something like: "You are engaging in this pay setting exercise in a way which is consistent with Concrete Experience." The idea was to condition the class as to why the exercise has the form it does and how it falls into a particular learning style (Black, 2004). The second class, the control group, was told nothing. They would be informed, for example, "You will be engaging in a pay setting exercise" and given no further information as to nature or rationale of the exercise from a learning style perspective; however, linkages to course objectives and materials were made. At the end of the semester, both groups were given the KLSI. Data analysis was performed using descriptive and t-test statistics.

Results and Findings

The initial offering of the KLSI allowed us to develop results on learning styles based on class and college of enrollment (as there are some nine colleges represented at the university). These results are reported in Table 1 which indicates total results for both classes as well as results for colleges of major enrollment when there were four or more students enrolled.

Since the course is offered in the business school, the bulk of the students reported on in Table 1 were from there. Some 161 were business students with 88 in the experimental group and 73 in the control group. It is interesting to note that the scores on the four categories from the Cycle of Learning are amazingly similar to those of the business school students. This is suggestive that those who enter business programs, at least on average, may have very similar learning styles.

The other four student colleges reported in Table 1 were from across campus, including liberal arts, education, home economics, and agriculture. It is evident that there are differences in learning styles, on average, for these other colleges. That is, the patterns exhibited in the four classifications of the Cycle of Learning reveal differences which may be significant in some contexts although this is beyond the scope of this inquiry.

To perform the tests of our hypotheses, we matched the scores of the Pre-Treatment and Post-Treatment results for the KLSI in both the experimental and control group classes. This led to sample sizes of $n_t = 80$ and $n_c = 53$. Student attendance in these large classes falls off during the semester.

Table 1. *Summary Report of Average Stage Scores from the Cycle of Learning, Kolb Learning Style Inventory, Experimental and Control Groups; by College of Major Enrollment*

<i>Experimental Group</i>					<i>Control Group</i>				
CE	RO	AC	AE	n	CE	RO	AC	AE	n
Business School									
22.1	29.2	35.0	33.8	88	22.5	29.0	35.1	33.5	73
College of Liberal Arts									
21.7	30.1	32.8	35.5	14	29.1	30.5	28.5	34.5	13
College of Education									
26.1	29.0	25.6	39.3	7					
College of Home Economics									
					25.7	31.8	27.0	35.5	6
College of Agriculture									
22.0	28.0	41.3	28.8	4					
Averages - All Colleges*									
22.3	29.2	34.2	34.3	114	23.4	29.6	33.4	33.9	105

NOTES: CE: Concrete Experience
 RO: Reflective Observation
 AC: Abstract Conceptualization
 AE: Active Experimentation

*:Totals include colleges not reported individually

Numbers reported only when college numbers are for four or more students.

Table 2 reports on differences in Learning Mode Scores for the experimental and control groups. As hypothesized, there were no significant differences under the experimental and control situations. Of the eight possible comparisons, five were lower and three were higher. The lack of statistical significance does not suggest there is any meaning to this finding.

Table 2. *Comparisons of Differences in Learning Mode Scores Pre-Treatment and Post-Treatment, With Level of Significance, Experimental and Control Groups*

	<i>Concrete Experience</i>	<i>Reflective Observation</i>	<i>Abstract Conceptualization</i>	<i>Active Experimentation</i>
Experimental Group				
Difference	- 0.538	1.338	- 0.338	- 0.613
Significance	p < .620	p < .283	p < .789	p < .586
Control Group				
Difference	0.345	- 0.724	- 0.517	0.897
Significance	p < .809	p < .653	p < .681	p < .462

Moving to Table 3, which reports on comparisons of differences of variances in Pre-Treatment and Post-Treatment KLSI learning mode scores, we again find no significant results, contrary to our hypothesis for the experimental group but consistent with our hypothesis for the control group. While it is clear that the variances in learning mode scores were not identical for both of the measured periods, they were so close as to indicate no difference of any significance.

Table 3. *Comparisons of Variances of Learning Mode Scores Pre-Treatment and Post-Treatment, with Level of Significance, Experimental and Control Groups*

	<i>Concrete Experience</i>	<i>Reflective Observation</i>	<i>Abstract Conceptualization</i>	<i>Active Experimentation</i>
Experimental Group				
F- Ratio	1.012	1.043	0.920	0.800
Significance	p < .479	p < .424	p < .644	p < .839
Control Group				
F- Ratio	0.972	1.080	0.861	0.570
Significance	p < .542	p < .386	p < .714	p < .661

It would appear that the slight differences in scores illustrated by the variance comparisons of Table 3—for both the experimental and control groups—were simply differences brought about by chance. The processes of learning about and working exercises in different learning styles had little impact on the participants in the experimental portion of this inquiry.

Conclusions and Recommendations

This study was a controlled experiment asking whether knowledge of learning styles a la Kolb (1984), when combined with a conditioning effort to explain the relationship between a set of classroom exercises and those learning styles, would alter them in some way—in a sense making the Kolb LSI a training instrument as well as an assessment tool, something it has not been asked to do before (Sims, 1983; see also Coffield et al., 2004). We hypothesized that while there would be no differences in average scores pre- and post-treatment, the variance of scores of the experimental group would be greater because they had learned of the linkages between practice and concept.

Our statistical results revealed no differences on average between the experimental and control groups, as expected, as well as revealing variances that were statistically unchanged pre- and post-experiment for both groups and contrary to our hypotheses. These results are in line with other, but different, studies of learning styles (Cassidy, 2004; Coffield et al., 2004; Laight, 2004). Why might these results have been different from our expectations and what do they suggest to us?

First, it may be the case that the Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation modes/constructs of the Kolb inventory, while having some uncertainty as to precise definition (Cassidy, 2004; Genovese, 2004), may yet be relatively stable and persistent in the individual. This would make any effort to change them difficult if not impossible to accomplish in the short run (Curry, 2004; Genovese, 2004). Second, this course represents only one out of the four or five courses a student typically takes in a semester at the university. This may make it difficult for an exploration of learning styles in one offering—20 percent or 25 percent of a student's course load—to overcome a lack of dealing with such issues in the other courses he or she is taking. Third, while we made great efforts to explore with the experimental group the variety of learning styles possible, the exercises used focused primarily on activities involving Concrete Experience (CE) and Active Experimentation (AE). The use of activities involving Reflective Observation (RO) and Abstract Conceptualization (AC) was, in turn, limited. This was realized after the fact as the nature of the experiment was debriefed and reviewed. There is certain to be a better research design in which the full variety of learning modes is explored more completely. Fourth, and finally, the amount of time spent in the conditioning process may have not been sufficient to produce the results hypothesized. The exercises amounted to only 10 percent to 15 percent of the students' time in the class. The bulk of the class time was spent in lecture and more traditional teaching styles. This may not have given the students enough time under the conditioning regime and may have made it difficult for them to change.

Do these results mean that the Kolb learning inventory cannot ever be used as a training tool? We would not reach that conclusion; the jury is still out on that possibility. There are likely many other research designs which might be addressed to this question and will be subject to exploration by these authors and others in a variety of venues. We have opened a door and we and others will pass through it in the future.

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