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ASSESSING THE EFFECTIVENESS OF LEARNING STYLES AS PREDICTORS OF PERFORMANCE WITHIN THREE DISTINCT PEDAGOGIC METHODOLOGIES

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Do individuals really learn differently? Will different instructional methods influence the performance of individuals with different learning styles? Answers to these basic questions represent the foundation of much of the research on pedagological methods and learning styles. One problem with research in learning styles is that no one has clearly defined the basic elements underlying various learning styles. Several researchers have suggested learning elements that apparently support learning styles in educational environments [3] [7] [9] [10]. These learning elements have been labeled by Kolb [8] as concrete experience (CE), reflective observation, (RO), abstract conceptualization (AC) and active experimentation (AE). He has developed an instrument that identifies four statistically prevalent types of learning styles based upon these four learning elements. Kolb labels these types of learning styles as convergers, divergers, assimilators and accommodators and describes them as follows [10, p. 6]:

> The converger's dominant learning abilities are abstract conceptualization (AC) and active experimentation (AE). This style seems to do best in those situations like conventional intelligence tests where there is a single correct answer of solution to a question or problem.
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> The diverger is best at concrete experience (CE) and reflective observation (RO). Their greatest strength lies in imaginative ability. They excel in the ability to view concrete situations from many perspectives and to organize many relationships into a meaningful "Gestalt." This learning style performs better in situations that call for generation of ideas such as a "brainstorming" idea session.
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> The assimilator's dominant learning elements are abstract conceptualization (AC) and reflective observation (RO). Their greatest strength lies in their ability to create theoretical models. They excel in inductive reasoning; in assimilating disparate observations into an integrated explanation.
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> The accommodator is best at concrete experience (CE) and active experience (AE). Their greatest strength lies in doing things; in carrying out plans and experiments and involving themselves in new experiences.

Hypothesis one--convergers would outperform the divergers, accommodators and assimilators on the traditional academic variables (i.e., ACT Score, GPA, Course Grade, etc.) in all three types of laboratory sections.

Hypothesis two--accommodators would outperform convergers, divergers and assimilators on the three individualized variables (Lab Total, Absences) in experiential and simulation laboratory sections.

Hypothesis three--there will be no difference between accommodators and convergers, divergers and assimilators on the three individualized variables in the discussion laboratory sections.

RESULTS

The results will be presented separately for each of the three types of laboratory sections. One way analysis of variance was used between learning styles with contrasts to evaluate differences between one learning style and the average of the other three styles.

Experiential Sections

Table one reveals that in the experiential sections five of the 11 traditional variables were significantly better for convergers than for the other three learning styles (variables number 2, 3, 5, 8 and 11). The other six traditional variables were all in the direction of supporting hypothesis one in that convergers had somewhat more positive scores (variables number 1, 4, 6, 7, 9 and 10). Table two shows that accommodators were significantly better on two of the individualized variables (Absences in Lecture, Absences in Laboratory Sections) and that the third individualized variable (Lab Total) was in the appropriate direction to provide support for Hypothesis two.

Simulation Sections

Table three shows only three of the traditional variables (variables number 2, 6 and 10) being significantly better for convergers, but the other eight variables (variables number 1, 3, 4, 5, 7, 8 and 9) were all in the hypothesized direction. This information also supports Hypothesis one. Table four reveals no significant differences for accommodators over the other three learning styles, but all three of the individualized variables were in the hypothesized direction. This shows some support f or Hypothesis two.

Discussion Sections

Table five reveals a departure from the previous trend. Only one of the traditional variables (Average Grade in High

They excel in those situations where they must adapt to specific immediate circumstances [8, pp. 6-7].

It appears from these descriptions of learning styles that convergers might be expected to outperform the other three styles in the traditional academic mode. On the other hand, accommodators should excel in experiential or simulation exercises that best utilize their particular strengths. Simulations and experiential techniques tend to focus upon the greater degree to which a student is actively involved and participating in the learning process and thus should be most effective with accommodators.

Fritzsche [6] has suggested that the study of learning styles may yield results that will allow identification of learning styles which are successful in specific learning environments and other styles which are more successful in other environments. Given this information one could possibly change the learning environment in an attempt to individualize the learning efficiency of each person. Conversely, it would also be possible to attempt to alter an individual's learning style in the direction of a more successful learning style for a particular task or learning environment. The predictable presence of a variety of learning styles among students suggests a need f or equal variability in the learning process. This line of reasoning would suggest that given the same relative past experiences and present conditions, different students are quite likely to react differently and even learn different things as a result of differential levels of some moderating variable or variables. It may be suggested, following contingency thinking, that where a particular student's learning style is in contradiction with the instructor's chosen learning process, education will be minimized if not rejected altogether.

Fritzsche [6] and Wolfe and Byrne [11] have studied the impact of learning styles upon performance in experiential environments. Denike [5] conducted research that investigated the influence of learning styles as predictors of learning in simulation games. Brenenstuhl and Catalanello [1] have investigated the relationship between learning style and selected personality constructs. The present study will build upon each of these approaches and uses a data base described elsewhere by Brenenstuhl and Catalanello [2] and Catalanello and Brenenstuhl [4].

The purpose of this paper is to investigate the association between learning style as described by Kolb [8] and measures of academic performance within three distinct types of learning environments. The broad question being addressed in this paper is whether students when grouped by learning style and exposed to either discussion, experiential or simulation pedagologies exhibit significantly different levels of performance on different course assignments and requirements.

METHODOLOGY

The sample consisted of approximately 500 college juniors and seniors enrolled in a basic Principles of Management course. The students attended one of two lecture sections twice a week. Each student attended one of 16 available laboratory sections once a week. The focus of the study is on the laboratory sections which consisted of six sections using a discussion group instructional method, five sections using an experiential mode of instruction and five sections where a simulation was used for instruction.

The subjects were randomly placed in one of the 16 laboratory sections. The experimental treatment assigned to each section was determined to minimize the possible effect of meeting times. No significant differences were found between the treatment groups with respect to learning style preferences.

All students were given a pre-test/post--test treatment with the course final exam serving as the instrument to determine learning. The following data points were used as measures of traditional academic performance: (1) Average Accumulative Index in High School; (2) American College Test (ACT) Comprehensive Scores; (3) Grade Point Average in College; (4) Pre-Test Score; (5) Common Hourly Objective Examination #1; (6) Common Hourly Objective Examination #2; (7) Common Hourly Objective Examination #3; (8) Post-Test Score (Final Exam Score); (9) Learning Score (Post-Test minus Pre-Test Score); (10) Case Analysis;
(11) Course Grade.

All of the above data points were either generally available for the subjects or were specifically measured as part of the regular course requirements. All students, regardless of laboratory section type, were evaluated with the same traditional testing instruments.

Three data points were used to measure the effectiveness of the individualized nature of the three types of laboratory section. Absences from the lecture section were included in this category because it was felt that the students' motivation to attend the lecture section would be correlated with the students' attendance at the laboratory sections. These three individualized variables are: (1) Total Points Earned in Laboratory Section; (2) Absences from Laboratory Section; (3) Absences from Lecture Section.

Analysis was directed towards each of the three pedagogic techniques separately. Thus three separate analyses were con- ducted: one for the discussion laboratory sections; one for the experiential laboratory sections and one for the simulation laboratory sections. Students were categorized into one of the four learning styles, as suggested by Kolb, for analysis. The following hypotheses could then be tested.

School) shows an advantage for convergers over the other three learning styles. In fact, convergers were outperformed on the other ten traditional variables. This provides no support for Hypothesis one.

Table six shows marginal support for the position that accommodators would not outperform the other three learning styles in the individualized variables. However, the directionality would suggest accommodators did slightly better on these variables but not significantly better.

This provides some support for Hypothesis three. This support should be tempered by the fact that while none of the individualized variables showed a significant difference, they all tended to favor the accommodators.

CONCLUSIONS

It appears that for the experiential laboratory sections and for the simulation laboratory sections Hypothesis one and two are well supported. Convergers did significantly better in the traditional variables while the accommodators did marginally better in the individualized variables. These findings lend support to Kolb's conception of the four learning styles [7,8]. The results for the discussion laboratory sections, however, were not supportive of Hypothesis one. In fact, convergers in the discussion sections generally reached levels of performance that were inferior (but not statistically different from) the other three learning styles. This inconsistency in the data is difficult to adequately explain. A follow up study is currently being concluded and will hopefully shed some light on this dilemma.

Hypothesis three received marginal support from the data. Accommodators tended to outperform the other three learning styles on the individualized variables in discussion sections. This finding was interpreted as supporting Hypothesis three because the significance levels were considerably higher in Table six than those in Tables two and four. It is cautioned that this interpretation of the data treads the border of post-hoc analysis and is subject to question.

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(Please contact authors for Tables 1-6.)