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Simulation Performance Revisited: The Fit Between Instructor Style and Learning Style

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ABSTRACT

The issue of simulation performance has been explored from many angles. This paper takes a fresh approach to the problem by looking at the individual learning style as it fits with the instructor style and the pedagogy.

INTRODUCTION

Simulation games continue to be incorporated into many business classes at an increasing rate. Although the effectiveness of experiential pedagogies is difficult to measure, proponents submit that learning is more operative when the students are involved in a relevant activity and the environment is responsive to the immediate needs of students [3]. Yet, most professors who use simulation games are aware that some students in each class do not have a productive learning experience in the simulation classroom and consequently do not perform well in the class.

Kolb [7] suggests that an incongruence in the learning style of the individual may be a factor in the reduced effectiveness of simulations. He hypothesizes that a mismatch between learning styles and discipline demands have an impact on social adaptation of a student to the university. Moreover, he gives evidence that fit between discipline selection and learning style affect the perception between light and heavy work-loads [7, p. 178]. This paper presents a pilot study that explores the thesis that the fit between instructor style and learning style may explain individual performance in the simulation classroom.

BACKGROUND

Simulation and Performance

Simulation performance is generally thought to be high if the team performs well as determined by several measures of corporate performance. Positive performance has been associated with group cohesiveness [5, 10], team size [11], group member aptitude and grade homogeneity [11], use of effective decision support systems [12], and a host of other variables. In a comprehensive review in the literature, Gosenpud [4] concludes that performance may be a yet unmeasured interaction among a series of independent variables. In all cases, performance is considered to be a function of the team rather than an attribute of the individual. Thus, none of these studies address the fact that individual performance is the critical classroom issue and that the instructor is still forced to rank the individual. Within teams, individual members may be performing at varying levels resulting in nonconclusive results about the overall team performance. This issue is articulated by students who express dissatisfaction with the simulation/experiential class due to its lack of structure, focus on group work, or absence of "traditional" ambience.

Individual Learning Style and Instructor Style Learning style is a complex construct that appears to consist of many

dimensions including cognitive and affective processes, a longitudinal development of skills (Piaget), and the conflict and tension created by the group (Lewin). Although there is a tendency to measure learning in terms of outcomes, it may better be treated as a process with stages that have distinctive features. Kolb [7] treats this approach in the Learning Style Inventory (LSI) and suggests that individuals pass through discernable stages with attributes that may be addressed by different types of classroom content. The stages are identified along two dimensions: reflective observation vs. active experimentation, and concrete experience vs. abstract conceptualization. Each stage is associated with a "best" learning approach (LSI, P. 5). Four categories of learning style are thus derived: diverger, assimilator, converger, and accommodator.

Although the LSI has been subject to some criticism, the 12-item 1981 version has been validated over a wide range of professions, age groups and academic disciplines [7]. In addition, it has been used in studies associating it with other variables of interest to the authors including a study matching Bostrom's Trainer Style Inventory [2] to the LSI categories [8].

Bostrom's Trainer Style Inventory is a 60-item instrument that categorizes the trainer according to locus of control (internal vs. external) and cognition (sensory perception vs. analytical verbal). Scores on each dimension permit defining the trainer as having a behaviorist orientation (high sense perception/external locus of control), structuralist orientation (high analytical verbal/external locus of control), functionalist orientation (high analytical verbal/internal Locus of control), or humanist (high sense perception internal locus of control). Table 1 below highlights the characteristics of the Bostrom categories showing the match or fit with the LSI.

TABLE 1
 LEARNING STYLES AND TRAINING STYLES
 (adapted from Info-Line, April, 1988, p. 8)

	Bostrom Instructor-Style Categories			
	Behaviorist	Structuralist	Functionalist	Humanist
Orientation to Teaching/Learning	New behavior can be caused or shaped	The mind is like a computer & the teacher is a programmer	People learn best by doing and will do best what they want to do.	Learning is self-directed discovery
Learning Diverger Style	Assimilator	Converger	Accommodator	

Thus, one would expect to see better learning if the instructor style was that of a behaviorist and the learning style was that of an assimilator. Conversely, one would expect to see poorer learning between a behaviorist instructor and a divergent learner. Since neither categorization scheme implies a continuum, there is no one better or poorer fit; rather the fit relationship is dichotomous: fit or no fit.

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Instructor-Learner Fit and performance

In the discussion above, the contingency notion of fit between the instructor and learner is proposed. It seems reasonable to assume that the performance of the individual will be higher if there is a "fit" situation than if there is a "misfit." The simulation approach to classroom teaching appears to be most consistent with the instructor style of the functionalist. The basic assumptions of the functionalist are that performance on the job is a true test and that the instructor role is one of coach. It may also be consistent with the behaviorist. The basic assumptions of the behaviorist are that learning is a process that has desired end results which can be achieved through reinforcement; therefore the behaviorist creates so environment of complete security for learners.

Both of these instructor styles are consistent with experiential classroom activities such as simulation games. In the behaviorist classroom, the emphasis may be on practicing while in the functionalist classroom, the emphasis is on problem-solving. Conversely, the structuralist depends on presentation techniques including carefully prepared lectures, and the humanist focuses on freedom and individuality [12]. Similarly, one would expect the Accommodator who learns best from hands-on activities and the Assimilator who can apply abstract concepts to a wide-range of information to outperform the Converger and the Diverger in simulation-type activities. Figure 1 below describes these contingency relationships.

FIGURE 1
CONTINGENCY RELATIONSHIPS BETWEEN LEARNING STYLE AND INSTRUCTOR STYLE



Thus, two general hypotheses may be generated:

H1: The performance of the learner will be highest in those situations in which the LSI score is consistent with the Bostrom Training Style Inventory Score of the instructor.

H2: Both Assimilators and Accommodators on the LSI will have better overall simulation performance than Convergers and Divergers.

METHOD

A pilot study was conducted at a large, Midwestern University using 102 undergraduate and graduate Business School students in Business Policy and Business Environment classes as subjects. All students were involved in a class situation in which a simulation game was the primary determinant of classroom performance. The simulation for all classes in the study was CORPORATION: A Business Strategy Simulation [9]. The simulation portion of the class included regular derivations for the simulation, periodic control analyses, peer review, and an annual report to stockholders.

All students were administered the Learning Style Inventory during the first class session. The instructors were administered the Bostrom Training Style Inventory. Performance was determined by the syllabus-weights on individual and group simulation activities. Overall firm performance was judged by:

1. Performance Points calculated by the simulation.
2. Overall cash management.
3. Cumulative return on sales,
4. Stock price.
5. A subjective ranking of the team by the instructor based on involvement and ability to maintain good group relationships.

Individual grades were assigned based on the quality of individual analyses (graded and returned each decision period) and peer review scores from teammates. Each individual was thus given a simulation score of 1-6 where 6 corresponds to an A and 1 corresponds to a C (this is the standard method of simulation grading at this university).

RESULTS

In order to test the hypothesis that fit between Bostrom's Training Style and Kolb's learning Style resulted in performance, frequency tables were formed using SAS Version 5.5. Performance categories of low, medium and high were formed by collapsing individual performance scores. Compatibility was determined in the following manner: accommodators (Kolb) in the functionalist classroom (Bostrom) and assimilators (Kolb) in the behaviorist (Bostrom) classroom were classified as compatible. All other combinations of LSI scores and Bostrom Training Style scores were classified as incompatible. Table 2 below summarizes the frequencies of classification. Although the Chi-square statistic was significant ($\chi^2 = 7.589$, $p < .05$), the frequency distribution indicated that incompatibility was associated with high performance. On the basis of this analysis, the fit hypothesis would need to be rejected.

TABLE 2
INSTRUCTOR STYLE AND LSI COMPATIBILITY RELATED TO PERFORMANCE (N=102)

Fit	Performance			Total
	High	Medium	Low	
Compatibility	9 (8.57%)	22 (16.67%)	10 (7.41%)	40
Incompatibility	20 (17.43%)	18 (13.33%)	4 (2.97%)	42
	29	40	14	

$\chi^2 = 7.589$ $p < .05$

A more detailed analysis was performed to see if the source of the negative results could be pinpointed. Table 3 below summarizes the frequency tabulations of LSI and performance controlling for instructor style. In this analysis, it was clear that the Converger learning style controlled the fit relationship since the Converger produced high performance (56.257 for the Behaviorist and 33.33 for the Functionalist) even though the literature did not suggest that this style would fit either the simulation pedagogy or the instructor styles he used.

In referring back to the learning Style Inventory, it appeared that the Converger would produce a high score on the dimension of Active Experimentation-Reflective Observation. Pearson r 's were computed for the four anchors of the LSI with the raw performance score. As Table 4 indicates, Active Experimentation has a $r = .274$ ($p < .01$) with Performance and Reflective Observation has an $r = -.302$ ($p < .01$). Correlations for the other axis (Concrete Experience-Abstract Concepts) were not significant. This can be interpreted as meaning that the use of Active Experimentation as a Learning Style has greater predictive value than the entire learning Style category.

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TABLE 3
LSI AND PERFORMANCE RELATIONSHIP CONTROLLED FOR
INSTRUCTOR STYLE
(N=102)

LSI Category	Performance					
	High	Medium	Low	High	Medium	Low
	Behavioralist ($\chi^2 = 11.559$ p < .05)			Functionalist ($\chi^2 = 10.750$ p < .10)		
Accommodator (%)	7 18.75	0 0.00	6 13.64	4 13.33	7 12.50	5 11.43
Assimilator (%)	4 25.00	30 45.45	5 11.13	4 11.31	6 17.50	0 0
Converger (%)	9 16.25	11 29.00	0 0	4 13.33	5 11.25	1 14.29
Diverger (%)	0 0	7 15.91	2 4.57	0 0	1 18.75	1 14.29

TABLE 4
CORRELATIONS OF PERFORMANCE AND KOLB DIMENSIONS

	Act. Exp.	Refli. Obs.	Con. Exp.	Advt. Concr.
Performance	.2734 **	-.1019 **	.0686	.1166

** p < .01

The hypothesis that Learning Style predicted simulation performance was tested with a frequency table. Table 5 below shows the anomalous fact that although approximately 547 of the high performers were in the predicted categories of Assimilators and Accommodators, these two categories were responsible for 71% of the low performers. It is interesting to note that in all analyses (Tables 2,4 and 5) the Diverger did not score high in performance. This may be a result of the Diverger's tendency toward Reflective Observation.

TABLE 5
LSI AND PERFORMANCE RELATIONSHIP
(N=102)

LSI Category	Performance			Total
	High	Medium	Low	
Accommodator	7 25.00%	9 13.33%	5 15.71%	20
Assimilator	8 28.57%	26 11.11%	5 15.71%	39
Converger	11 46.41%	16 26.67%	1 1.43%	28
Diverger	0 0%	10 16.67%	1 21.43%	11
	28	60	14	

$\chi^2 = 14.929$ p < .05

DISCUSSION

This study did not produce the conclusive results that would permit one to associate simulation performance with either individual learning style characteristic or some contingency relationship between the instructors style and the learning style. However, the role of Active Experimentation as a factor in learning style seems to have some predictive value. This suggests that one would find the greatest benefit in simulation and other experiential exercise at that point in the educational development at which experimentation is the active mode.

Kolb's studies indicate that this point is in the later stages of the learning cycle and are associated with certain careers that are action oriented. Therefore, simulation performance might improve in those universities in which there is a two-semester Business

Policy course. An additional analysis of learning style and performance as moderated by discipline may produce more robust results.

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