GOAL ORIENTATION AND SIMULATION PERFORMANCE

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ABSTRACT

This study explored the relationship between the students' success on a simulation exercise as measured by financial performance, their perceptions of the simulation's educational value, and their goal orientation. This study found the relationship between financial performance on the simulation and student perceptions of its attractiveness as an educational pedagogy were not significantly moderated by the goal orientation of the student. Limitations and directions for future research are explored.

INTRODUCTION

Many simulation users have argued that student attitudes toward simulation exercises are influenced by their financial success in the exercise (see, for example, Anderson and Lawton, 2007; Gentry, et.al. 2007). The focus of this study was to assess whether a relationship exists between a student's goal orientation, success in the simulation, and changes in attitudes toward the simulation. That is, does financial performance affect the attitudes of students with a performance goal orientation differently from those with a learning goal orientation?

LITERATURE REVIEW

ACHIEVEMENT GOAL ORIENTATIONS

Considerable research has been reported in the social psychology literature regarding the effect of goal orientation on motivation in an academic environment (Archer, 1994; Barron and Harackiewicz, 2003; Bouffard, et.al., 1998; Harackiewicz, et.al., 2000; Harackiewicz, et.al., 2002). Dweck & Leggett (1988) and Nicholls (1984) argue that students' achievement goals play an important role in shaping academic interest and can influence how a student approaches coursework. Students pursuing a mastery goal seek to acquire new knowledge and skills (Dweck, 1990). This contrasts with students pursuing a performance goal where the focus is on demonstrating competence relative to their peers (Diener and Dweck, 1978, 1980).

Mixed results have been reported for how these goal orientations relate to interest and consequent motivation in academic settings. For example, Harackiewicz et al. (1997) report that mastery goals predicted interest in a class, while Bouffard, Boisvert, Vezeau, & Larouche (1995) found no support for this relationship.

Harackiewicz et al. (2002) found that students with an initial interest in a course may be more oriented toward adopting mastery goals in an effort to learn more about the discipline. There was, however, no attempt to examine causality, so it may also be that students with mastery goals are more likely to develop an interest in a course where the potential for learning is high (Harackiewicz et al., under review, *Journal of Educational Psychology*). In fact, Elliot and Church (1997) found that when mastery is assessed early in a course, there was higher interest later.

While research demonstrates that students pursue multiple goals in their classes (Pintrich, 2000), it is unclear how the goals affect performance. While we know that students can pursue simultaneously both learning (mastery) goals and performance goals, research has not resolved the issue of which orientation will dominate or what the outcome will be if the person is both performance and learning oriented.

ACHIEVEMENT GOAL ORIENTATIONS AND BUSINESS SIMULATIONS

Dweck (1990) argues that performance-oriented individuals are more threatened by situations that are challenging and ill-defined than are those who are learning-oriented. Business simulations, by virtue of their fluid nature, place students in situations that challenge their ability to succeed (Gentry and Burns 1997). Given the complexity of most simulations, instructors typically do not expect students to possess the knowledge, skills, or experience needed achieve successful outcomes in the early

decision rounds of the game. The assumption is that students will learn the keys to success over time, hence the use of multiple decision rounds spread across a quarter or semester (Anderson and Lawton, 1997).

Gentry, et.al. (2006, 2007) contend that initial poor performance translates into students experiencing negative outcomes as they work to understand the complexities of the exercise. They question whether performance-oriented students will be able to manage the almost inevitable negative feedback that comes will game participation as well as learning- oriented students. That is, Gentry et al., speculate that performance-oriented students will be handicapped by their preoccupation with performance and as a result, will be less able to respond to changing conditions. They may assume a defensive position rather than adopting a broader focus on the learning opportunities that the simulation presents.

Earlier, similar concerns led Gentry and Burns (1997) to recommend "guided learning" to help students manage their experiences over the duration of a simulation exercise. They argued that students need active assistance from the course instructor to manage their expectations and help them focus on the results of a particular decision round as opposed to the simulation exercise as a whole.

FINANCIAL PERFORMANCE, ATTITUDES AND BUSINESS SIMULATIONS

Seijts et al (2004) studied three groups of students given three different goal outcomes in a complex simulation exercise. The three groups undertook the same simulation and were evaluated in terms of achieving one of either: a performance goal outcome, a vague "do your best" goal outcome or a learning goal outcome. They found that students who were asked to accomplish a learning goal outcome significantly outperformed the performance and vague goal outcome groups. Seijts et al (2004) also report that the performance goal group did not significantly outperform the vague goal group. They characterized this finding as "astonishing" because it was counter to most of the prior research on goal setting and motivation which states "that people who work toward specific, difficult goals outperform those instructed to do their best" (Seijts et al 2004, p. 235).

Anderson and Lawton (2006, 2007) reported no support for a relationship between financial performance on the simulation exercise and students' attitudes toward the simulation. Nor did they find support for a relationship between a student's performance and his or her perception of how much was learned from participating in the simulation. While the correlation coefficients were positive, as predicted, they were very small and none was statistically significant. The authors noted that anecdotal evidence seems to suggest that students achieving financial success on a simulation often express more positive opinions of the value of the simulation than do those experiencing weaker financial performance. Anderson and Lawton questioned whether there might be some unmeasured variable that would explain which students respond most favorably to simulations.

Simultaneous with Anderson and Lawton's studies, Gentry, Dickinson, Burns, McGinnis, and Park (2006 and 2007) presented evidence that learning-oriented students respond better to negative results on a simulation exercise than do students with a performance goal orientation. While they acknowledged complications with sample size and the instrument used to assess goal orientations, their results suggested that the impact of students' goal orientation might be an important consideration as instructors attempt to manage the simulation and assess students' engagement in the exercise. Their research suggests that goal orientation of students may be the unmeasured variable sought by Anderson and Lawton.

PURPOSE OF THE STUDY

The purpose of this study was to explore the relationship between: 1) performance on a simulation exercise; 2) a student's goal orientation; and 3) students' attitudes toward the exercise. As noted above, students can be simultaneously both performance oriented and learning oriented (Pintrich, 2000). Our hypotheses for this study, therefore, did not posit the results for performance goal oriented *versus* learning goal oriented students. Rather, they assessed the results for each goal orientation *independently*.

The hypotheses for this study were:

H1: For students with a high Performance Goal orientation there will be a positive correlation between performance on the simulation and changes in students' attitudes toward the simulation experience.

H2: For students with a high Learning Goal orientation there will be little or no correlation between performance on the simulation and changes in students' attitudes toward the simulation experience.

H3: For students with a high Performance Goal orientation there will be a positive correlation between performance on the simulation and changes in students' perception of how much they learned from the simulation experience.

H4: For students with a high Learning Goal orientation there will be little or no correlation between performance on the simulation and changes in students' perception of how much they learned from the simulation experience.

RESEARCH METHODOLOGY

THE SUBJECTS OF THE STUDY

Subjects for the study were 165 sophomores and juniors enrolled in an introductory marketing course at a medium-sized, university located in Canada. The course is required for all business majors and was taught as a large lecture class consisting of three hour night classes meeting over thirteen weeks during the Winter 2007 semester. The majority of the students were traditional, college-aged

students. A total of 114 students completed all parts of the study (69% usable response rate).

THE SIMULATION

The simulation used was *Merlin* (Anderson, et al., 2004). *Merlin* is a moderately complex marketing simulation requiring students to make approximately 120 decisions. The majority of the decisions involve elements of the marketing mix (e.g., price, quality, promotion) and marketing research, (e.g., purchase of price information) for each period of play. In addition, there are a few decisions related to operations (units sub-contracted) and finance (borrow short-term funds and manage cash flow). Each decision period represents three-months (i.e., one quarter).

Merlin has a Team version (in which student-managed companies compete against other student-managed companies) and a Solo version (in which one student-managed company competes against 14 computer-managed companies, not other student-managed companies). Only the Team version was used for this research. The initial simulation was set up for 29 industries composed of six teams each of which was managed by a single student (maximum of 174 participants). Due to enrolment shifts and student withdrawals only 165 students actually undertook the simulation and as such, the twenty-nine industries were variously composed of four to six teams. The simulation was played over eight periods with one decision each week. The simulation experience was weighted at twenty percent of the student's course grade consisting of 15 percent based on their simulation performance, 4 percent based on completing reports which contained the study's survey assessment measures and the final 1 percent came from a *Merlin* Solo completion exercise. The *Merlin* Solo exercise was tied into a lecture session on *Merlin* designed to familiarize the participants with the decision elements and the physical operations of the *Merlin* game itself. The remaining eighty percent of the course grade was allocated as 70 percent to examinations, 5 percent to a written ethics case exercise and 5 percent to interactive clicker exercises.

ASSESSMENT MEASURES

Four measures were used in this study. They were (1) performance on the simulation, (2) student attitudes toward the simulation, (3) student perceptions of how much they learned from participating in the simulation, and (4) student goal orientation (performance orientation versus learning orientation). The measures were undertaken before the start of the simulation and just following its completion. Only 114 students completed both measures and provided "usable" responses for analysis. The sample size for the analyses that follows fluctuates slightly (from 110 to 114) as a result of non-response on individual items.

Ten items were used to measure student attitudes toward the simulation. Factor analysis was conducted and two items were excluded from the scale. The remaining eight items had a high level of internal consistency as measured by Cronbach's alpha. This was true for both times that students' attitudes were assessed. Table 1 shows the items and Cronbach's alphas for the attitude measure.

The measure used for performance on the simulation was the Game-to-Date total points score (GTD Points) which ranges from a maximum of 100 points to a minimum of -100 points and is generated by the *Merlin* simulation. This score reflects the relative performance of each company based on their performance and the points weightings assigned by the instructor to the categories of sales revenue (5 points), net income (85 points), return on sales (5 points), and forecasting accuracy (5 points).

The learning measure was assessed using a single item

Table 1
Study Scales

Scale Name	Description of Items	Number of Items	Cronbach's alpha**
Attitude	a. I'm really excited about participating in the simulation* b. I think that participating in the simulation will be very worthwhile* c. I think that what I will learn from the simulation will be important for me to know* d. I'm really looking forward to learning more about the simulation* Six semantic differential scales. *The simulation was…* ▪ unpleasant 1 2 3 4 5 6 7 enjoyable ▪ frustrating 1 2 3 4 5 6 7 satisfying ▪ dreadful 1 2 3 4 5 6 7 engaging ▪ dull 1 2 3 4 5 6 7 stimulating Excluded from analysis to improve Cronbach's alpha ▪ simplistic 1 2 3 4 5 6 7 challenging ▪ overwhelming 1 2 3 4 5 6 7 manageable	8	.886, .937

* The scale for these four items is 1= strongly disagree to 7= strongly agree.
** Note: there are two values of Cronbach's alpha for each of the scales shown above because the questionnaire was administered on two separate occasions – before the simulation began and after its completion.

question. Students indicated their perception of how much they learned from participating in the simulation on a 7-point scale from "Nothing" to "An extreme amount".

The student goal orientation measure was assessed using a 25-item questionnaire. Twenty of the items were taken from Button, Mathieu, and Zajac and five additional items were added by the authors. (Button et al., 1996, p. 33). Factor analysis was performed on these items and several items were pruned from the list. In the analysis that follows, there were seven items for Learning Orientation and nine items for Performance Orientation. The Cronbach's alphas were .835 for the Learning Goal items and .722 for the Performance Goal items.

RESULTS

GOAL ORIENTATION

Because students can pursue simultaneously both performance goals and learning goals, we assessed the extent to which this occurred in the current study. Student goal orientation results were segmented roughly into thirds for each orientation. Table 2 shows the results of this analysis. Of the 114 students who completed the study, 18 (15.8%) were in the top one-third for both their performance goal orientation and learning goal orientation. This contrasts with 12 (10.5%) who were singular in their learning goal orientation (i.e., top one-third in learning goal orientation and bottom one-third in performance goal orientation) and six (5.3%) who were singular in their performance goal orientation (i.e., top one-third in performance goal orientation and bottom one-third in learning goal orientation).

GOAL ORIENTATION, PERFORMANCE, AND ATTITUDES.

To assess the relationship between goal orientation, simulation performance, and attitudes, we performed analyses using the *change* in student attitudes from the beginning to the end of the simulation exercise. Table 3 shows the results of this analysis.

As shown in Table 3, across the entire sample, there was a statistically significant relationship between change in attitude toward the simulation exercise and performance on the exercise ($p = .039$). The change was in the expected direction – the better the performance, the greater the improvement in attitude from the beginning to the end of the exercise. However, the magnitude of the change was very small; performance explained only 3% of the variation in attitude change.

To test Hypothesis 1 (changes in the attitudes of students with a high Performance Goal orientation will be positively correlated with performance), we took those who scoring in the top one-third on performance goal orientation. The range of financial performance for this group of students was very wide, from among the very best performers on the simulation to among the very worst. There was no statistically significant relationship between performance on the simulation exercise and change in attitude ($p = .290$). In fact, the small relationship that does exist is in the wrong direction. That is, as performance went down, the attitudes actually improved a bit. Consequently, there is no support for Hypothesis 1.

To test Hypothesis 2 (there will be little or no relationship between performance and changes in attitudes toward the simulation for students with a high Learning Goal orientation), we took those scoring in the top one-third on learning goal orientation. As with the high performance goal students, there was no statistically significant relationship between performance on the simulation exercise and the change in attitude ($p = .439$). Also like the "high" performance goal oriented students, very little of the change in attitudes is explained by the students' orientation toward learning. Since we hypothesized that there would be little or no correlation between a learning goal orientation and attitude toward the simulation, Hypothesis 2 is technically supported. However, when viewed in tandem with the lack of support for Hypothesis 1, this finding is not very revealing. Based on the results of this study, goal orientation does little or nothing to explain changes in students' attitudes toward a simulation exercise.

Table 2
Goal Orientation

		Learning Oriented		
		Bottom 3rd	Middle 3rd	Top 3rd
Performance Oriented	Bottom 3rd	14 (12%)	9 (8%)	12 (11%)
	Middle 3rd	17 (15%)	10 (9%)	11 (10%)
	Top 3rd	6 (5%)	17 (15%)	18 (16%)

Table 3
Goal Orientation, Simulation Performance, and Attitudes

	p-value	Adjusted R-Sq
All students (n = 110)	.039	3.0%
Performance Goal Oriented – Top 1/3 (n = 40)	.290	0.4%
Learning Goal Oriented – Top 1/3 (n = 39)	.439	0.0%

Table 4 Goal Orientation, Simulation Performance, and Perceived Learning		
	p-value	Adjusted R-Sq
All students (n = 111)	.073	2.0%
Performance Goal Oriented – Top 1/3 (n = 40)	.667	0.0%
Learning Goal Oriented – Top 1/3 (n = 39)	.792	0.0%

GOAL ORIENTATION, PERFORMANCE, AND PERCEIVED LEARNING.

To assess the relationship between goal orientation, simulation performance, and perceived learning, we conducted our analyses using the change between how much students expected to learn when they began the simulation exercise and how much they reported that they learned at the end of the exercise. Table 4 shows the results of this analysis.

As shown in Table 4, across the entire sample, there was a marginally significant relationship between change in perceived learning from participating in the simulation exercise and performance on the exercise ($p = .073$). The change was in the expected direction; the better the performance, the better of perceived learning in the exercise. However, the relationship was very weak; goal orientation explained only 2% of the variation in perceived learning.

When assessing just the students who were in the top one-third for performance goal orientation, there was no statistically significant relationship between performance on the simulation exercise and perceived learning ($p = .667$). Consequently, Hypothesis 3 was not confirmed.

As with the "high" performance goal oriented students, those who were in the top one-third for learning goal orientation showed no statistically significant relationship between performance on the simulation exercise and perceived learning ($p = .792$). Consequently, Hypothesis 4 was not confirmed.

DISCUSSION

The lack of support for a relationship between performance and attitudes toward the simulation (as well as perception of how much they learned from participating in the simulation) are consistent with the findings of Anderson and Lawton (2006, 2007). This study carries that conclusion one step further. The results of this study found no support for the hypotheses that students' goal orientation moderates the relationship between performance on a simulation and changes in student perceptions of its attractiveness as an educational pedagogy.

Based on the results of this study, concern for whether a student is performance goal oriented or learning goal oriented is not particularly valuable. Neither performance nor learning goal orientation had a significant effect on the changes in students' response to the simulation exercise in terms of their attitude and perceived learning. Further, the relationships that did exist between the students' goal orientation and attitude, and perceived learning explained 3% or less of the variation in those measures.

It was reassuring to discover that the students maintained a positive perception of the learning gained from participation in the simulation exercise regardless of their goal orientation. It appears they were able assess its educational value independent from their particular goals for the experience.

If these findings can be replicated by other teachers using other simulations, as noted in the Limitations section, below), then pedagogical designs related to simulation exercises would not have to reflect concern for students' goal orientation. While student's goal orientation may be relevant for other course objectives, it appears that they do not influence those related to simulation exercises.

LIMITATIONS

The principal limitation of the study is that it is based on a single instructor using a single simulation. It is conceivable that students would respond differently to other instructors or to other simulations. Another limitation involves unmeasured variables. Klein, Noe and Wang (2006, p. 671) discuss the notion of how enablers (environmental conditions that facilitate progress) and barriers (environmental conditions which impede progress) can affect motivation to learn which impacts performance. Given the situation of a moderately complex simulation like *Merlin* administered to sophomore and junior students in a large lecture class there is a high likelihood that there were a number of variables acting as enablers and/or barriers for motivation to learn.

CONCLUSIONS

As stated above, the results of this study found no support for the hypotheses that students' goal orientation moderates the relationship between performance on a simulation and changes in student perceptions of its attractiveness as an educational pedagogy. These results were contradictory to our expectations. Conventional wisdom and prior research would suggest that students' goal orientation would influence the students' attitudes and perception of learning regarding the exercise, depending on their financial success. No evidence was found for this in the current study.

Given the possible impact of enablers and barriers on motivation to learn which were not fully controlled for in this study a clear need for replication exists if we are to understand the results of this study. Klein, Noe and Wang

(2006 p. 672) discuss how time constraints, learner-instructor relationships, technology concerns, information, and authority can be barriers to motivation to learn. Conversely, comfort with technology, ease of use, and the availability of support can be enablers for motivation to learn. While the sample size of this study gives credence to the results we believe there is a need for replication of this study by other instructors using different simulations and also by instructors using *Merlin*, who undertake measurement of enablers and barriers of motivation to learn so as to control for them in the analysis of results. Further, in order to gain deeper insights into the role that students' goal orientations play on their learning, research in this area should include assessments of specific measures of student learning set by the course instructor that are not based on student self-perceptions.

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