THE PEDAGOGY AND EFFICACY OF USING INTERNET-BASED MARKETING SIMULATIONS: THE MARS SIMULATIONS (MARS) EXPERIENCE

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ABSTRACT

The present study considers the pedagogy and efficacy of using Internet-based simulations in relevant marketing classes. Two Internet-based simulations, The MARS Sales Management Simulation (MARS SMS) and the MARS Marketing Management Simulation (MARS MMS) were integrated into appropriate classes. Student reactions to the simulations and textbooks used in the courses are presented. The study concludes that the use of simulations not only achieves basic and higher-level learning objectives, but from the student perspective accomplishes these objectives better than a textbook

INTRODUCTION

There is a gulf that exits between theory and application. The theoretical aspects of course content have been handled so well in textbooks that they have become the staple of pedagogical tools in academia. College classes without textbooks of some type are very rare. While textbooks dominate the theoretical aspects of education, they exhibit much less effective performance when it comes to teaching the application of those principles. Yet, students graduating in business are expected to have experienced the complexities that come with decision making in a business context (Chapman and Sorge 1999).

Attention to application from textbooks takes primarily two forms – illustrative anecdotes or vignettes integrated into the chapters and cases at the end of chapters. However, both suffer from the same critical deficiency. In the same way that you cannot learn to fly an airplane, ride a bicycle, or drive a car from simply reading about it; it is very difficult to learn to apply course content without actually having to do it. While it can be argued that cases provide opportunity for practicing application, they have significant limitations. For example, they are static snapshots in time, do not demonstrate variable interactions very well, and provide subjective student performance feedback.

Another pedagogical device is available for teaching students to apply course content – the business simulation game. Creating a simplified, experiential environment, business simulation games maintain sufficient reality to reward and encourage real world-like responses by those participating in the exercise. As a result, students are presented with a series of situations that allow them to see the links between decisions made in the corporation, thus teaching real world concepts (Wolfe and Luethge 2003).

The present investigation looks at a student's reaction to the use of a marketing simulation in comparison to textbooks. The results suggest that students are very receptive to the use of simulations in the classroom. And a simulation's ability to provide the side benefits of developing higher level skill sets (problem solving, decision making, analytical) far surpasses the textbook.

SIMULATION EVOLUTION

The use of gaming as a pedagogical device in the business professor's educational repertoire is not new. According to Burns and Gentry (1992) marketing simulations have been used since the 1960's. Since that beginning the number of games and their frequency of academic use have grown dramatically. A study by Faria (1998) indicated that over 200 business simulation games were being used by approximately 8,600 professors at 1,733 business schools across the United States. Many corporations use business gaming in training their employees (Solomon 2002; Chapman and Sorge, 1999). These business gaming simulations have evolved through three generations as better technology came on line. As the level of computer technology has become more mature, simulations have become more complex and widespread (Doyle and Brown 2000; Faria 1998). But each generation also brought significant user benefits.

The authors have conceptualized a three generational typology as a result of first hand experience with simulation evolution. These three generations represent significant simulation advances based on the technology related to where the simulation is housed and how it is accessed.

First Generation Simulation Games

The first generation of business simulation games was mainframe based. They were housed on magnetic reel-to-reel tapes that were mounted on tape drives connected to a mainframe computer. Access to the simulations was accomplished through a dumb terminal. These simulations were difficult to interface, with data being input in 80 columnar formats. Mistakes were easy to make since inputting data one column to the right or left meant that all decision inputs were affected. Data input was essentially a string of contiguous numbers looking something like: 1727374583733656569.

Second Generation Simulation Games

The second generation of business simulation games followed the introduction of the desktop micro computer. These games were housed on floppy disks, and installed on individual microcomputers. The main program was transferred to the hard drive on the professor's computer and run from that location. The earliest forms of generation two simulations required students to submit their decisions on paper, and the professor input them into the microcomputer for the actual run. Output reports were printed and returned to the students as was the case of the first generation simulations. These simulation games were DOS based, and both decision input and distribution of output were once again time consuming tasks.

Over time the simulations evolved from DOS based to Windows based with the point-and-click interface making them much easier to use. Also data transfer from professor to student became available by floppy disk rather than hard copy. That evolution greatly simplified simulation administration and substantially reduced input error. However equipment and software compatibility issues made second generation simulations troublesome to use.

Third Generation Simulation Games

With the development and widespread use of the Internet came the third generation of business simulation games. These simulations are accessed directly over the Internet by both professor and student. They are housed on a computer at some remote location. Compatibility issues essentially

disappear. This paper focuses on third generation simulations, describes their features and benefits, and discusses the results of the use of two such simulations in marketing classes.

The learning experience is only as good as the simulation upon which it is based. A poorly designed simulation where one variable dominates and allows students to win by "gaming", rather than by learning, is useless. Also, where a mistake can have long-lasting devastating effects, the simulation has the innate potential to lose its ability to engage students over its entire gaming horizon. Therefore, caution must be exercised in the choice of a business simulation game.

THE PEDAGOGICAL ADVANTAGES OF A BUSINESS SIMULATION GAME

The primary pedagogical alternatives for teaching college level classes are lecture/discussion, case studies, projects, films, guest speakers and simulations. The textbook is generally the primary learning aid, with the other tools included to enrich the course. Each of these approaches has its merits and drawbacks. And it is probably good that students are exposed to a variety of teaching methodologies at some point in their academic careers.

As an educational alternative, simulations are a very enriching part of the learning experience. Students learn both the basics and the higher-level skills (e.g. problem-solving, decision-making, and analytical thinking) better by doing rather than by being passive in a classroom. These are among the skills at the top of the list when employers are interviewed about attributes they would like to see in their hires.

Simulations aid in the development of group management skills. Students learn how to organize and work effectively in small groups. Skills relating to the management of small group dynamics, leadership, and persuasive communication can be developed.

Simulations aid the development of problem-solving, decision-making, and analytical skills. Doing well in a simulation requires a situation analysis to learn the rules of the game, experimentation and data-based analysis to determine the forces impacting the desired outcome, and problem solving in a competitive environment. The development of these skills is invaluable.

Simulations provide exposure to a simulated real-world environment. Few undergraduate students have work experience that gives them a "feel" for what a sales or marketing manager actually does. Simulations are analogous to the on-the-job training often used in business environments, but without the inherent risks to the company or customers. It gives students a base from which to evaluate the relevance of course material in real-world applications.

Simulations are, by there very nature, dynamic. The environment changes due to participant decisions and the evolution of variables built into the simulation model. Resistance to change is a major problem with many corporate cultures. Learning that stagnation is a corporate death sentence is a pretty good lesson for students to learn. A dynamic environment certainly penalizes students who are not willing to change over time.

Simulations demonstrate the complexity of the interaction effects of management decision variables. Most textbooks deal with topics sequentially. A simulation simultaneously deals with course content components. Students get a feel for the complexity, interaction, and difficulty in measuring variables in a real-world setting.

Simulations provide an active learning environment. Active learning is a very valuable complement to the passive lectures that are so frequent in college classrooms. It gets students involved in the simulated world, and demonstrates the useful application of the concepts discussed in the classroom. In a sense, it makes students more receptive to course content because they can see its application.

Simulations are competitive. It is never too early for business students to begin to understand the competitive nature of the modern business world. In a simulated environment there are winners and losers. This is a great learning experience for students.

Simulations add fun, excitement, and interest. Yes, students can have a great time while learning in a simulated environment. Simulations help turn students on to the subject being taught. It is much easier for students to learn when they are enjoying the experience.

According to Faria and Dickenson (1994), the greatest benefit of all is the experience derived from participation in the simulation. They suggest that to learn how to play golf, drive a car, or fly a plane, one must be actively engaged in that activity. Instruction alone is insufficient to gain a proficient skill level.

Adding additional teaching methodologies to use of the simulation can increase these pedagogical benefits. For example, Zych (1997) suggests the use of cases in conjunction with a simulation to obtain the benefits of both. And Alpert (1995) describes the use of "executive briefings" on a weekly or bi-weekly basis to help students get the most benefit from the simulation experience.

THE MARS SIMULATIONS SELECTION

The two MARS simulations used in the present study were selected because they were third generation, Internet based simulations (Cook, et. al. 2003 and 2004). As such, they provided a significant number of benefits over first and second generation simulations.

Since the simulations are housed on a remote computer and accessed directly over the Internet, there were no installation, hardware or software compatibility issues to deal with.

Because students input their decisions and receive their output reports directly over the Internet, the professor's simulation administration is accomplished by one click of the "run simulation" button. The time required to run each decision period is literally seconds.

The simulations are very flexible in terms of time, location, and class size. They can be accessed 24 hours per day, seven days a week from any location on earth with Internet access. And because they are so easy to administer, larger classes can be easily accommodated by running multiple concurrent simulations.

Finally, both simulations have sound theoretical underpinnings. The MARS SMS is based on the Churchill et al. (2000) model of salesperson performance and the MARS MMS is based on the strategic principles of market segmentation, target marketing, and product positioning.

THE MARS SIMULATED ENVIRONMENTS

The Mars Sales Management Simulation

Students play the role of a newly promoted, first-line, district sales manager. They have responsibility for directing and motivating 5 salespeople in their district. Each of the 5 salespeople in the district have a unique set of preferences, and experience levels; and as such respond differently to the various decision input variables available to students. Each sales person is assigned to a unique, geographic territory.

The product is a line of electronic video games that can be played on computers or a variety of gaming machines. Sales of these products are highly seasonal. This forces the students to carefully consider their decisions from one decision period to the next. Since students cannot hire or fire their salespeople, they are forced to concentrate on the determinants of salesperson performance. Their job is to maximize that performance.

Participants in the MARS SMS make a total of 53 decision inputs for their district. There are 10 decisions that are made for each of their 5 salespeople (50 total decisions), and 3 contest-related decisions that are made for their district as a whole. In addition, students have the opportunity to purchase 7 research reports reflecting the outcomes of each decision period. Finally they can purchase benchmarking reports representing the input decisions for any other team in the simulation. In total, the number of required decisions each period is 60, plus whether or not to purchase a benchmark for each of the other teams in the simulation.

The MARS Marketing Management Simulation

Students play the role of a newly hired corporate marketing manager. As such they are responsible for the strategic marketing direction of the company. They report directly to the President and CEO. The MARS MMS uses the same corporate setting as the MARS SMS described above. Students who play one simulation are therefore easily assimilated into the other.

Participants in the MARS MMS make both strategic (market segmentation, target marketing, product positioning) and tactical (marketing mix) decisions. They can make up to 32 new product development decisions, 44 marketing mix decisions, and 15 market research report decisions for a maximum of 91 decisions each decision period.

METHODOLOGY

The MARS Sales Management Simulation was used in two Sales Management classes. One class was conducted in fall semester, 2003. The other class occurred during spring semester, 2004. Each team made 12 simulation decisions over a 12 week period. This represented a simulated 3 years, since each decision represents a simulated business quarter. The textbook for this course was Sales Management: Analysis and Decision Making (2004) by Ingram et al.

The MARS Marketing Management Simulation was used in two principles of marketing classes in the summer of 2004. One class was for students enrolled in the college of business and economics and the other class was composed of students from a variety of disciplines in the university's academic setting. The results therefore reflect the perceptions of both business and non-business students. As with the

sales management simulation, each team made 12 simulation decisions over a 12 week period. The textbook for these courses was Essentials of Marketing, 4th edition (2005) by Lamb et al.

A survey was administered to all students as part of the course evaluation during the last week of classes. The questions were based on the types of questions used in the studies by Chapman and Sorge (1999), Cook (2004) and Cook and Swift (2004).

In the Sales Management classes, a nine-point scale was used to measure student reaction to each of these statements. The scale ran from 1, strongly disagree, to 9, strongly agree. Thus the higher the number the more strongly the respondent agreed that the statement reflected either the simulation or textbook experience. A nine-point scale was used because that was the scale in the original study (Chapman and Sorge, 1999) that formed the basis for the sales management questionnaire statements.

The survey administered to the two introductory marketing classes was based on a 5-point scale from 1, strongly agree, to 5, strongly disagree. It should be noted that for the marketing survey the scale, the statements, and the direction of the anchors were different than in the sales management study. A five point scale was used so that the data could be collected on scanning forms for future research on mass sections of over 150 students.

The number of respondents from each class follows:

Sales Management (fall + spring): 50
Survey of Marketing (Non Business): 26
Principles of Marketing (Business): 17

For purposes of analysis the sales management classes were combined since they were sequential replications of the same course. The marketing classes were kept separate since one class was composed of business students and the other was composed of students from other disciplines within the university.

Means and two-tailed t-tests were calculated for each statement comparing the MARS simulation to the textbook used in the class.

RESULTS

The mean responses and two-tailed significance for all three cases are contained in Tables 1, 2, and 3. Table 1 also contains a statement on team skill development that was applicable to the simulations but not the textbook. Hence, no significance test could be performed on that statement. For ease of identification, statements that are significant at 0.05 are listed in bold font.

As demonstrated in Table 1 for the Sales Management class, the simulations dominated the textbook with 10 of the fifteen statements demonstrating a significant difference in student ratings at the 0.05 level. In the other 5 cases, the mean was higher for the simulation than for the textbook, although the results did not meet the 0.05 standard for significance. These results are very striking in that the students not only found the simulation to be better than the textbook at teaching the application of course content, but in teaching the course basics as well.

Table 1
Comparison of Means for Evaluation Statements
Sales Management Simulation
N=50

Statement	MARS	Text	Prob.
Made me think	7.50	7.00	0.060
Should continue to be used	8.02	5.88	0.000
Made course more interesting	7.44	6.74	0.038
Is useful learning tool	7.34	6.86	0.127
High level personal involvement	7.80	6.98	0.016
Overall very positive	7.94	5.64	0.000
Improved decision making	7.96	7.06	0.011
Kept me interested	7.42	6.98	0.165
Improved analytical skills	7.76	5.86	0.000
Applied what learned in class	7.88	6.20	0.000
Improved problem solving	7.66	6.30	0.000
Helped learn concepts	7.58	6.18	0.000
Taught fundamentals	7.62	6.22	0.000
Helped understand subject	7.44	7.12	0.245
Helped retain knowledge	7.56	7.02	0.109
Opportunity to develop team skills	8.00	N/A	N/A

Rating Scale: 1 = “strongly disagree” to 9 = “strongly agree”

Table 2
Comparison of Means for Evaluation Statements
Marketing Management Simulation (Business)
N=17

Statement	MARS	Text	Prob.
Helped understand Mktg. Issues	2.294	1.705	0.614
Made course more interesting	1.823	2.70	0.021
Applied course concepts	2.411	2.058	0.346
Helped retain course concepts	2.352	2.294	0.859
Useful learning tool	2.117	1.529	0.076
High level of personal involvement	1.470	2.352	0.012
Continue to use in class	1.882	1.588	0.436
Helped learn course concepts	2.294	1.470	0.011
Kept me interested	1.941	2.529	0.130
Made me think	1.647	2.411	0.003
Improved decision-making skills	2.000	2.941	0.002
Improved problem-solving skills	2.176	2.941	0.021
Improved analytical skills	2.235	2.647	0.296
Taught fundamentals of Mktg.	2.235	1.529	0.009
Overall very positive experience	2.294	2.235	0.870

Rating Scale: 1 = “strongly agree” to 5 = “strongly disagree”

Table 3
Comparison of Means for Evaluation Statements
Marketing Management Simulation (Non Business)
N=26

Statement	MARS	Text	Prob.
Helped understand Mktg. Issues	2.038	2.038	1.000
Made course more interesting	1.423	3.000	0.000
Applied course concepts	1.885	2.269	0.153
Helped retain course concepts	1.961	2.346	0.140
Useful learning tool	1.807	2.076	0.315
High level of personal involvement	1.538	2.884	0.000
Continue to use in class	1.653	2.307	0.024
Helped learn course concepts	2.076	2.115	0.886
Kept me interested	1.161	2.846	0.000
Made me think	1.161	2.769	0.000
Improved decision-making skills	2.153	2.923	0.005
Improved problem-solving skills	2.076	3.038	0.000
Improved analytical skills	2.230	2.846	0.014
Taught fundamentals of Mktg.	2.000	2.076	0.782
Overall very positive experience	1.576	2.307	0.009

Rating Scale: 1 = “strongly agree” to 5 = “strongly disagree”

The sales management simulation was also perceived to be superior to the textbook in allowing students the opportunity to develop higher level skill sets in the areas of problem-solving, decision-making, and analysis. There was no case where the students rated the textbook significantly higher than the simulation. In fact the sales management simulation mean is rated higher than the textbook on every statement tested.

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The results for the two introductory marketing classes, contained in Tables 2 and 3, were not quite as dominant as for the sales management class, but still pronounced. Students in these two classes agreed that the simulation surpassed the textbook in the sense that it made the class more interesting, got them personally involved in their educational experience, required them to think, and improved their decision-making and problem-solving skills. In one introductory marketing class the textbook was perceived as superior in teaching course concepts, subject fundamentals, and was a more useful learning tool. In the other introductory marketing class the textbook was not perceived to be significantly superior to the textbook on any attribute.

LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

The questionnaire was administered at one major public land grant university in three distinct classes covering two subjects. They constituted convenience samples without controls and relatively small sample sizes. While the results are therefore not statistically generalizeable across universities, the authors believe that the present study, coupled with previous research, provides some evidence that the results could be replicated in a large number of public universities across the United States, and perhaps elsewhere. The study was limited to two MARS simulations. Therefore the authors have less confidence that the results could be replicated regardless of the simulation selected. Additional

investigation at private, smaller, and liberal arts settings would help to generalize the results beyond the business school of a major public university. The results represent student perceptions of the simulations and textbooks. That falls short of independently measuring specific learning outcomes resulting from use of the textbook versus the simulation. The study of actual learning effects would be productive.

CONCLUSION

The results of the present study demonstrate that the use of a Marketing Simulation can significantly enhance the perceived value of instructional materials in a marketing class. In particular, at the 0.05 significance level, the simulations were universally perceived as better than the textbook at developing higher level skill sets, making the class more interesting, and doing a better job of getting students personally involved in their educational experience than were the textbooks.

The MARS Simulations proved to provide very positive educational experiences in their administration in the three marketing classes. They were extremely easy to administer, and presented no student problems regarding input or output. Students were very receptive to the simulations from a pedagogical standpoint, and were energized by their competitive nature. They saw the applicability of the course content in the simulations, and by inference, to the real world beyond academia.

The simulations provided the students with three simulated years of sales and marketing management decision-making experience. While the decisions were a simplification of reality to make them manageable in a course context, they were sufficiently complex to give the students a feel for what a career in sales or marketing management would entail.

The simulations allowed students to learn-by-doing. Their interaction with the simulations, coupled with immediate feedback, provided them with a very valuable educational experience.

The use of a simulation as a supplement to textbook content in marketing classes has significant educational and motivational value, and should be more widely used in higher education.

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