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Cooperative-experiential learning: using student-developed games to increase knowledge retention

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Abstract

Previous literature has discussed the use of cooperative and experiential learning as a means of augmenting student involvement in the learning process. Teamwork has been one method of employing cooperative learning and having students play games has been used extensively in experiential learning approaches. Often the two pedagogies are employed simultaneously by having students teams participate in games. This research combines the cooperative and experiential learning approaches by involving student teams in designing the games that other students will play with the goal of increasing student retention of knowledge. The sample included consumer behavior and integrated marketing communications students in two subsequent semesters. The pedagogy employed in the first of the two semesters included PowerPoint-based lectures, whereas the students in the second semester identified important concepts from the previous week's lectures and integrated that content into a review game. A comprehensive examination and student survey at the end of the semester indicated that knowledge retention increased in the courses that utilized student-developed games.

Keywords: student-developed games, cooperative and experiential learning, knowledge retention, marketing education

INTRODUCTION

Cooperative-Experiential Learning

Students in colleges and universities today, the “net generation” (Matulich, Papp and Haytko 2008), are more technologically savvy and less traditional in their styles of learning. Shorter attention spans, instantaneous access to information, and increased class size have required those teaching in higher education to continue to integrate innovative teaching strategies into the classroom to enhance student engagement and improve learning and performance.

Research indicates courses that utilize interactive approaches rather than traditional lectures increase learning (e.g., Harton et al. 2002, Gray and Madson 2007; Yazadjian and Kolkhorst 2007). Studies have examined active versus passive course designs and the benefits of student collaboration in cooperative learning (Davis 1993, Graham and Graham 1997, Munoz and Huser 2008, Wingfield and Black 2005). Petress (2008) defined active learning as the process where learners are involved in one’s own education and passive learning when learners are dependent upon the instructor to provide the knowledge content. Active learning activities require the student to be a participant in the transmission of knowledge (Yazadjian and Kolkhorst 2007). The student’s intention with regards to understanding, reproducing, and achieving objectives impacts the desired outcome of learning (Entwistle et al. 1979). An essential component of cooperative learning is that students are required to explain, support, relate, and convince others (Graham and Graham 1997) resulting in greater comprehension of course material.

The experiential learning approach to education and the impact of learning styles with regard to creating learning spaces conducive to students’ control and responsibility have been examined (Kolb and Kolb 2005). Students reflect, test, and create new ideas with experiential learning (Munoz and Huser 2008) and approach learning differentially relative to their learning preference styles (Entwistle (2001). The application of Kolb’s experiential learning model among business students showed equal distribution of learning styles for marketing students (Loo 2002), illustrating the diversity of learning styles within the marketing discipline. Social interaction among students enhances learning and when students explain information to other students the explainer’s learning is reinforced (Davis 1993).

Games in Higher Education

Many educators have used games in higher education as an experiential learning pedagogy. Having students play games has increased participation, interaction, interest, and learning (e.g., Azriel et al. 2005, Haytko 2006, Reinhardt and Cook 2006). Games have also been used to examine competitive and collaborative strategies (Fawcett and McCarter 2006) and in conjunction with problem-based learning (Kanet and Stöblein 2008). Business instructors have employed games as a pedagogical approach in accounting (Shanklin and Ehlen 2007), operations management (Kanet and Stöblein 2008, Reinhardt and Cook 2006), production (Piercy 2010), principles of marketing (Graham and Graham 1997, Haytko 2006), marketing capstone (Strauss 2011), and supply chain management (Fawcett and McCarter 2006, Dhumal, Sundararaghavan and Nandkeolyar 2008).

The use of games by business instructors often involves a game designed by the instructor based on a popular TV or board game. The instructors in Azriel et al. (2005)

generated a Jeopardy game for mid-term exam reviews with “answers” selected from the textbook, readings, and lecture materials. Students in an experimental section of strategic management were divided into two teams and played the game against the other team. Students in a control section of the same course received a traditional lecture-based mid-term review and a question-and-answer session. Students expressed favorable attitudes and perceptions about the game, but there were no significant differences on a mid-term exam between the experimental and control groups.

Reinhardt and Cook (2006) used a version of the TV game show, “Who Wants to Be a Millionaire,” to conduct numerous mid-term and final exam review sessions for both undergraduate and MBA students. The instructors designed the game and selected four-answer multiple-choice questions from testbanks and/or prior exams. The questions mirrored the kind of questions students could expect to see on an exam. Student perceptions about the game were generally positive, and students’ performance on the exams was enhanced. Haytko (2006) experienced similar student perception and learning outcomes in employing a version of the TV game Jeopardy.

Barr and Tagg (1995) argued that modern education must go beyond merely having students participate in class. The modern learning paradigm should involve cooperative, collaborative, and supportive learning, as well as shared governance with the instructor in producing student learning. Strauss (2011) relied heavily on this learning paradigm in designing a variation of the TV reality game show, “The Apprentice,” for students in a marketing capstone course. Summarizing the ways that Barr and Tagg (1995) suggested to implement the learning paradigm, she sought to:

- Offer students experience with the knowledge construction process....
- Offer appreciation and experience with multiple perspectives....
- Embed knowledge in realistic contexts....
- Support student ownership and voice in the learning process....
- Embed learning in social experience....
- Encourage self-assessment of the knowledge construction process.... (Strauss 2011, p. 4)

Student teams in this capstone course worked on four or five client-sponsored projects over the course of a semester and competed with other teams to produce the best set of results for their clients. Student grades were partially based on the success of their solutions. Students “co-created” the knowledge process in that they had to determine what materials to review and learn in order to reach a solution and produce the required deliverables.

Abramson et al. (2009) argued that having students prepare game material is critical to their mastering course material. Students who supply questions and answers will have lecture notes that are more organized and their critical thinking/rote memory skills will be enhanced. This approach is consistent with the learning paradigm espoused by Barr and Tagg (1995), who encouraged a learning environment that is “cooperative, collaborative, & supportive,” governance is shared between the instructors and students and students are enabled to discover and construct knowledge.

The primary purpose of this study was to determine if students could identify important knowledge content and create a game-based learning strategy that improved student performance

on a comprehensive end-of-semester exam. The secondary purpose was to determine student preferences between lecture-based and game-based pedagogy.

EMPLOYING THE COOPERATIVE-EXPERIENTIAL LEARNING PARADIGM IN INTERMEDIATE-LEVEL MARKETING COURSES

This section describes the innovative approach to implementing the new learning paradigm in two intermediate-level marketing courses. The university is a small public university located in a city of approximately 100,000 people in the southern United States. A large percentage of the student body are commuters who live in a four-county region. Most students commute less than thirty minutes, but for some, the commute may be as long as two hours each way.

The two courses, consumer behavior and integrated marketing communications, are typically taken by students in the second semester of their junior year or during their senior year. Principles of marketing is a prerequisite for both courses. Students in principles of marketing at this university must participate on a team to prepare and present a marketing plan for a new product, so the students have some experience with cooperative learning prior to taking the two courses.

A traditional lecture-based approach was used in the fall semester for seventy-four students in consumer behavior and integrated marketing communications. Eighty-eight students in the same two courses the succeeding spring semester participated in an innovative teaching pedagogy using student-developed games for weekly reviews. All four courses were taught by the same instructor. Students completed a non-graded comprehensive end-of-semester exam and opinion survey. Bonus points were awarded to students for completing the exam and survey. The comprehensive end-of-semester exam comprised multiple-choice questions selected from each chapter. The questions were selected based on their difficulty, which were questions most often missed in prior exams.

Both classes met on a Tuesday/Thursday schedule for an hour and fifteen minutes. One chapter per day was discussed, for a total of two chapters per week. Student self-selected into teams of 3-4 students and chose the game day at the beginning of the semester. Students were instructed to develop a game that involved a creative learning strategy. The game was played in the first 10-15 minutes of class the following Tuesday and was to address the important concepts from the previous week's lectures. Students were instructed to not only identify the important concepts, but also review concepts that they thought might be confusing or difficult for other students to understand. Teams were evaluated on the creativeness of game, identification of important concepts, ability of game to clarify confusing/difficult concepts, and audience involvement.

One example of a student-developed game created for the integrated marketing communications class was Marketing Feud, which was an adaptation of the television show "Family Feud." The topics included print advertising and television/radio electronic media. The student group divided the class into two teams. The Marketing Feud questions asked students to identify advantages and disadvantages of print, television, and radio advertising for a series of six questions. If a student listed one of the advantages that was discussed in class, their team earned one point. This game continued until the advantages and disadvantages of print, television, and radio advertising had been identified. When students answered incorrectly, the

team would explain why the answer was not correct. The team with the highest points at the conclusion of the game received candy awarded by the team members.

A second example of a student-developed game was Marketing BINGO, which was an adaptation of the traditional BINGO game. This game was utilized in the consumer behavior course. Team members had pre-printed Marketing BINGO boards with key terms from the previous week's lecture. In a traditional BINGO game, letters and numbers are called out and players mark their boards accordingly. For this game, a team member would provide the definition to a key term and the students were instructed to mark their BINGO card if their card listed the correct term. Other team-developed review games included adaptations of Jeopardy, Who Wants to Be a Millionaire, Hangman, Word Search, I Spy, Wheel of Fortune, \$100,000 Pyramid, Monopoly, Chutes and Ladders, as well as other team-created games.

Watson (1992) identified four elements that are collectively essential to maximize achievement: a cooperative task structure, cooperative incentive structure, individual accountability, and heterogeneous grouping. A cooperative task structure requires that the group be assigned some task that requires cooperation of the members to be completed. The assigned task in this study accomplished this element by requiring the team to identify important concepts and learning objectives and to collectively design a game that achieved these goals. Whether the teams did this through task specialization, wherein each team member was assigned a specific duty, or through group study was determined by the team. There is no strong evidence that either method is preferred (Slavin 1983).

A cooperative incentive structure is achieved if the group is rewarded based either on the group product or individual learning (Slavin 1983). This element was achieved by evaluating the team games based on the criteria described above (creativity, concept identification, concept clarification and audience involvement). A single grade was allocated to each member of the team based on the instructor's subjective evaluation of the team as a whole using a grading rubric.

Individual accountability requires that each student's performance be assessed (Johnson and Johnson 1987). The end-of-semester exam employed in these two courses assessed individual performance, despite the fact that the awarding of bonus points for completing the exam meant that course grades were not influenced by how well a student did on the exam but rather were influenced only by whether the student took the exam. This may enhance the validity of the results (see below) in that they were not influenced by last-minute cramming to do well on the end-of-semester exam but instead are a measure of how much the students learned and retained throughout the semester.

RESULTS

Student Demographics

Table 1 contains the demographics of the student population for both classes, broken down by gender, class rank, and age. For class rank and age, the populations were fairly evenly distributed between the lecture-based and game-based pedagogies for both the consumer behavior and integrated marketing communications classes. The key difference between the classes is the gender distribution in that the percentage of males is higher in both the lecture-based and game-based integrated marketing communications class than the consumer behavior class.

Table 1 Student Demographics (%)

	Consumer Behavior		Integrated Marketing Communications	
	Lecture n=48	Game n=37	Lecture n=26	Game n=51
Gender				
Male	54%	46%	62%	63%
Female	46%	54%	38%	37%
Rank				
Sophomore	2%	5%	0%	2%
Junior	38%	30%	23%	16%
Senior	60%	65%	77%	53%
Unclassified	0%	0%	0%	29%
Age				
19 to 24	81%	81%	81%	76%
25 to 30	13%	16%	15%	22%
31 to 40	4%	3%	0%	0%
over 40	2%	24%	4%	18%

Student Attitudes

Table 2 contains means and standard deviation of students' responses on a five-point Likert scale indicating their level of agreement to five opinion statements, where 1 indicated strong agreement and 5 indicated strong disagreement. Table 2 also contains results of independent *t* test analyses of differences between the two groups. The difference between the two groups' agreement with Statement 2 was significant at $p \leq .10$ level, a finding that indicates students who had exposure to the game-based strategy felt more strongly that the student-developed games increased their ability to remember course materials when compared to more traditional lecture-based pedagogical approaches.

Students in both groups indicated relatively strong disagreement with Statement 1 (mean response 4.04 for the lecture-based class and 4.03 for the games-based class, respectively), which measured their preference for lecture-based pedagogy over more innovative learning strategies. This result suggests that students prefer more innovative learning strategies such as games. One student described the approach as "refreshing" when contrasted with "lectures and large semester long projects" that are the norm for college courses.

Students also expressed relatively strong disagreement with Statement 3 (mean response 4.14 for each group), which measured their level of agreement that teaching methods do not affect their enjoyment of a class. Clearly the instructor selection of an innovative learning strategy affects students' enjoyment of a class. "It helped engage classroom interaction and discussion of topics, allowing students to ask each other questions in a more relaxed manner than having to ask the professor during lecture."

Students neither agreed nor disagreed with Statement 4, which measured their level of agreement that the use of creative teaching strategies would encourage them to attend class more regularly. The results of this study suggest that students express more enjoyment of class when innovative strategies are employed but they do not associate increased enjoyment of class with

increased likelihood of attendance. Students in both groups also agreed with Statement 5, that discussing material from the previous week prior to beginning new material makes it easier to understand the prior information (mean response 1.99 for the lecture-based group and 1.86 for the games-based group, respectively). The strongest agreement for both pedagogies was to Statement 2, that a “teaching style that uses games and other creative strategies increases my ability to remember course material....” Students who created the games expressed greater agreement (mean response 1.86) than did students from the lecture-based class (mean response 1.64). “I feel that it was extremely beneficial to students because it caused the preparers of the game to come up with questions (that would probably be on the test) and prepare coordinating answers. This definitely helped in test preparation.”

Table 2 Student Preference Results from Student Questionnaire on Use of Games

	Lecture based n=74	Game based n=88	Mean difference (std dev)
Statement 1: I prefer a traditional lecture style of teaching rather than a lecture that is combined with other learning methods such as games and other creative strategies.	4.04	4.03	0.044 (0.148)
Statement 2: A teaching style that uses games and other creative strategies increases my ability to remember course material as compared to a traditional lecture style of teaching.	1.86	1.64	0.229 (0.121)*
Statement 3: My enjoyment of a course is not affected by the teaching method used by the instructor.	4.14	4.14	0.001 (0.134)
Statement 4: I would attend class more regularly if games and other creative strategies were used in class.	2.53	2.49	0.038 (0.176)
Statement 5: If important course material from the previous week was discussed again at the beginning of the following week, it would be easier for me to understand the information.	1.99	1.86	0.123 (0.116)

Note. 1 = *strongly agree*; 5 = *strongly disagree*

* $p < .10$

Student Performance

Student learning outcome was measured based on the percentage correct of the comprehensive final exam. Identical questions were used for both the lecture and game-based approaches in order to compare results between the two teaching methods. Table 3 shows the

results of the independent t-test analysis of comparing mean scores between the lecture and game-based classes. For the consumer behavior class, students performed better in the game based than the lecture based class and were statistically significant at $p < .05$. Surprisingly, there were no statistical significant differences between the game-based and lecture-based approach on outcomes in the integrated marketing communications course. As noted previously, the integrated marketing communications was comprised of a higher percentage of males than the consumer behavior class. To determine if learning styles were impacted by gender, the population was analyzed by gender. In both classes, males performed better on the game-based approach; 14.5% improvement in consumer behavior and 9.4% improvement in the integrated marketing communications course. In the integrated marketing communications course, there was a statistically significant improvement in outcomes for male students ($p < .10$) when using the game-based approach; but not a statistically significant change in female students. There are a number of studies that confirm that there are learning differences between males and females (Severiens and Tab Dam 1998, Baxter 1992, Vermunt 1996). These results provide support that engaging students in identifying important knowledge content and designing social interaction game-based strategies increases their learning and retention of course materials and that the game-based strategy is even more effective with males than females.

Table 3
Comprehensive Exam Results by Class

Class	Lecture based Mean score % correct	Game based Mean score % correct	Mean Difference (Std. Error)
Consumer Behavior	.4606	.5691	.1084 (.031)**
Integrated Marketing Communications	.4183	.4804	.0621 (.044)

** $p < .05$

Table 4
Comprehensive Exam Results by Class and Gender

Class	Lecture based Mean score % correct	Game based Mean score % correct	Mean Difference (Std. Error)
Consumer Behavior			
Male	.4338	.5784	.1447 (.054)**
Female	.4924	.5611	.0687 (.034)**
Integrated Marketing Communications			
Male	.3867	.4805*	.0938 (.050)*
Female	.4688	.4722	.0035 (.081)

* $p < .10$

** $p < .05$

CONCLUSION

Educators continually look for new pedagogical approaches, particularly those which have been proven to increase student knowledge and retention. This study identified a teaching strategy that involves students in the learning process by requiring them to identify key knowledge concepts from lecture and to develop a creative way to review that information that their peers would find interesting and informative. The approach met the instructor's objectives to increase student knowledge and retention of course material throughout the semester as evidenced by improved performance on a comprehensive exam.

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