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Designing Group Examinations to Decrease Social Loafing and Increase Learning

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This study examines a method to decrease social loafing in a group examination. Students who met in teams during the semester took an exam in groups. Rules for the exam, based on the Jeopardy game show, facilitated both group and individual accountability. Feedback from students indicated that compared to a class that did not have group exams, students taking the group exam had less social loafing and had higher perceived levels of learning. Furthermore, among students taking the group exams, higher group participation was related to higher perceived performance and more positive attitudes about the exam. We developed a model for how the environment affects group processes which, in turn, affects group and individual outcomes.

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Introduction

Integrating student teams with classroom instruction is increasingly popular in higher education. Faculty reap the benefits of fewer assignments to grade while students benefit (presumably) from peer-to-peer learning. Student team utilization is diverse with teams ranging in size, duration, and task assignment; however one thing seems constant – teams are used for assignments but rarely used for examination purposes. It is as if instructors assume student groups are good for learning but not for assessment. This widespread assumption is being negated by recent research that shows the promise of effective team assessment.

A wealth of literature exists on student teams. The literature ranges from exploring applications in different disciplines, to handbooks and guidelines for establishing and managing student learning teams (Astin, 1993; Birmingham et al., 2004; Felder and Brent, 2001; Johnson et al., 1991; 1998; Millis and Cottell, 1998; Oakley et al., 2004; Smith, 2000; Springer et al., 1997; Stein and Hurd, 2000; Strbiak and Paul, 1998). There are also studies on the effectiveness and feasibility of group-based

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examinations, done largely in business administration, management, and science, that show increased student learning and satisfaction (Berry and Nyman, 2002;

Cottell and Millis, 1993; Graham and Graham, 1997; Hite, 1996; McIntyre et al., 1999; Ochoa et al., 2003; Rao et al., 2002, Webb, 1997, and Zimbardo et al., 2003). Despite the evidence, instructors are not adopting team-based assessments as widely as they adopt team-based learning. One possible explanation is the presumed problem of social loafing, or free riders, which are common to small groups (Harkins and Jackson, 1985 and Strong and Anderson, 1990) and would be accentuated under the pressure of a team examination. Social loafing during a team examination would result in unfair and distorted results – both of which instructors deliberately seek to avoid. The existing paradigm of inevitable social loafing assumes that cooperation during examinations is at best misdirected and at worst a form of cheating. This study aims to demonstrate a method to reduce social loafing in group examinations.

The emerging literature on cooperative group examinations documents the relative advantages of team tests, but does not explore possible causative factors. Both Rao et. al. (2002) and Stearns (1996) found that students who took examinations in small groups scored significantly higher than when they took the same test individually. Building on this, recent research demonstrates the effectiveness of holding a group-based, "public" examination in a format based on the game of Jeopardy. Specifically, Revere (2003) found a team-based Jeopardy examination promoted learning, measured achievement, and increased satisfaction, presumably due to student teams working together to achieve goals. Benek-Rivera and Mathews (2004) found similar results when using a team-based Jeopardy game to review for an examination. It appears that a team-based game examination fosters student preparation while promoting feelings of preparedness, team discussion, enhancement of understanding, and overall positive examination experiences (Benek-Rivera and Mathews, 2004; Revere, 2003). Neither study examined why the team-based assessment was successful, nor did they address how, if at all, social loafing was minimized.

High levels of group cohesion and effectiveness, coupled with individual accountability, reduce social loafing. Johnson and Johnson (2003) state that if "there is high individual accountability . . . and the group is cohesive, then the social loafing effect vanishes" while Birmingham and McCloud (2004) note that high levels of individual accountability logically would be associated with low levels of social loafing. Specifically, their comprehensive review of social loafing literature found minimizing social loafing depends on the extent individual and team behavior is recognized and rewarded and the extent to which individuals value the consequences of their team's success or failure. In short, although tasks can be clearly specified and relevant for a student learning team, the danger of social loafing exists unless the "assessment – reward (grading) system encourages collaborative task behavior".

Thus, the design of a team based examination that leads to high group cohesion and effectiveness, while assessing both individual and collaborative efforts, should result in low social loafing and responsible team member performance. The net effect should include high student performance and positive student attitude.

Design of a Team-based Jeopardy Examination

A team based Jeopardy examination was designed as a group assessment mechanism that encouraged positive social interdependence and required individual contribution. Jeopardy is a popular quiz show on television. Players compete against one another. There are multiple categories and each category has several levels of difficulty with greater rewards for more difficult questions. Players are free to pick the category and the level of difficulty until all choices have been exhausted. If a player answers incorrectly, players on other teams have the opportunity to answer the question and gain the reward. Then the correct answer is revealed.

For this study, the instructor used student teams as opposed to individual players. For each question there were two teams who were eligible to receive points – a primary responding team and a secondary team who could win points if the primary team answered incorrectly. Both teams were presented a question, with a member of the primary team having the first chance to correctly answer the question. If the question was not answered correctly, a member of the secondary team was asked to answer. Once a member of a team answered a question, they could not do so again until all other members of team had correctly answered at least one question. Thus, as soon as the question was presented, eligible players on both teams raised their hands if they knew the answer. The first person on the primary team to raise their hand was allowed to answer the question, and if answered correctly, received the point. If answered incorrectly, the first person on the secondary team to raise their hand was asked for the answer. If answered correctly, the secondary team received the point. If answered incorrectly, no teams received the point. The instructor then took time to demonstrate (on the blackboard) how to correctly solve the problem. This immediate feedback was a learning experience for the two players, as well as the class. Students had an opportunity to ask additional topical questions and receive clarity on the missed concept. The assessment also included some bonus questions in which the entire team could discuss and answer together. All bonus questions were computational and student teams were given approximately 5-10 minutes to answer these questions. Answers were submitted on an index card to the instructor. Once all student groups had turned in their answers, the instructor worked the problem on the blackboard and student teams knew immediately if they received credit. By providing immediate feedback for both the 'missed' individual questions and all computational questions the instructor sought to provide during examination learning and prevent further mistakes on the same concept.

The Jeopardy game creates a structure that Johnson and Johnson (2003) term "positive social interdependence," specifically, goal interdependence, reward interdependence, and outside enemy interdependence. The instructor achieved positive goal interdependence by measuring team performance through a team-driven evaluation score. The team-based Jeopardy examination was 15 percent of the total semester grade. Reward interdependence was assured because the same joint reward (grade) was given to all group members. Teams would benefit by ensuring that all team members achieved higher learning. Outside enemy interdependence also promoted positive social interdependence. Each team was placed in direct competition with a peer team for the purpose of answering examination questions. Incorrectly answered questions provided competing teams the ability to win points from their peer groups if they properly answered the question.

Individual accountability is integrated into this Jeopardy examination by requiring each individual team member to correctly answer at least one of the examination questions, without the benefit of teammates. Incorrect answers (poor individual performance) penalize the entire team because competing teams may steal the question and win a point, and other teammates may not answer additional questions until each team member has correctly answered one question. Thus, all individual team members must significantly contribute during the examination or negative consequences for both the individual (embarrassment) and the team (lower examination grade) will result.

Therefore, not only did the team as a whole need to perform well, but each individual needed to perform well because other team members would not be allowed to answer a second question until all individuals had answered at least one question. Based on the literature, requirements for individual accountability were presumed to minimize social loafing and encourage responsible team membership. The anticipated result was a positive student experience driven by high achievement scores and positive student attitudes.

Two research questions were multifaceted, centering on both group and individual outcomes. Specifically, to analyze the effectiveness of the Jeopardy game, we created two hypotheses:

H1: Students who participated in a team-based Jeopardy examination would:

1) demonstrate higher levels of participation among team members (i.e., less social loafing),

2) demonstrate higher perceived levels of learning, and

3) have more positive attitudes.

H2: Students taking the team-based Jeopardy examination who rated their groups high in participation would:

1) rate themselves higher in perceived performance, and

2) rate themselves higher in positive attitudes.

Methods

Study Data

The data in this study were obtained from two business undergraduate statistics courses, taught by the same professor. Thirty-four students were enrolled in the Monday class and 29 students were enrolled in the Tuesday class. Students were from a medium-sized state university. Undergraduates in the business school are 57% female, 61% White, and average 29 years old. The same content and teaching method was used in both classes. Three group cases, two mid-semester examinations and a final examination were given during the course. Both classes were required to self-select groups of 3 to 4 students for the group casework and both classes had completed two group cases prior to the Jeopardy/ traditional mid-

semester examination. Thus, both classes had substantial and equivalent group experience going into the Jeopardy examination. The same traditional (individual problem-solving) examination one was given in both classes during about the fifth week of the fifteen-week semester. Examination two, which was given during about the eleventh week of the semester, was a team-based Jeopardy examination for the Monday class and an individual examination for Tuesday's class. Questions for the Jeopardy game were primarily short answer factual questions with the bonus questions being more computational. The examination for Tuesday's class was created by randomly extracting questions from Monday's team-based examination. Thus, assessment criterion for both classes was the same; however, students in Monday's class were required to work as a team (3 to 4 students) and the entire team received the same grade. Students in Tuesday's class received individual examination scores. A post-examination questionnaire was given to both classes and students answered questions regarding their preparedness and understanding, as

well as the team's cohesion and effectiveness. Questions measuring overall student experience and performance were also asked.

H1: Comparison of Group and Individual Outcomes between Jeopardy and Traditional Classes

Group Participation

Three statements on the post-examination questionnaire measured the group outcomes of responsible team member performance and minimal social loafing. The first two questions directly ascertained individual participation in group study sessions. This was proxy for evaluating responsible team member performance because responsible performance on a team requires active and full participation in team activities, such as group study sessions. The third question assessed social loafing through self-reported feelings of peer pressure to study or prepare for examination. Peer pressure was not explicitly defined in the survey; however the prior anecdotal experience with this team based exam suggested students felt pressured to perform well because their group members were counting on them. This phenomenon was routinely reported in the form of a complaint, often verbally, but sometimes on the end of the course evaluations. Thus, it was presumed that if peer pressure drove an individual to prepare for the examination then the group had effectively minimized, or eliminated, social loafing because all group members were actively contributing to the group's success. Specifically, the three questionnaire statements measuring these group outcome were "Most of the members of my group participated in the study sessions," "All of the members of my group participated in the group study sessions," and "I felt motivated to prepare for this examination because of peer pressure." All of these statements were rated on a 1-10 scale with 1 indicating strongly agree and 10 indicating strongly disagree. Responses to these questions were analyzed individually and the mean scores were compared, using a series of two-sample independent t-tests, between those students taking the team-based Jeopardy examination and those taking the individual exam. Lower mean scores suggest higher levels of responsible team member performance and lower levels of social loafing.

Perceived Learning

Six statements on the post-examination questionnaire measured the first of two student outcomes - perceived learning. Given the examination was different between the two classes; we did not compare the actual grades on the examination.

Instead, this research focused on analyzing the difference between classes on perceived measures of performance. Questions regarding group learning that occurred through both examination study and completion were asked to better understand perceived student performance on the exam. Specifically, students in both classes scored their agreement on two statements regarding their understanding of the material; these were, "Preparing for the exam enhanced my understanding of the material" and "Taking the exam enhanced my understanding of the material". Students in both classes were also asked to rate their agreement with three additional questions regarding the learning of additional material from both the instructor and their teammates. These three questions were, "I learned additional course material from the instructor during the exam", "I learned additional course material from my group members during the exam", and "I learned additional course material by studying with my group". The final measure of perceived performance asked students about their examination performance (grade) compared to their expectation; this was the sixth question regarding perceived performance. The question was, "My examination performance met my expectations". These six questions were analyzed individually using a series of two-sample independent t-tests to determine if there was a difference in perceived performance between

students taking the Jeopardy examination versus those taking the traditional examination. The six measures were rated either on the same 1-10 scale as above or on a 4-point strongly agree-strongly disagree Likert scale. For ease of understanding the analysis, we transformed the 4-point scale into the 10-point scale.

Student Attitudes

The third student outcome of interest was attitude. To determine if the team-based Jeopardy examination produced a higher positive attitude compared to a traditional examination, participants in both classes (Jeopardy and traditional) answered three statements that measured attitude. These were "I was prepared for the examination", "Overall, the examination was part of a positive learning experience", and "I was more nervous before taking this examination than I was before Examination 1". Feelings of preparedness were thought to contribute to a positive attitude while feelings of nervousness were thought to deter from a positive attitude. It was presumed that students in cohesive groups who studied together would report high levels of preparedness; however they could potentially report more nervousness due to the effects of peer pressure. Comparison of the mean score between classes was analyzed using two-sample independent t-tests. There were also two additional questions that asked students about their experience with the Jeopardy examination to better understand their overall attitude toward taking a team-based test. These two questions were, "Overall, the Jeopardy examination was a more positive experience than Examination 1" and "Overall, I prefer the Jeopardy examination to the individual Examination 1". These two questions were not given to students taking the individual exam, and therefore the means between the two classes were not compared. Future research could assess the responses of the non-Jeopardy students on these same measures of experience which would allow for more direct comparisons. All of the statements were measured on the same 4-point or 10-point Likert scale and converted, if necessary, to the 10-point scale.

H2: Correlation between Group and Student Outcomes for Students within the Jeopardy Class

Hypothesis two focused only on those students taking the team-based Jeopardy examination (n=30). An analysis was performed correlating the three previously mentioned questions comprising group participation and the 11 previously mentioned questions comprising perceived learning and student outcomes.

Results

Research Question One: Comparison of Group and Individual Outcomes between Jeopardy and Traditional Classes

Differences between the students taking the team-based Jeopardy examination and those taking the individual examination were examined by a series of two-sample independent t-tests comparing class means on each of the twelve class comparison questions. Table 1 lists the class means and the t-test results.

Table 1: Differences between participants in Jeopardy examination and traditional examination on Group and Student Outcomes.

Question	Means		t-value	sig
Group Outcomes	Jeopardy	Traditional		
Most of my members of my group participated in the examination study sessions	2.80	4.79	2.40	=.02
All members of my group participated in the group study sessions	2.93	6.17	3.52	=.001
I felt motivated to prepare for this examination because of peer pressure	2.83	5.74	3.40	=.001
Student Outcomes – Perceived Performance				
Preparing for this examination enhanced my understanding of the material	3.10	3.50	0.67	ns
Taking the examination enhanced my understanding of the material	2.80	4.58	2.75	=.008
My examination performance met my expectations (i.e., I got the grade I expected)	5.02	5.67	0.84	ns
I learned additional course material from the instructor during the examination	3.30	5.23	2.90	=.005
I learned additional course material from my group members during the examination	3.30	5.33	2.80	=.007

I learned additional course material by studying with my group	3.00	4.47	1.91	=.06
Student Outcomes – Attitude				
I was prepared for this examination	3.60	4.29	1.06	ns
Overall, the examination was part of a positive learning experience	3.38	4.10	1.15	ns
I was more nervous before taking this examination than I was before Examination 1 (a traditional examination)	3.33	3.65	0.39	ns
Overall, the Jeopardy examination was a more positive experience than Examination 1	2.79	NA		
Overall I prefer the Jeopardy examination to the individual Examination 1	2.55	NA		

Overall, students taking the Jeopardy examination had better group outcomes. On a scale of 1 to 10, with 1 being strongly agree, students taking the team-based Jeopardy exam reported significantly higher levels of group member participation. When asked if most members participated in the group study sessions, the Jeopardy students showed significantly higher agreement with this statement than the non-Jeopardy students. Similarly, when asked if all members participated in the group study sessions, the Jeopardy students also showed higher agreement than the non-

Jeopardy students. When asked if the student felt motivated to study due to peer pressure, there was a significantly higher mean agreement score in the Jeopardy class when compared to the traditional class. Therefore, this analysis provides evidence that social loafing was reduced when taking the team exam.

Three of the six questions regarding perceived performance show significantly higher agreement in the Jeopardy class when compared to the traditional class. Interestingly, all three of these measures involved during exam learning. The first question asked students if actively taking the exam enhanced their understanding of the material, the second and third questions, respectively, asked if they learned additional material from the instructor and their group during the examination. A fourth question regarding group learning asked if additional course material was learned by group study. The t-test results for the mean agreement scores on this statement showed marginal significance between the two classes with the Jeopardy class in stronger agreement, suggesting the instructor's clarification of missed concepts enhanced learning, at least for some students. Neither of the two remaining questions that were focused on the student outcome of perceived performance asked about exam preparation and performance expectations, showed a significant difference between classes.

In questions regarding student attitude, the mean responses between the two groups showed no difference. Students in the two classes reported statistically equal responses regarding being prepared for the exam, feeling the exam was part of a

positive learning experience, and being nervous. However, the mean agreement responses for two statements regarding overall attitude toward the Jeopardy exam provided information that the Jeopardy exam was liked (see Table 1).

Table 2: Correlations between Group Outcomes and Individual Performance and Attitudes for Students in the Jeopardy Examination

Question	Most members participated in group sessions	All members participated in group sessions	Motivated to study for exam due to peer pressure
Student Outcome – Perceived Performance			
Preparing for this exam enhanced my understanding of the material	-.08	-.03	.09
Taking the exam enhanced my understanding of the material	.19	.08	.37*
My examination performance met my expectations (i.e., I got the grade I expected)	-.01	.16	.16
I learned additional course material from the instructor during the exam	.44*	.32	.59**
I learned additional course material from my group members during the exam	.69**	.65**	.58**
I learned additional course material by studying with my group	.92**	.92**	.59**
Student Outcome – Attitude			
I was prepared for this exam	.12	.18	.01
Overall, the exam was part of a positive learning experience	.11	.18	.15
I was more nervous before taking this examination than I was before Exam 1 (a traditional exam)	-.01	.07	.09
Overall, the Jeopardy examination was a more positive experience than Exam 1	.43*	.51**	.47**
Overall I prefer the Jeopardy exam to the individual Exam 1	.47**	.58**	.62**

*p<.05; **p<.01

Research Question Two: Correlation between Group and Student Outcomes for Students within the Jeopardy Class

Next, a correlation analysis was performed to better understand the relationship of group participation with perceived learning and student attitudes (see Table 2). To test the relationship between group outcomes and individual outcomes all students within the Jeopardy classes were evaluated to see if students with more positive group outcomes had more positive student outcomes. First, the correlation analysis showed significant, strong correlation between two or more of the three group participation variables and student learning from 1) the instructor during the exam, 2) group members during the exam, and 3) studying with the group. Interestingly, there was almost a perfect correlation between most or all group member participation in study sessions and the learning of additional material during these sessions, suggesting cohesive and effective groups (e.g., decreased social loafing) led to enhanced performance. Also noteworthy is the correlation between these two group participation measures and learning that takes place from group members during the exam, suggesting that cohesive and effective groups promote learning throughout the assessment period. When evaluating peer pressure and the student outcomes for perceived performance it is clear that peer pressure is related to group learning and during exam learning from both the group and the instructor.

Evaluation of the relationship between the group outcomes and the student attitudes showed significant positive correlations between all three group outcome measures and positive attitude about the Jeopardy exam experience, as well as preference for the Jeopardy exam. In fact, groups with full member participation were more likely to agree that the Jeopardy exam was a positive experience. Groups with most or all participation were more likely to prefer the team-based exam to an individual exam. This again supports the premise that cohesive groups contribute to a positive student experience. Analysis of peer pressure on student attitude showed that high feelings of peer pressure were positively correlated with positive feelings about the exam when compared to a traditional exam, as well as preference for the Jeopardy exam over an individual exam. This may be due to the higher levels of achievement on the team based exam. There was no correlation between the group participation measures and the attitude questions regarding exam preparation, overall positive experience of the exam (this question differs from the one previously which asked 'when compared to' a traditional individual exam), and exam nervousness. This non-correlation is likely explained by 1) students in both classes felt prepared regardless of how and who they prepared with, 2) no student ever feels exams are positive experiences, and 3) students in both classes felt nervous before the exam, regardless of format.

Discussion

Jeopardy Design Decreases Social Loafing

The results of this research suggest a promising future for team-based examination, particularly those that are carefully designed to reduce social loafing and foster effective and cohesive groups. It is shown here that a team-based Jeopardy examination results in higher group member participation at study sessions and higher levels of motivation. Peer pressure appears to be related to these improvements. This finding supports the literature that suggests cohesive teams are

likely to be effective at achieving group goals because of increased commitment and accountability to the group. Prior research also links high levels of group cohesion and individual accountability with reduced social loafing. This too is validated by the current research. Students taking the team based Jeopardy examination demonstrated higher levels of individual accountability (low social loafing) through participatory group study and motivation to prepare for the examination. Thus, it appears the presumed concerns of social loafing in team-based assessment can be overcome through careful design. In fact, certain assessment structures, such as the team-based Jeopardy examination, may reduce social loafing by capitalizing on group based peer pressure. Students in the Jeopardy class who felt more group based peer pressure learned additional course material from their group. Thus, assessment structures that foster positive peer pressure may also deter social loafing because team members are motivated to participate.

We believe that these findings would be highly generalizable to other group exams. Individual accountability is a key factor in reducing social loafing. The design of the exam created here builds in individual accountability, and we have demonstrated evidence that it can decrease social loafing. This method should be effective for other group exams that have a high potential for social loafing, which would include most group exams.

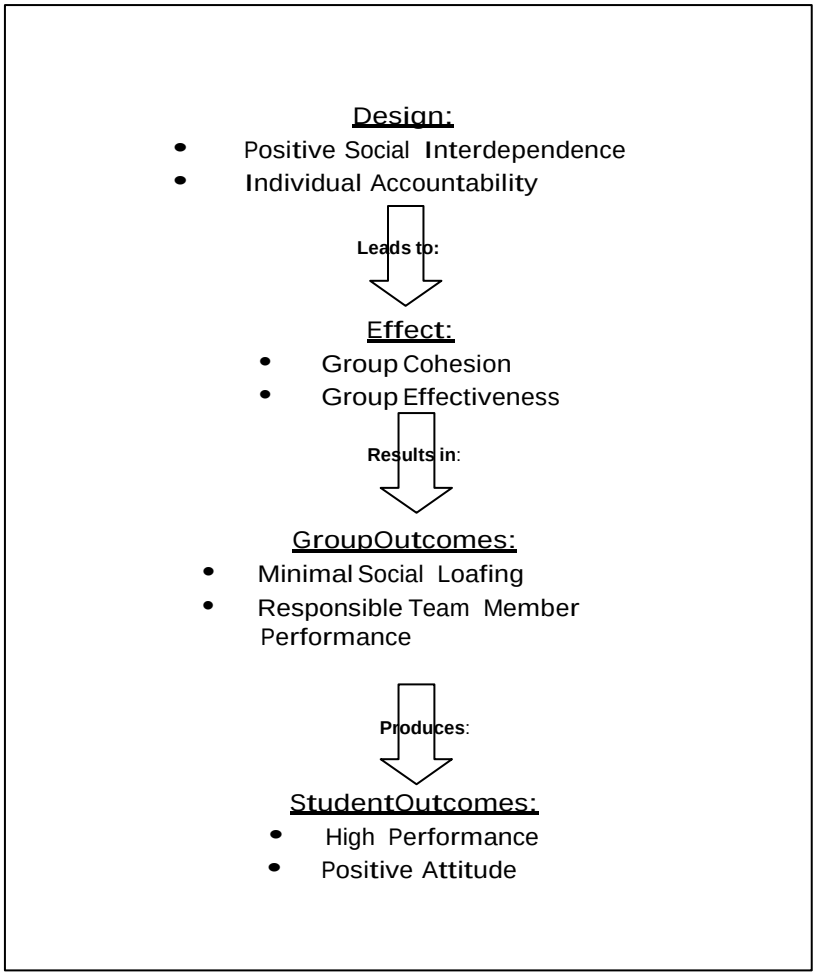

Figure 1: A conceptual model relating environment to group and individual outcomes.

Positive Group Outcomes Lead to Favorable Student Outcomes

Our analysis of a Jeopardy based team exam suggests a model for how teams are affected by the environment and can affect individual performance and attitudes (see Figure 1). Effective groups with responsible team member performance should foster the positive student outcomes of perceived performance and attitude. Perceived performance should be high for effective groups because team members gain knowledge from the group activities. Student attitudes should be high and positive for effective groups because attitudes increase with strong team camaraderie and subsequent achievement on the examination. This study supports, at least in part, these assumptions by showing Jeopardy students in effective groups report high levels of perceived performance with respect to group learning and preferential attitudes toward team-based assessment.

Positive group outcomes were, not surprisingly, correlated with high levels of group learning while preparing for the team-based assessment. Interestingly, positive group outcomes were also correlated with high levels of learning during the examination. It appears the interactive nature of the team examination allowed students to learn additional course material from both group members and the instructor during the assessment period. A high percent of Jeopardy students who

reported positive group outcomes also reported learning additional material from their group during the examination. This relationship is likely a facet of the high

levels of peer pressure because groups that had more participation were shown to have higher levels of peer pressure. Peer pressure may have motivated students to not only prepare for the examination but also to continue to glean information during the assessment process. Individually answered examination questions that were missed by multiple students were immediately explained by the instructor and it is likely that individual team members paid attention in an effort not to make the same mistake and disappoint their group when it was their turn. The Jeopardy examination also consisted of group answered questions. On these questions students routinely worked alone (initially) to answer the question and then as a group to compare answers and gain consensus for the single group answer that was submitted. This peer interaction may have led to some students immediately realizing their mistakes and/or learning additional material in the process. Thus, the examination became a learning forum for students, demonstrating the usefulness of teams in education and the promise of game-focused assessment.

Members of cohesive and effective groups demonstrated a preferential attitude for the team-based assessment. Overall, students participating in the team-based assessment expressed a preference for this examination when compared to the individual examination 1. This preference was highly correlated with the positive group outcomes of participation and peer pressure, suggesting group behavior does affect student attitudes. However, the team-based examination did not promote higher individual feelings of preparation, nervousness, or grade performance when compared to students taking the traditional examination. One possibility for these null findings is that if students were not satisfied with the group outcome, they would study more individually until they were at a level of preparation with which they were comfortable. The non-significant findings regarding feelings of nervousness suggest students are nervous before any assessment, regardless of its format. With respect to grade performance, it is highly likely that student's raised or lowered their expectations based on their levels of preparedness and not those of the group. Students with a lack of confidence in their group may have overcompensated by studying more and/ or lowering their performance expectations. Despite these non-significant findings on preparation, nervousness, and grade performance, students in the Jeopardy examination did have very high preference for this examination even when compared with their traditional first examination, indicating that students found the examination more enjoyable.

The results of this research suggest this type of team based examination can reduce social loafing, and therefore, more instructors may want to try group examinations. Although we have reduced one potential problem with team exams, there are still other arguments against them. For example, an instructor may not want to give students on the same team the same grade because some students on a team are stronger and know more material other students. In other words weaker students, even though they had pressure to perform well, may be rewarded for unearned learning. Furthermore, the logistics in having a properly designed group exam may be difficult for some classes.

This study also leaves several areas open for future research. For example, we measured students perceived learning; however, we did not measure actual learning.

It is not clear from this study if students who took the team exam learned more from the entire exam process than students who took an individual exam. We could not compare scores from the two tests because they were not equivalent. It would be interesting to test students a few weeks afterwards and determine if there is a difference in retention of material. This type of assessment could provide a stronger test of group exam's effectiveness.

We also suggest that peer pressure is an important component to reducing social loafing; however, this relationship is correlational in nature and it would be premature to state peer pressure caused less social loafing and increased performance during this team based exam. Additionally, the exact nature of peer pressure should be researched further. We only used one question to measure peer pressure and it is possible that different students had different definitions. In examining this construct further, it would be useful to determine the different group dynamics that formed with this type of examination. For example, students may have found more motivation for not only studying but also helping their fellow students. Having demonstrated how to do design and administer this type of group assessment and its potential benefits, future research can examine these questions.

A final limitation to consider is the subject matter of this group exam. Our research was conducted in Statistics courses. Statistics is a very objective course which lends itself to multiple choice and short answer questions which have a right or wrong answer. Other subject matter, particularly subjective course content, might be difficult to assess in a Jeopardy format. On a related note, although it is relatively easy to test information at lower level's of Bloom's taxonomy (e.g., knowledge); it is more difficult with this type of exam to test higher levels (e.g., synthesis).

Conclusions

Team research suggests that activities aimed at maximizing positive social interdependence and individual accountability contribute to effective and cohesive groups. These groups will exhibit low levels of social loafing and high levels of individual member responsibility. Although our findings are based on one dataset, our results support the literature. In fact, the team-based Jeopardy examination appears to provide an assessment format that creates favorable group outcomes and positive student outcomes. This was accomplished by carefully designing the examination to create individual accountability and an environment conducive to group effectiveness and group cohesion. High levels of group effectiveness and cohesion resulted in the positive group outcomes of responsible team member performance and minimal social loafing. These favorable group outcomes were shown to contribute to favorable student outcomes of high perceived performance and positive attitude. We believe favorable group and student outcomes, coupled with the positive student feelings regarding the team-based style of the Jeopardy examination, reflect the multifarious benefits of a carefully designed team-based assessment.

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