

Battle Buddies: A Cooperative Learning Technique for Reducing Anxiety and Increasing Motivation

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Tests can be a major source of anxiety in a student's learning process. Team testing as a learning technique can decrease stress, increase motivation to learn and improve critical thinking skills. This study assessed students' performance in a team testing situation, with the intent to reduce anxiety and improve learning. Students were administered daily quizzes throughout a semester long course which they took with a partner. Their team performance was compared to individual scores and previous semester scores. Students were also given midterm and end-of-course surveys assessing the team testing. Results document that team testing reduced anxiety, enhanced understanding of the material, and increased motivation to prepare for class.

Introduction

Anxiety often influences how well students perform on tests. This anxiety can be compounded by the daily demands of college life, especially at a military academy such as West Point. The intent of this study is to assess whether anxiety is an issue among cadets in the daily preparation for class and looks at one method to reduce the anxiety and improve learning and performance on evaluations such as daily quizzes while encouraging better class preparation.

One main issue associated with student learning in a required course that is outside the student's interests is a lack of cadet preparation for daily participation. This is reflected in poor performance on daily quizzes and evaluations. The goal of this research is to assess whether team testing on quizzes will improve learning and motivation. Team quizzes presents a low threat environment, allowing the instructor to gauge the students' understanding of the lesson readings and promoting more active learning. Taking quizzes as a team would promote cooperation, and students could share their ideas with another cadet without feeling pressured since they are not presenting their ideas to the entire class.

Background

Cooperative learning is a form of active learning where students rely on their peers to help them learn the material. Cooperative learning may be formal or informal. One of the structured methods of cooperative learning is the jigsaw method, where the material is divided into parts and each student becomes the subject matter expert on different parts in order to teach the rest of the group. One method of informal cooperative learning is having students conduct discussions in pairs on specific lesson objectives during class. There are numerous methods for incorporating cooperative learning in the classroom. Whether structured or unstructured, cooperative learning should have five main

components to be effective – positive interdependence, face-to-face promotive interaction, individual accountability, interpersonal skills, and group processing [4]. Researchers have proven the positive effects of cooperative learning. Specifically, collaborative testing has proven to be an effective technique in improving academic performance, reducing anxiety and fostering positive attitudes towards the course material.

Collaborative testing has proven to improve student performance on academic evaluations and overall course performance. Testing with a partner encourages critical thinking of the material with active processing of the information as students discuss their answers. Student performance on team-based examinations has proven to be superior to student performance on individual-based examinations [5, 6, 8, 9, 10]. This improvement may be attributed to the sharing of knowledge. Some may argue that team performance could actually decrease due to “social loafing”, as students put less effort into their studies, relying on their partner to learn the material [9]. The type of individual that would choose team testing over solo testing may also be an average student versus a high performer [10].

Team testing has been shown to reduce anxiety both in preparation for daily class and while taking examinations [3,5]. In a traditional educational environment, anxiety can plague students as they compete for grades or class rankings. Students with high levels of anxiety will typically score lower on examinations than students with lower levels of anxiety [1,2]. Many students also feel pressure from family, friends and peers. Although testing with a partner typically reduces anxiety, team testing can actually increase anxiety in students due to low self esteem or a sense of responsibility toward their partner [9]. Other studies have shown no changes in levels of anxiety while working in pairs [6].

Testing with a partner improves students’ ability to communicate and cooperate, which is essential in most businesses [8]. Students have to present their own argument to back up their answer. Experience in presenting their ideas may help enhance self-esteem and make students more comfortable socially. Team testing gives an individual the opportunity to verbalize their thoughts which can improve recall of information [3]. It has been shown that students spend more time working on a collaborative test as they share their ideas [6], which can assist in learning the material.

Having a learning partner can also increase enjoyment of the course and the subject matter [3,10]. Difficult subjects, such as engineering, may seem easier to manage when discussed with another person. Students may become more motivated to study in order to support the team, and this method of testing enhances critical thinking [5]. Students typically show a strong preference for collaborative testing [6].

Collaborative testing is not for everyone. Whether a student prefers team testing or not greatly depends on the student’s personality, such as their desire for control and sense of responsibility to the team [9]. Some individuals work better as individuals. Unarguably, the weaker student would benefit by teaming up with a stronger student. High performing students may feel as if they would not benefit from a team testing situation,

although teaching a fellow student could assist in processing the material. “Social loafing” may also be a concern for some students, where one partner does not contribute to the group.

Although collective learning appears to have positive implications on most students’ learning, team testing is a controversial topic, especially at the college level. Does team testing increase student motivation to learn and improve performance? Will students be more motivated to study because they feel a sense of responsibility toward their partner or will students be less motivated to study because they can rely on their partner to answer the questions? Will students learn more when taking an examination with a partner? These questions are addressed in this study. Most studies have looked at team testing on major graded assignments. This study narrows the impact of team testing on the student grades by using the team testing on daily quizzes versus major examinations.

Teamwork is an essential ingredient to success in military operations. It is bred into the military culture to take care of your fellow soldier. Soldiers are assigned a “battle buddy” during basic training and during most unit operations. This study capitalizes on the cadets’ instinctual nature to take care of their comrade in order to assist in improving learning by assigning them an academic battle buddy.

Methodology

This study was conducted in an ME380 Engineering Materials course. The students were all Mechanical Engineering majors. This course is a required course for the major. There were 26 students in the course.

Students were initially given a test attitude survey at the beginning of the course to assess whether anxiety is a prevalent issue in this population of cadets. This survey was used to identify issues that may be affecting cadet performance on examinations. The survey was modeled after a Test Anxiety Inventory from the Educational Psychology and Measurement course at the University of Iowa [7]. The survey was a fifty item survey assessing whether students agree with statements about test taking.

The desks in the classroom were arranged in pairs, and cadets were informed during the first lesson that they would be taking quizzes with the cadet sitting next to them. Most of the students knew each other already since they were all among a small population of Mechanical Engineering majors. Although the students selected where they would be sitting, they did not realize they would be testing with the person sitting next to them when they choose their seat. Only one individual changed seats after the first quiz.

The quizzes were given at the beginning of every lesson at the start of the semester. For the first ten lessons, the students took the quizzes as individuals and then took the exact same quiz with a partner. A quarter of the way through the semester, the quizzes were only administered every other lesson, and the students only took the quizzes as a team. The quizzes were worth ten points each with 3 bonus points available on every quiz and

were similar to historical daily quizzes administered in this course, consisting of short answer, true/false and multiple choice questions.

The five main components of cooperative learning as described by Johnson, Johnson and Smith [4] were used to frame the methodology of this study. Positive interdependence was established through shared grades on quizzes. The team members had to agree on an answer and develop strategies for success. The face-to-face promotive interaction occurred as the students assisted in teaching each other through discussion of each quiz question. Individuals were still accountable for their own learning since the quizzes were only a small fraction of their grade. Students were also given individual tests to compare to the team tests. The fourth element was the development of social skills as students explained their answers to each other and had to come to a consensus on the correct answer. Finally, the periodic surveys helped students assess the effectiveness of their team for group processing.

A mid-semester and end-of-semester survey was conducted to assess the cadets' feelings toward team testing. The midterm survey was nine Likert item questions and seven open-ended questions involving team testing. The end of course survey was five yes-no questions on statements involving team testing and two open-ended questions as to how the students would motivate students to prepare for class each day and how they would assess whether students had learned/retained the material for each lesson.

Results

Test Anxiety

A test attitude survey was given to the students in this course prior to the start of the semester in order to determine the level of anxiety that was prevalent in this group of students. The survey identified that anxiety is evident among cadets based on the statements that a majority of the cadets agreed reflected their test taking experience. The main sources of anxiety for cadets were concerns about how others would view them if they did poorly and concerns about how their performance would affect their future. The students' concerns about their future may be especially prevalent at West Point because students' military branch and post are dependent on their class ranking. There were also significant concerns about how well prepared cadets felt for tests. This feeling of being unprepared may be a result of the demanding schedule that cadets follow. Figure 1 shows representative statements from the survey to which the majority of the cadets agreed reflected their own experience in test taking.

The test attitude survey established that some level of anxiety was evident in the cadets. The midterm survey and the end-of-course survey showed that this anxiety was reduced by taking quizzes as a team. The results of these surveys are shown in Figures 2 and 3. 79% agreed that they felt less anxiety while taking the quizzes as a team, and 87% agreed that taking quizzes with a buddy reduced anxiety in preparing for class.

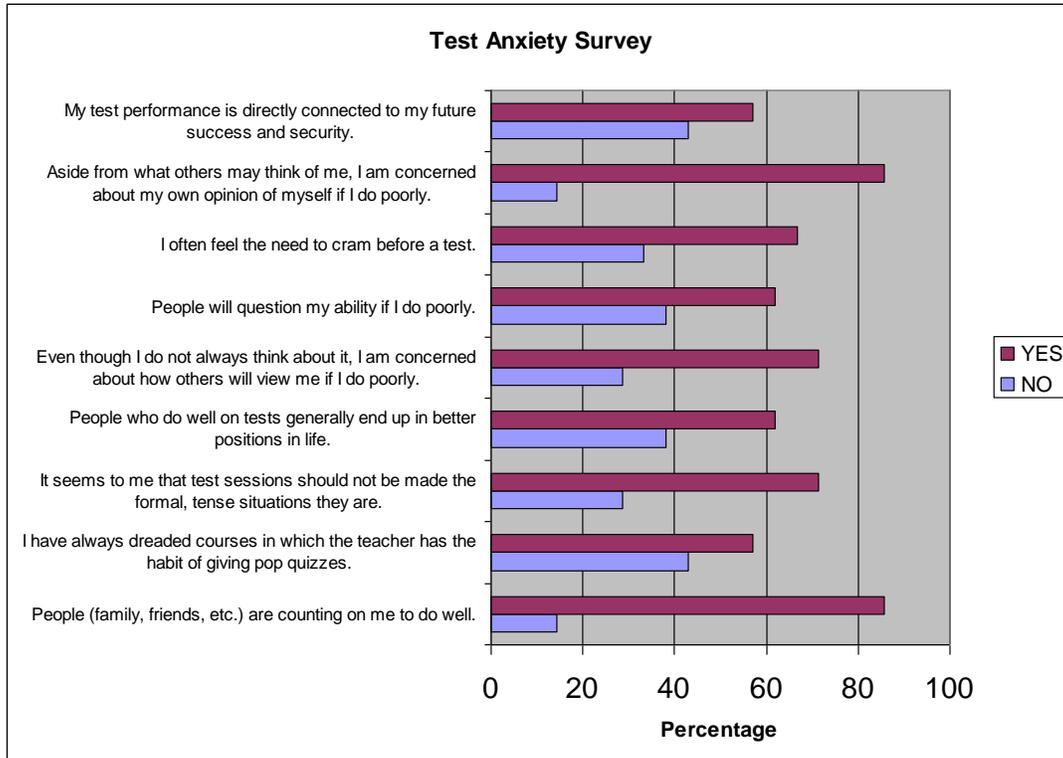


Figure 1: Representative questions from test attitude survey

Improving Communication

Some students would prefer not to participate in class based on their personalities, even if they were knowledgeable about the material. By breaking the class down into teams of two, the cadets were forced to participate and voice their opinion to their partner. Cadets could share their responses with their partner without concerns of being incorrect in front of the entire class. Observations while the quizzes were being administered showed active participation by all cadets and lively discussions when there were disagreements as to the correct answer.

During the midterm survey, cadets were asked how well they communicated with their partner. Most responses stated that the team communicated well. Comments included:

- *We allow for both sides to be heard on a problem if neither side is 100% sure.*
- *We always talk before we put down a response.*
- *We share ideas when answering the questions.*

This method of testing forces students to talk about the lesson objectives with well-structured quizzes.

This cooperative method of test taking helps prepare students to work as a team. Teamwork is essential in the military and business settings. Members of a work force need to be able to communicate their ideas, defend their opinions and negotiate a final decision.

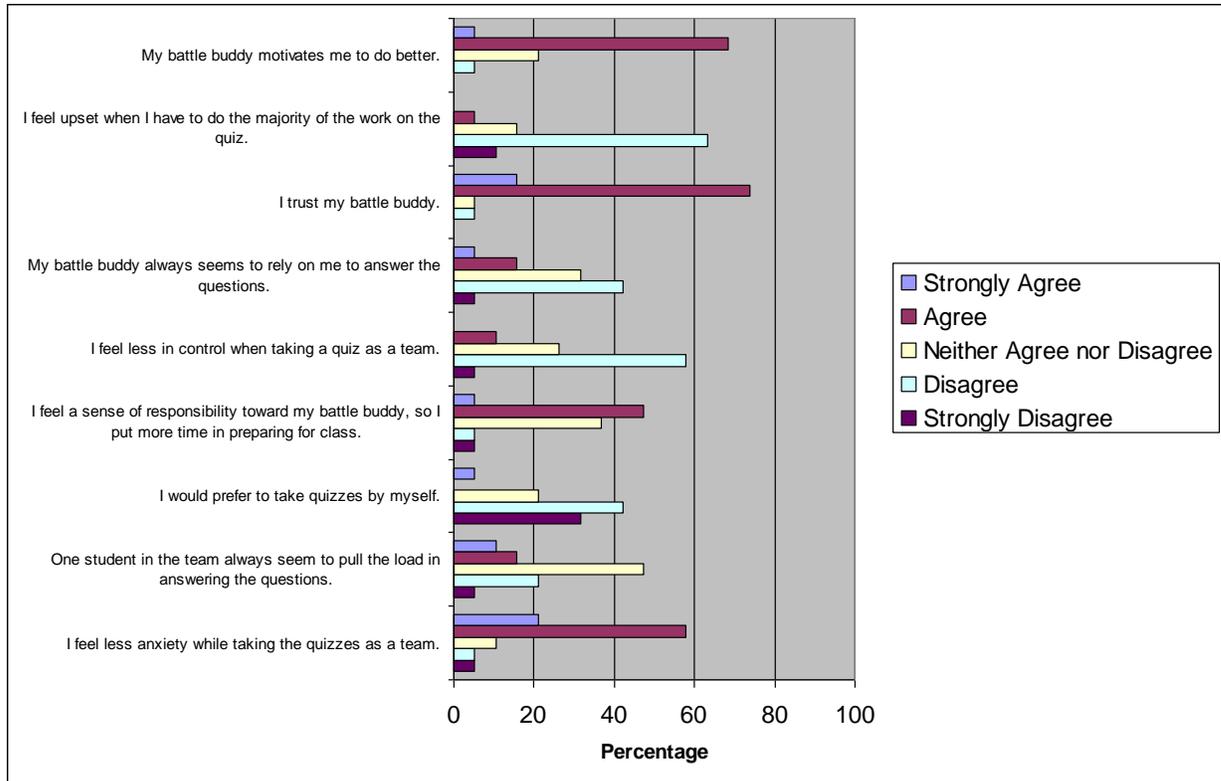


Figure 2: Midterm Course Survey

Contributing to Fellow Students Learning

Results on the standard United States Military Academy End of Course Survey showed a significant increase in the rating for the question – “My fellow students contributed to my learning in this course.” The rating increased over last year from 4.11 to 4.68 on a five-point scale. This rating was also significantly higher when compared to the same term’s USMA course average of 4.16. This question may have been affected by other group projects such as presentations and lab reports. However, these group requirements were the same as last year. The only change from last year in regards to group work in this course was the addition of team testing for the lesson quizzes.

During the midterm survey, students were asked open-ended questions on the conduct of the quizzes. Only one student provided negative responses due to lack of contributions from their partner. West Point may be an anomaly when determining the impact of social loafers due to the competitive nature of most cadets. Less than 6% of the students agreed that they felt upset when they had to do the majority of the work on the quiz and only 21% stated that their battle buddy always seemed to rely on them to answer the questions. 26% of the students agreed that one student always seems to pull the load in answering the questions. Team testing can turn testing into not just an evaluative process but also a learning process. However, all students need to participate and should vocalize their own response. The instructor should monitor the involvement of every individual to ensure all are contributing.

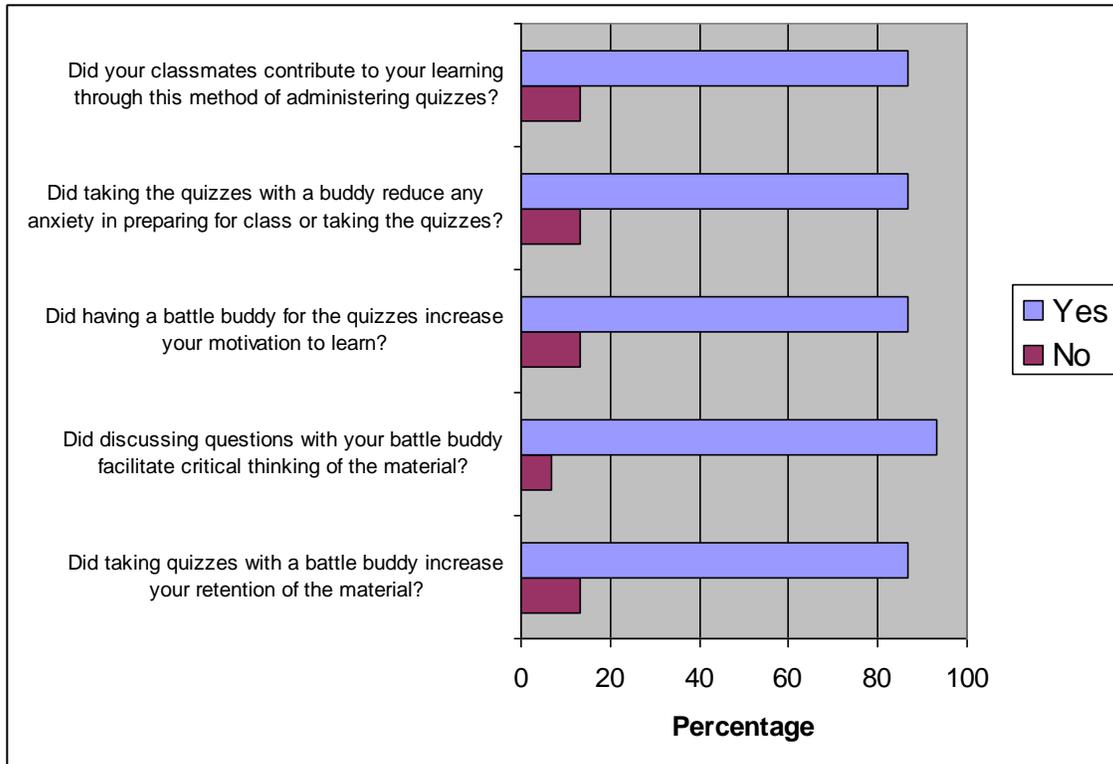


Figure 3: End of Term Survey

Motivation to Prepare for Class

In order to promote active learning, the students must be knowledgeable about the topic of discussion. For improved participation in class, students should prepare for class by reviewing the assigned readings. Due to a lack time or interest, most cadets do not read the assigned readings prior to each lesson. Administering a reading quiz in class makes the students accountable for doing the readings and recalling what they read. Based on the cadet’s responses to the test attitude survey given at the beginning of the semester, cadets do not like pop quizzes. The approach taken in this study still made use of reading quizzes to hold students accountable for the readings, but lessened the anxiety by allowing the students to take the quizzes with their partner and by announcing when each quiz would be given. By taking the quiz as a team, each cadet’s preparation for class affected not just their own grade, but also their teammate’s grade.

The midterm survey asked the question “Knowing you will be taking quizzes as a team, does this increase or reduce the amount of class preparation time?”. Over half the responses stated that this method of testing increased their preparation time because the cadets did not want to let their buddy down or because they did not want to be the team member that did not contribute anything. Only one cadet said that this method of team testing reduced the amount of preparation time. The rest of the responses stated that there was no impact because they would be doing the same amount of class preparation regardless of the method of evaluation. Their study time for the course depended on their

priorities for the night. When asked about their performance as teams, one student commented “I am doing better in a team, because I am more motivated to prepare”. During the midterm survey, 74% of students agreed that their battle buddy motivated them to do better. 52% of students agreed that they felt a sense of responsibility toward their battle buddy, so they put more time in preparing for class. The increased preparation time for class was reflected in the increased participation in class.

Student Preference

On the midterm survey, less than 6% of the students stated that they would prefer to take quizzes by themselves. On an open-ended question during the midterm survey, the majority of the students commented that they liked taking quizzes with a partner.

Comments included:

- *I like the challenge of agreeing on answers in the short amount of time allotted.*
- *I do like team testing. It allows you to work with someone to improve your score, teamwork abilities, and to share the score with. I like the sense of being on a team, when we do well and when we do poorly, it is nice to have someone to be “in it with you”.*
- *I like team testing, because it builds teamwork, increases material understanding, decreases quiz anxiety, and results in usually a better grade.*

There were some reservations about team testing from a few students. Some thought that team testing allows students to become dependent on each other and could cause stress in a team that does not get along. Comments included:

- *I think it makes people too reliant on their buddy.*

When using team testing, the instructor should ensure that everyone is participating and should ensure that students have other opportunities to demonstrate their own knowledge. Since the quizzes were less than 6% of the students’ overall grade in this course, students were still required to demonstrate their own knowledge on other assignments and examinations.

The end of course survey also supported positive attitudes toward team testing, where students agreed that team testing helped in reducing anxiety, increasing motivation and enhancing retention of the material. One student commented that he has learned a lot from his “battle buddy”, and they actually started socializing more outside of class as a result of the teamwork required in class.

Performance

When analyzing the individual versus team test scores for the quizzes administered during the first ten lessons, students scored higher on the team test greater than 61% of the time. Some students actually changed their answer from the correct answer to the wrong answer based on the influence of their partner. Over the first ten lessons, the difference in individual versus team scores was significant. The average individual quiz score was 7.18, and the average team quiz score was 8.34. Figure 4 shows the average individual and collective scores for the quizzes administered during the first ten lessons.

One primary reason for improved scores may be that the teams took advantage of the combined knowledge of both partners. This supports the proposal that team testing can be used as an instructional tool.

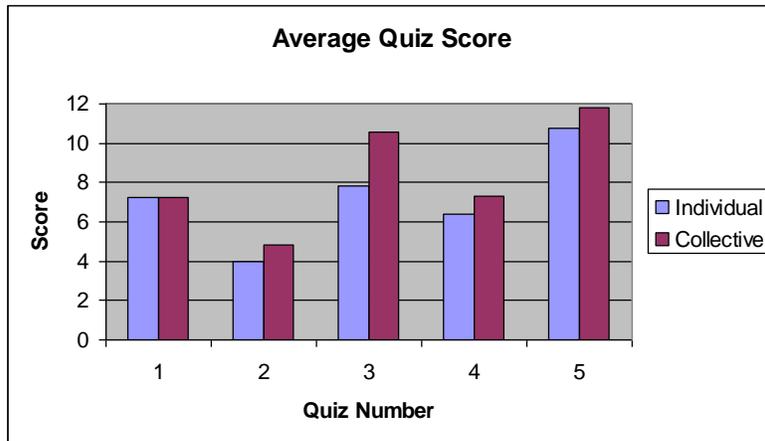


Figure 4: Comparison of average individual and collective quiz scores

The average quiz scores for this term, Term 08-1, were compared versus the average quiz scores for a previous term, Term 07-1. Both terms consisted of Mechanical Engineering majors that were in the first semester of their senior year. All sections were taught and graded by the same instructor. When comparing the students' average quiz scores versus the previous semester's score, there was no significant difference in the average score. Term 07-1 (no team testing) had an average score of 8.82 and Term 08-1 (team testing) had an average score of 8.78. These results may be a product of differences in the academic abilities of the students in the course or variations in the quizzes. The incoming grade point average of Term 07-1 was 3.22 and the incoming grade point average of Term 08-1 was 3.08. The outgoing course grade point average for Term 07-1 was 2.99 as compared to 3.33 for Term 08-1, which may support the position that team testing fostered improved overall performance in learning the course material. Figure 5 outlines the differences in the daily quiz scores and the overall course performance for Term 07-1 and Term 08-1. All factors need to be considered before comparing the two different terms.

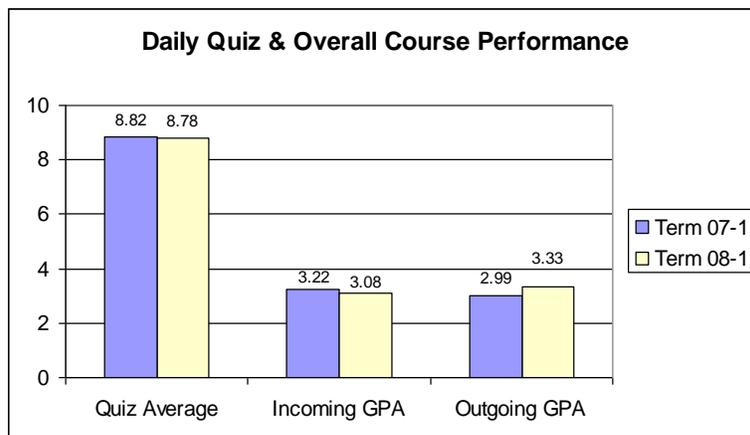


Figure 5: Daily quiz and overall course performance for Term 07-1 and 08-1

When asked on the midterm survey whether they thought they were doing better taking the quizzes as a team than if they were taking the quizzes by themselves, 84% of the students said they thought they were doing better as a team.

- *I am doing better as a team, because it helps eliminate careless mistakes, such as misreading or misunderstanding the question.*
- *I think we perform better on team quizzes as it allows two different memories and perspectives a chance to work the best answer out as a team.*
- *Often I can provide responses to some questions and my partner will be able to answer others.*

A few students thought that they would do better by themselves, as reflected in the comments listed below:

- *I second guess myself when I am with a partner*
- *I would probably do better on my own since I would try to study more if they were single person quizzes.*
- *I don't receive any help from my teammate anyways.*

Overall, the combined knowledge of two students and the ability to debate answers led to improved performance on the quizzes.

Discussion

This study focused on using team testing during daily quizzes. Each quiz was less than one percent of the student's grade. However, added up over the semester, the quizzes were worth about 6% of the student's grade. Therefore, there was still individual accountability for learning. Team testing may be viewed differently by the student's if the teams were used on major examinations.

The sample size for this study was relatively small, with only 26 students. Future research should include assessing larger groups. There was also no control group with which to compare the team testing results. Ideally, a control group that was taking the exact same test under individual testing conditions with the same instruction should be compared to the collaborative testing group. The sample for this study was also relatively homogeneous. All of the students were Mechanical Engineering majors in their senior year. Results may vary across classes and majors.

The test attitude survey was only used to assess whether anxiety was an issue. Further analysis should include investigating the correlation between individual anxiety level and performance on team testing. Certain personalities may perform worse in the team testing situation. Anxiety levels could also be checked immediately before being tested as well as on comprehensive surveys.

Conclusion

Students were allowed to take daily quizzes with a "battle buddy" throughout the semester. The general consensus was that the cadets preferred taking quizzes with a partner. The students felt less anxiety while taking the quiz and while preparing for class. Most students stated that they were more motivated to prepare for class because they did

not want to disappoint their partner. Participation in class increased since cadets were more prepared and they were forced to share their thoughts with their partner during quizzes. Students scored better taking quizzes as a team versus individually. However, scores did not improve when compared with previous semesters. Overall, team testing provided an opportunity to develop critical thinking skills and teamwork abilities.

Acknowledgement

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