MECH MADNESS: A FUN WAY TO ASSESS STUDENT COMPREHENSION AND EVALUATE HOMEWORK

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INTRODUCTION

Are you tired of collecting homework? Are you grading the same problems over and over again, year after year, and still not convinced the students are getting it? If so you might consider holding a Mech Madness session for your class. Mech Madness is an in-class, 20-minute ladder tournament, where students compete against each other, testing course and homework knowledge for a grade.

Mech Madness is effective for many reasons. Firstly, it is a fun change of pace for the students and faculty. Secondly, students are forced to work cooperatively on homework, helping each other understand complicated material. Thirdly, the competitive nature of the game entices more students to complete the homework assignments, better preparing them for the more heavily-weighted graded events.

This paper provides instructors who are looking for innovative teaching ideas and methods with a complete description of the Mech Madness gaming format and how to implement Mech Madness in the classroom.

HOW MECH MADNESS WORKS

The game is set up like a competition ladder used in athletic gaming events. There are six gaming rounds lasting 3:00 minutes. At the end of each round, the winning teams progress to next table in the ladder and the losing teams retreat. At the end of the competition, the teams at the top table receive the highest marks and the teams at the cascading tables receive marks commensurate with their performance.

GAME SETUP

Figure 1 illustrates the game setup for the competition. At the beginning of the game, students arbitrarily seat themselves at the game tables. The instructor reveals the order of play by designating the top and bottom table. Table 1 designates the top table. Table 6 is the bottom table.

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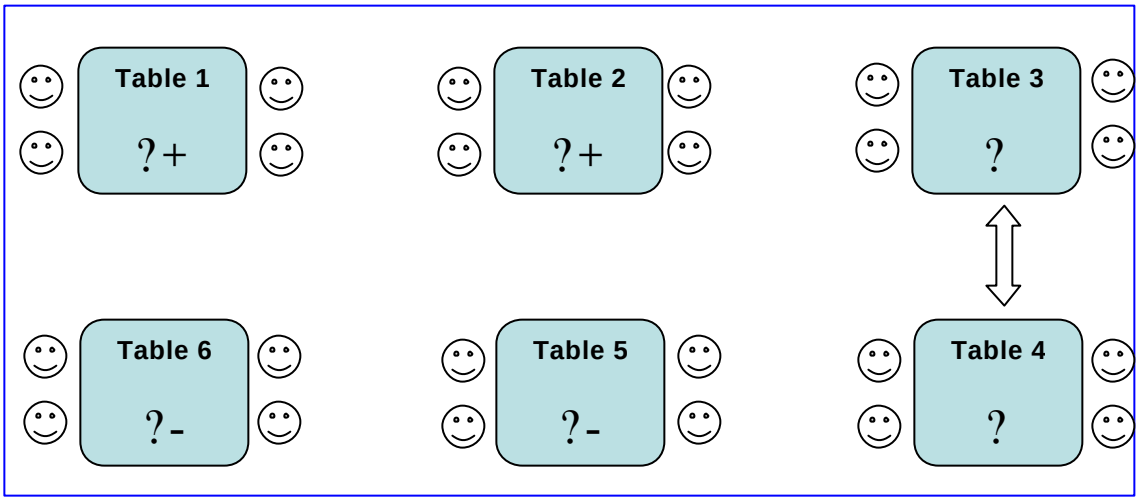

Figure 1 Mech Madness classroom layout

Figure 2 illustrates how each team rotates after each round of play. The winners advance to the next table up the ladder and the losers retreat. The winner at the top table and the loser of the bottom contest remain at the same table after each round.

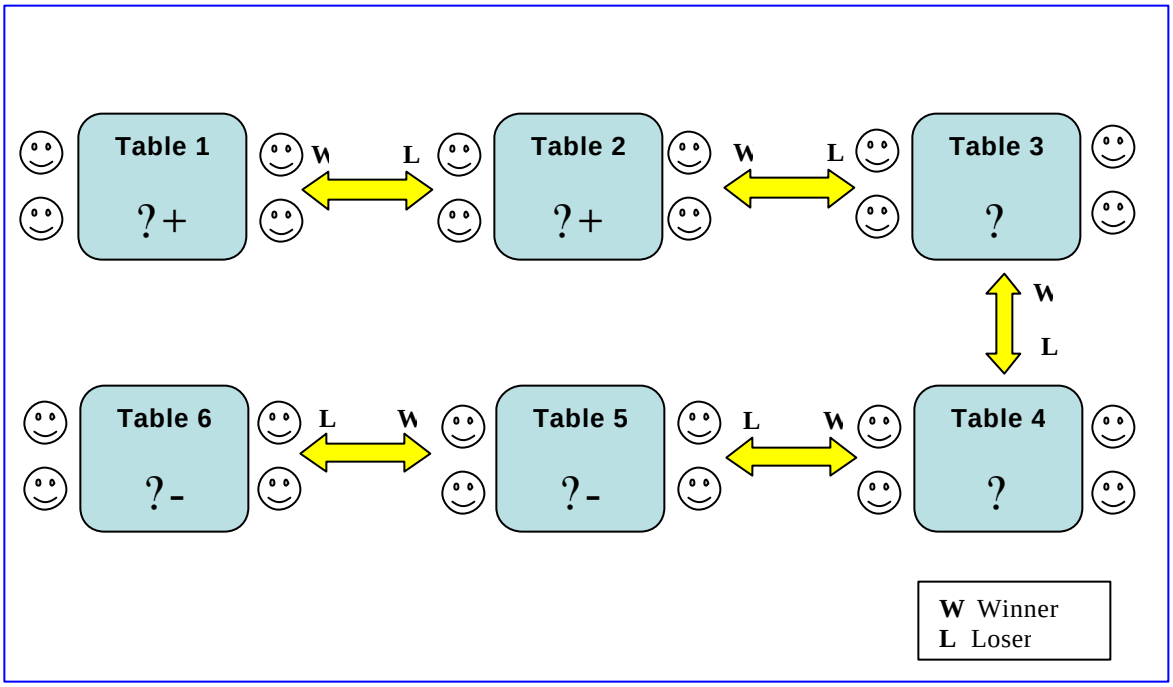

Figure 2 Team rotations after a round of play

TABLE PLAY

The flow of the action involves team members alternately answering questions. The first round of questions is posed to an individual from each team. Once the individual questions are answered, each team answers a team question.

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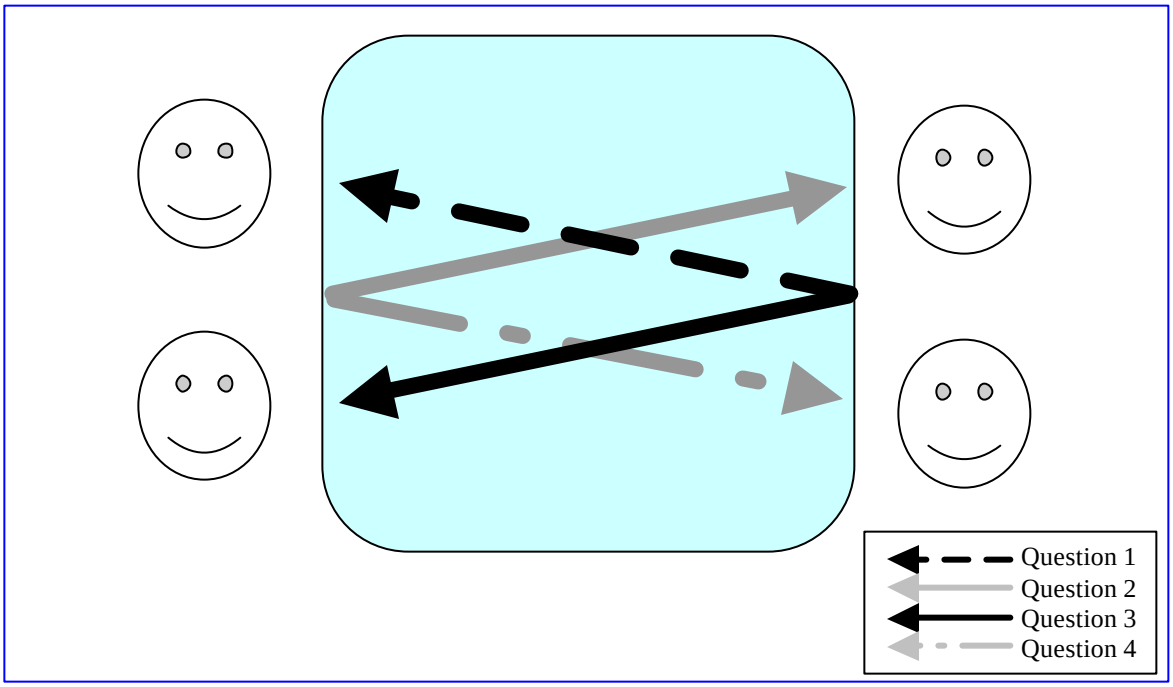

Figure 3 Order of Questions Asked During Each Round

The figure above illustrates the order of the first four questions asked during each round. The remaining two questions are team response questions.

SCORING

One point is available for each question asked. The answering team gets 1 point for a correct response. The asking team receives points if the opposing team answers a question incorrectly or is unable to answer. Questions are asked until the three minute timer signals round over.

TIEBREAKERS

As one can imagine, ties are frequent during these games. The current game policy determines tiebreakers using the age-old "rock, paper, scissors" game of chance. Although, it provided for some great classroom laughs, students grew weary of lady luck and requested alternative forms of tiebreaker determination.

GAME MATERIALS

Each student was allowed to have a copy of class notes, a copy of their individually completed homework, and a copy of the score card.

SCORE CARDS

Score cards were used by each team. A customized score card was designed to provide a common template for the questions, the scoring for the individual and team, as well as the final team score.

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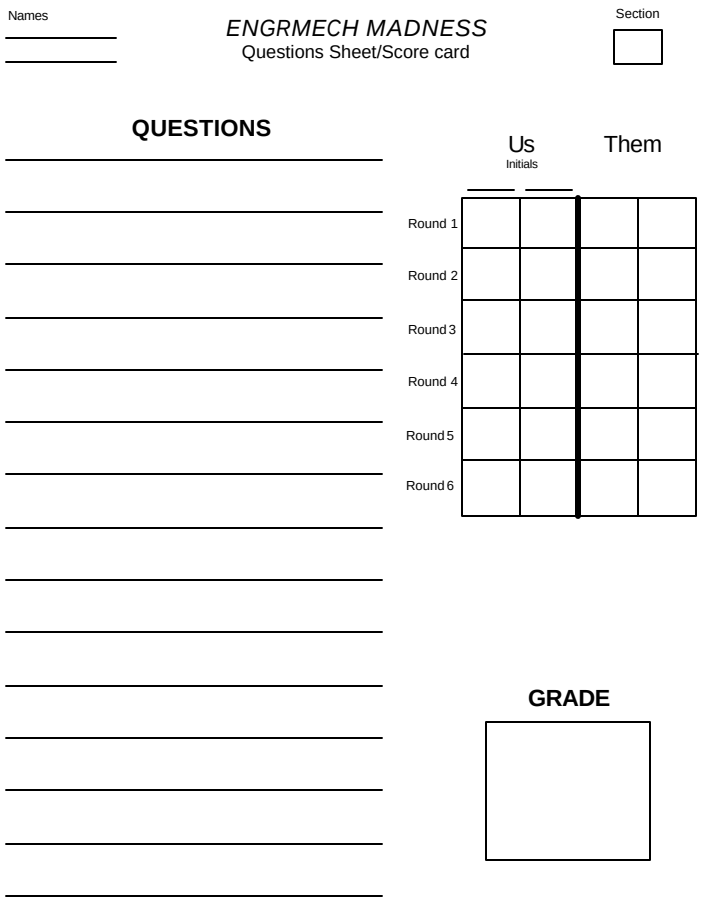

Figure 4 Mech Madness score card

Students were required to attend gaming periods with several questions, from homework assignments and class notes, prepared on the score card. Students who did not complete the score cards prior to the beginning of class were penalized at the instructor's discretion. In some cases, unprepared students were not allowed to participate and received a zero for the assignment. At the end of round 6 the score cards were collected and grades were assigned.

ACCEPTABLE QUESTIONS

The students were given specific instructions on acceptable questions. Questions were derived for assigned homework problem sets. For each Mech Madness session, students were able to create question from 10 to 12 common homework problems. For each problem set, students were directed to design questions from an individual problem's find, given, free-body diagram, essential intermediate steps, and final answers. Solution sets were available for the students to check their homework and ensure they had correct answers for their prepared questions. Solutions for individual problems were provided only if students had made a significant attempt or solved the problem. In addition, the students were also able to ask questions from the lecture notes.

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UNACCEPTABLE QUESTIONS

Unacceptable questions were often asked during the games. In most cases, students had prepared questions which they had an incorrect solution or no solution. Also, students asked insignificant questions which were not essential to the solution of the problem. If an opposing team felt they were asked an unacceptable question, they were able to appeal to the instructor. If the question was deemed unacceptable, the accusing team was awarded two points. Conversely, if the question was acceptable, the asking team received two points. The accusing team won most appeals.

OTHER RULES

Due to the parity which evolved during the course of several competitions, special incentives were put in place for well prepared teams who started at the bottom of the ladder. The incentive stated that at the end of each game, teams which were able to climb the ladder would receive a + for each table forward they had moved. For example, if a team had started at table 6, and finished the game at table 4, they would receive a ?+ for a final score. There was no penalty for moving backwards. The students liked this arrangement. If they were prepared, most students were able to better their position.

BENEFITS OF MECH MADNESS

The game itself was meant to be a motivating factor for cadets to complete the homework assignments. Previous instructors had demonstrated a strong correlation between test performance and homework completion. Therefore, Mech Madness was designed to be a fun alternative to the traditional collection of homework. Student collaboration on completing the homework assignments in preparation for the competitions was encouraged. Some student indicated that the process of thinking of good questions helped their preparation for graded events like quizzes and exams. They felt that Mech Madness forced them to view the material with the mind of an instructor, in that they were required to understand and ask questions, rather than simply solve problems.

The competitive aspect also motivated several of the students to complete the homework who might not have. Several comments on an end of class survey indicated that the competitive nature of the game and the fact that another individual was depending on their performance was a motivating factor in completing the homework. Unfortunately, the teaming aspect was also an issue of contempt for other students. Several students felt that they had received grades they did not deserve because of the lack of preparation of their partner. This issued soured many students who would have much preferred an individual competition.

The instructor also greatly benefited from the gaming format. The score card provided vital information on individual cadets. Cadets who came unprepared, scored very few points, this was evidenced by a low box score. As a result, it was abundantly obvious which students were not completing the homework. On traditional homework assignment hand-ins it is often very difficult to determine how much of the work is individual effort. The Mech Madness score card is very telling, because two-thirds of the problems are individual effort problems.

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Next, the gaming format lightens the workload of an individual instructor who is teaching 104 students with no assistance. After a 20 minute session, the instructor can quickly determine homework performance without the cumbersome task of grading homework assignments.

CONCLUSION:

Mech Madness provides a fun alternative to traditional homework collection. Future research and assessment will be preformed to quantify the overall benefits.

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Capt Bartolomei is currently an instructor in the Department of Engineering Mechanics at the USAF Academy. He has a B.S. degree in mechanical engineering from Marquette University and a M.S. degree in systems engineering from the Air Force Institute of Technology. Prior to his current position, he was a project engineer for the F-22 System Program Office, Wright-Patterson Air Force Base, Ohio.

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