THE PUZZLE GAME: A NOVEL APPROACH TO TEACHING ACCOUNTING

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BACKGROUND

Previous research has found that the use of non-traditional teaching aids is beneficial in terms of students’ perceptions of learning, exam performance, and the learning process. The objective of this research is to determine if the use of non-traditional teaching aids, specifically crossword puzzles, in an introductory accounting course, increases student interest in the subject matter and, therefore, enhances learning.

The education literature has identified a number of situations in which various games have been used in different academic disciplines as effective teaching aids to enhance
student learning. Lewis and Mierzwa (1989) suggest that games such as charades, crossword puzzles, board games, word searches and bingo are effective teaching aids when used in the right situation. Rotter (2004) believes that the game “Jeopardy!” can be modified by teachers to assess knowledge thus replacing the need for formal tests. Bailey, Hsu and DiCarlo (1999) developed educational puzzles as supplemental materials to complement and enhance the information presented in the traditional lecture. They believed that the crossword puzzles provided students with a unique, innovative, and fun opportunity to evaluate their own level of learning by identifying concepts not yet mastered.

Tanner and Lindquist (1998) used the Monopoly game as part of a business simulation and cooperative learning exercise in a junior level accounting course. They found that students developed a positive attitude towards financial accounting, learning, and perceived achievement at the end of the project through the use of the game. Helliar et al., (2000) used a portfolio management computer game to teach finance. They found that students enjoyed using the game and used it to practice the various strategies and techniques that were introduced in the course.

Massey, Brown and Johnston (2005) used crossword puzzles for homework assignments and a web-based jeopardy game for in-class review sessions in their information systems courses. They found that the use of games were beneficial in terms of exam performance and students’ perceptions of learning and the learning process. Hoffjan (2005) discussed the use of Calvados, a business game used in three different cost accounting courses. The use of the game was intended to help students understand the complex issues of relevant costs for decision making and transfer pricing. The researcher found that the overwhelming positive feedback from the students supported the use of the game in the classroom.

Leong (2005) recommends creating in-class activities such as term papers, cases and projects as a way of ensuring students’ active involvement in the learning process. Saunders and Christopher (2003) suggest that faculty members teach outside the box by looking for some nontraditional teaching methods to use in the accounting principles classroom. These might
include creative tasks such as requiring students to attend a laboratory session, use of a computer assignment and use of simulations.

MOTIVATION

Principles of Financial and Managerial Accounting are core courses for all business majors across many universities. At our university, this sequence of courses is also taken by some non-business majors. Therefore, a majority of students enrolled in the principles of accounting sections are non-accounting majors. These students often are not as motivated to study accounting as compared to accounting majors and getting them to read the text and come prepared to class is often a fruitless exercise. Student complaints about accounting being tedious should motivate instructors to find interesting and innovative ways to increase student interest in the subject matter and, therefore, stimulate learning. Diller-Hass (2004) believes that student interest can be achieved by ensuring that students are active participants in the learning process.

THE PUZZLE GAME is a non-traditional teaching aid that encourages students’ active involvement in the learning process and provides a "fun" method that energizes students to become active participants in the learning process. THE PUZZLE GAME is more than just fun because it reflects real life challenges such as the importance of knowledge, self-reliance, and timing.

THE PUZZLE GAME: RULES AND FRAMEWORK

Previous research has found that the use of games was beneficial in terms of exam performance and students’ perceptions of learning and the learning process. The objective of this research was to determine if the use of a non-traditional teaching aid, THE PUZZLE GAME, increases student interest in the subject matter and, therefore, enhances learning.

I. Background

THE PUZZLE GAME consists of 10 topical crossword puzzles and one BIG PUZZLE based on material presented in standard principles of accounting texts. In recent years, textbooks have become cluttered and "busy" and, consequently, key points are often lost within the
information presented. THE PUZZLE GAME targets the primary points within each chapter. A copy of a chapter puzzle (Cost Concepts & Cost Allocation) and the BIG PUZZLE appear in Figure 1. The answers to both puzzles appear in the Appendix.

II. Goals

The goals of THE PUZZLE GAME include, but are not limited to, the following:

A. encourage students to read actively their textbook in preparation for class;
B. teach students the importance of self-discipline in developing good study habits;
C. emphasize to students how the rules of THE PUZZLE GAME are similar to situations in life where situations are often effected by the extent of one's preparedness, knowledge and luck;
D. require students to exercise good ethics when grading the puzzles and recording scores.

IV. Time Required

A maximum of five minutes is needed to complete THE PUZZLE. The grading process and discussion of the answers normally takes an additional five minutes. On occasion, administrative issues concerning THE PUZZLE GAME, such as discussion of the procedure, may consume an additional five minutes of class time. The term's FINAL PUZZLE, the activity that is drawn from all the clues used throughout the term, is limited to fifteen minutes.

VII. Process

Everyone attending class participates in THE PUZZLE GAME and is given a puzzle on the recently assigned material. The puzzle consists of clues on fundamental points covered within the text.

When the allocated time has elapsed the puzzles are exchanged among students, who now serve as Ethics Monitors, in grading the puzzles as the answers are reviewed. The Instructor can use his/her discretion to assign extra credit points for participating students.

VIII. THE BIG PUZZLE

On the last class day, the Instructor will distribute to each student THE BIG PUZZLE, which is comprised of clues drawn from the pool of puzzles used throughout the term. Students
have fifteen minutes to complete this exercise, which is then reviewed and graded by the Ethics Monitors.

**STUDY SETTINGS AND DESIGN**

We evaluated the impact of the game on students’ performance in two sections of the Principles of Accounting II (Managerial Accounting) course with a total of 70 students, evenly divided between the two sections. The same instructor taught both sections, within one hour of each other, during the spring 2005 semester and followed the same procedures in both sections. For instance, homework assignments were assigned and evaluated as part of students’ final grades, the same quizzes and examinations were given in both sections, and the lecture format was similar in both sections.

Each chapter puzzle was administered during a designated class period in which the chapter’s material was covered and the instructor served as the timekeeper. The BIG PUZZLE was administered during the second to last class period of the semester after all course material was substantially covered in the class. After the time to complete the puzzle lapsed, students exchanged puzzles, graded each others’ puzzle based on correct answers provided by the instructor and recorded the number of correct responses on the puzzle sheet. A student worker reviewed each puzzle to ensure the integrity of the results and recorded the results in the overall tally sheet kept by the Instructor. Students, who missed a chapter puzzle and who failed to include their names on the puzzle sheet, were given a score of 0 for that puzzle.

**RESULTS**

The demographics of the 70 students, who participated in this study, revealed that, as expected, an overwhelming majority of the students were non-accounting majors (60 non-accounting majors vs. 10 accounting majors), a majority of the students were male (42 males vs. 28 females), and most students were in their sophomore or junior year (1 freshman, 26 sophomores, 30 juniors, 12 seniors, and 1 graduate student).
The average score of each student was computed by adding the scores on all puzzles attempted (maximum = 10) and dividing by the number of puzzles attempted. Each puzzle consisted of 10 clues with one point awarded for each correct answer. The average scores ranged from a low of 0.75 (for a student who attempted 4 of the 10 puzzles) to a high of 8.86 (for a student who attempted 7 of the 10 puzzles) with a median score of 5.26. As expected, student course grades were significantly correlated to the average score on the puzzles (t = 2.75, p = 0.008) indicating that performance on the puzzles could have influenced overall course performance. However, this finding needs to be interpreted with caution and may not necessarily suggest cause and effect.

A more interesting finding, however, is that student course grades were significantly correlated to the number of puzzles attempted (t = 2.87, p = 0.005) indicating that the number of puzzles attempted could have influenced course grades. This finding was further confirmed by the fact that course grades of students attempting all ten chapter puzzles as well as the BIG PUZZLE (2.62) were significantly higher than the other students (2.07), (t = 2.47, p = 0.008). Of the 70 total students, 26 attempted all ten chapter puzzles as well as the BIG PUZZLE. A strong indication of student involvement and motivation was the high average (8.4) of the number of puzzles attempted.

Accounting majors had a significantly higher average score (6.27) as compared to non-accounting majors (5.25), (t = 1.86, p = 0.03). Also, female students had a marginally significant higher average score (5.77) as compared to male students (5.14), (t = 1.61, p = 0.055).

Course grades of accounting majors (3.1) were significantly higher than non-accounting majors (2.1), (t = 3.28, p = 0.00). Also, course grades of female students (2.61) were significantly higher than male students (2.0), (t = 2.73, p = 0.00).

**SUMMARY AND CONCLUSIONS**

The objective of this research was to determine if the use of non-traditional teaching aids increase student interest in the subject matter and, therefore, enhance learning. Previous research
has found that the use of games was beneficial in terms of exam performance and students’ perceptions of learning and the learning process. The results of this research strongly support earlier findings. We found that student course grades were significantly correlated to the average score on the puzzles as well as the number of puzzles attempted. Student motivation and participation were also high as evidenced by the high number of puzzles attempted, on average, by each student. Anecdotal evidence also suggests that students found THE PUZZLE GAME to be fun, challenging, and an effective learning methodology.

REFERENCES


Cost Concepts & Cost Allocation

Across
4. An inventory account used to record the production costs incurred and assigned to partially completed units (3 words).
8. This inventory account holds the costs assigned to all completed units that have not been sold (2 words).
9. This cost changes in direct proportion to a change in productive output.
10. Cost assigned to inventory, which includes the cost of direct materials, direct labor, and factory overhead.

Down
1. Cost of all units completed and moved to finished goods inventory (4 words).
2. Cost conveniently and economically traced back to a specific product.
3. Cost of resources consumed during the current period and not assigned to products.
5. Costs incurred to turn material into a finished product.
6. Activity base that causes a cost pool to increase when the activity increases (2 words).
7. Cost that stays constant within a relevant range.
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Big Puzzle

Across
3. Budget plans used in daily operations (2 words).
6. A method of evaluating capital investments based on the time estimated to recover the original investment (2 words).
7. In this accounting method the cost flow follows the logical physical flow of products (anronym).
8. The method that separates a mixed cost into its fixed and variable components using only two observations (2 words).
13. A framework that links the perspectives of an organization's four basic stakeholder groups (2 words).
16. A summary of expected costs geared to be adapted for a range of activity/production levels (2 words).
17. The amount that remains after all variable costs have been paid (2 words).
19. A cost that will not differ between two alternatives (2 words).
20. Direct material costs are also referred to this.
21. A report that managers use to track & analyze costs in a process cost system (3 words).
24. The cost of all units completed and moved to finished goods inventory (4 words).
25. This labor variance measures whether workers take more or less time than expected.

1. Over/under applied MOH that is insignificant is closed to this account at year end (4 words).
2. An inventory account used to record the production costs incurred and assigned to partially completed units (3 words).
4. Costs that can be eliminated by changing a course of action (2 words).
5. A company that manufactures custom bridal gowns will use this costing system (2 words).
9. The maximum production capacity of a firm given its existing resources (2 words).
10. The minimum desired rate of return on an investment (3 words).
11. The sales dollars generated by each dollar invested in assets (2 words).
12. Practice of identifying all major operating activities, tracing costs to those activities, & assigning those costs to relevant products (3 words).
14. Tool aimed at improving productivity and eliminating waste by requiring all resources be acquired only as needed (3 words).
15. This document contains all information about the costs of a specific job (4 words).
18. Broad, long-term goals that determine the direction of a business and that serve as a guide for decision-making.
22. The direct material, direct labor, and factory overhead budget are all a function of this budget.
23. This material variance measures whether a higher/lower cost was incurred than expected.
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7. In this accounting method the cost flow follows the logical physical flow of products (acronym).
8. The method that separates a mixed cost into its fixed and variable components using only two observations (2 words).
9. A framework that links the perspectives of an organization’s four basic stakeholder groups (2 words).
10. A summary of expected costs geared to be adapted for a range of activity/production levels (2 words).
11. The amount that remains after all variable costs have been paid (2 words).
12. Practice of identifying all major operating activities, tracing costs to those activities, & assigning those costs to relevant products (3 words).
13. Cost of goods manufactured (2 words).
14. This document contains all information about the costs of a specific job (4 words).
15. Broad, long-term goals that determine the direction of a business and that serve as a guide for decision-making.
16. Direct material, direct labor, and factory overhead budget are all a function of this budget.
17. Efficiency O E N

Down

1. Tool aimed at improving productivity and eliminating waste by requiring all resources be acquired only as needed (3 words).
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