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USE OF INTERACTIVE ACCOUNTING GAME TO ENHANCE STUDENTS' TEST SCORES: EVIDENCE FROM UNIVERSITI TEKNOLOGI MARA SARAWAK

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ABSTRACT

A strong foundation in the basic principles of accounting is important for accounting students as they move on to further studies in financial accounting of higher levels. The aim of this research was to investigate whether there were any significant differences in accounting students' performance after being exposed to the Accounting Balancing Game at Universiti Teknologi MARA (UiTM) Sarawak. This study found that 76% of the accounting students who were exposed to the Accounting Balancing Game improved their performance. The results showed that there was a significant improvement between pre and post-test scores by the experimental group. However there was no significant improvement between pre and post-test scores by the control group. Hence the results of this study offer useful insights in enhancing the teaching and learning of financial accounting for future accounting students in local universities.

Keywords: *teaching and learning, accounting game, Accounting Balancing Game.*

INTRODUCTION

The teaching and learning environment in the 21st century faces great challenges due to globalization and continuous development of new

technologies. Most students entering higher education today are from the generation Y who are exposed to the latest advances in technology. As such, there is greater pressure on all parties involved in the provision of tertiary education to make necessary changes to ensure continuing relevance. Garvin (1993) notes that a learning organization must be skilled at creating, attaining and transmitting knowledge, and in modifying its behavior to reflect new knowledge and insights in order to remain relevant.

In 2007, the Malaysian government revised the National Higher Education Strategic Plan. The seven strategic thrusts in the plan are to be accomplished by the year 2020. One of these thrusts is directed towards improving the quality of the teaching and learning methodology. A growing concern among academicians in various fields including accountancy has resulted in new teaching and learning methodologies to provide better quality services to ensure that students acquire knowledge and other skills accordingly. According to Azriel, Erthal and Starr (2005), academics must try to break out from the traditional lecturing format and develop a creative pedagogy to create an interactive learning environment. This should be done although they acknowledge that there is no one specific superior methodology to improve students' exam scores.

PROBLEM STATEMENT

Financial Accounting is a core subject; therefore it is important for the overall performance of accounting students. In six semesters of the Diploma in Accountancy program at Universiti Teknologi MARA (UiTM), the students have to take financial accounting papers to graduate. To excel in these papers, they should have a strong foundation in accounting principles which are taught in their first semester. However previous semester's results produced by accounting students in UiTM Sarawak campus, indicated that most of them failed to perform well especially when they progressed to the higher levels in the Financial Accounting papers. Among the comments highlighted in the chief examiner's report was students had poor understanding of basic accounting principles. As a result, these accounting students did not perform well in this core paper and this in turn affected their cumulative grade point average scores at the end of the semester.

OBJECTIVE OF THE STUDY

The objective of this study was to examine whether there is any significant difference in the accounting students' performance after their exposure to the accounting game at Universiti Teknologi MARA (UiTM) Sarawak.

SIGNIFICANCE OF THE STUDY

The outcome of this study would be significant particularly for the UiTM Sarawak Accountancy Faculty lecturers, students and researchers for the following reasons.

1. For UiTM Sarawak Accountancy Faculty Lecturers

UiTM Sarawak requires all faculties to plan and organize academic enhancement programmes using the Student Development Fund under the administration of the Academic Affairs Department. As such, the findings of this research will provide information and input particularly for accounting lecturers in planning and organizing the student academic enhancement programs with an eye towards improving the students' performance for Financial Accounting. The result of the study will also provide new information on how Accounting lecturers can include accounting games as part of their teaching methodology to improve the students' performance in Financial Accounting.

2. For Students

Students voice that they cannot perform well in examinations due to time constraint. Thus the results of this study will serve as an input specifically for students taking the Financial Accounting paper in Year One. The accounting devices such as the Accounting Balancing Game suggested here can be a supplementary learning tool since the game can train them to answer questions under time constraints.

3. For Researchers

Future research can explore further on areas which were not specifically covered in the scope of the study.

SCOPE OF STUDY

The study focused on the Diploma in Accounting (DIA) students who were pursuing their studies in UiTM Sarawak.

LITERATURE REVIEW

There are a few prior studies done which investigated the use of accounting games to identify students' performance in accounting class. Albrecht (1995) found that the integration of simulation games can enhance students' participation in accounting class. Other researchers such as Brozik and Zapalska (1999) and Arhin and Johnson (2003) suggested that the utilization of games in class learning would foster a proactive learning environment and increase students' participation in their learning process. Another research done by Azriel et al. (2005) examined students' perception on the effectiveness of using games as part of the teaching methodology. The specific research questions posed to the students were (a) Is the game appropriate in the course? (b) Does the game facilitate learning? (c) Does the game complement lecture materials? (d) Does the game help students to learn? The results of their study showed the overall consensus that students agreed with the use of games as an appropriate method of instruction that facilitated their learning. In their recommendations, they suggested that academicians should try to shift from the traditional lecture format and develop an ingenious pedagogy to make the learning environment more attractive.

Smalt (1999) discussed the issue where the accounting profession expressed concern over losing the "best and brightest" to other career options. Thus it is indeed important that effective teaching methodologies be identified to ensure that the accounting profession will not lose its potential future members since the DIA students serve as a feeder to

other programmes in UiTM Sarawak. Smalt (1999) also found that the Accounting students who were exposed to accounting games performed better in their post-test results as compared to the control group.

Most of the earlier studies conducted by previous researchers found that positive results were produced from the utilization of games in learning. However, study by Hicks (2007) on generation Y students indicated a contradictory finding. He found that there were no significant differences in the students' performance between the control group and the experimental group which utilized games in their learning. Hicks (2007) recommended that further studies needed to be done on a new set of generation Y students.

METHODOLOGY

The accounting game utilized in this study is known as the Accounting Balancing Game. The game had been designed by its inventors based on the research output of a brain researcher Dr. Kawashima, who discovered that the best way to stimulate the brain is to perform a simple mathematical calculation quickly (Kawashima, 2007). This feature, which is integrated in the game, is basically to train the students to answer simple questions quickly as part of their preparation before they sit for test. To make the game more attractive some accounting principles have been taken into consideration in designing and building the game board, game cards, timers and game regulations.

The Accounting Balancing Game is a manual board game. Part of the game technique is similar to the Snakes and Ladders game but it was designed to integrate some elements of accounting principles. It aimed to be educational. The board of the Accounting Balancing Game consists of eighteen columns where nine columns are referred to as the positions on the left hand side, representing the debit section, and another nine columns on right representing the credit section. The game can be played by two or four players. The players need to throw a dice to make their move on the board game. At the end of every move made by the players after the dice is thrown, they are required to pick and answer a question on the principles of accounting within thirty seconds. Points will be rewarded for

the correct answer and penalty marks charged if the players fail to answer. The positioning of the players inside the board game is based on double entry rules where if there are four players, two players must be on the debit section and another two on the credit section. This is to fulfill the requirement of the balancing concept under the accounting principles. In the event when the player positioning in the board game not fulfilling the double entry rules (after the dice is thrown), he/she will need to throw a reward dice to move forward and fulfill the double entry rules, provided he/she has answered correctly the question on the Principles of Accounting.

On the other hand, if the player fails to answer the question on the Principles of Accounting, he/she will need to throw a penalty dice which will reverse his/her position in the board game, to fulfill the double entry rules. The winner is the player with the highest marks. The game ends when all the full sets of 24 questions are completed. In this study, we postulated that the Accounting Balancing Game would produce some positive impacts on the learning process.

Based on the difference in pre and post-test scores, the following hypotheses were developed:

Hypothesis 1

$H_0: \mu = 0$; There is no significant improvement between the pre and post-test scores within the experimental group.

$H_1: \mu \neq 0$; There is a significant improvement between the pre and post-test scores within the experimental group.

The improvement is measured based on the percentage of increase between the pre and post-test scores.

Hypothesis 2

$H_0: \mu = 0$; There is no significant improvement between the pre and post-test scores within the control group.

$H_2: \mu \neq 0$; There is a significant improvement between the pre and post-test scores within the control group.

The focus groups in this study were students of UiTM Sarawak who were pursuing their Diploma in Accountancy course in the July to October 2008 academic session. This study also took into account the fact that the accounting game in this study was still in the process of experimentation and therefore could not be exposed to the wider population. Students who were exposed to this accounting game were required to sign a non-disclosure agreement by the innovators to protect such information. It was also to preserve any confidentiality necessary under the copyright of the game.

Semester 1 students were not chosen as they would not be able to answer the complete set of the pre-test questions since they had not yet acquired the basic knowledge when the pre-test was conducted. The Diploma in Accountancy students in semesters 5 and 6 were also not included since most of them had successfully got through the critical stage of Financial Accounting, which was Financial Accounting 4. Thus only students from Semesters 2, 3 and 4 were chosen as the subjects of the study.

These groups of students were selected as all of them had gone through the first level of accounting syllabus, which focused on the basic accounting concepts and principles. Thus as far as the level of knowledge was concerned, the researchers assumed that they all possessed the same level of ability. The students were divided into two groups, the experimental group and the control group. The experimental group referred to those students taking part in the Accounting Balancing Game and the control group the students who did not take part in the game. They were categorized by their CGPA in their previous semester, namely high scorers (3.00 – 3.49), medium scorers (2.50 – 2.99) and low scorers (2.00 – 2.49), before the stratified random selection was made. Those with CGPA of 3.50 and above scored excellent results in Financial Accounting, and hence were not selected, as it was feared that this group might not be relevant to the study.

The experimental group consisted of fifty percent of randomly-selected students from each CGPA category. The rest of the students

formed the control group. At the beginning of the study, all students who were identified in the focus group were required to sit for the pre-test for an hour. To ensure the consistency of the questions utilized for this study, two sets of questions each, one for pre and post-test of equivalent level were designed. The questions were based on the first level basic accounting principles in line with the semester one Financial Accounting syllabus of Diploma in Accountancy. Then the experimental group was exposed to the Accounting Balancing Game by playing it once (30 minutes) per week for four consecutive weeks. The experimental group had the freedom to play the accounting game in groups of 2 or 4. Since the game was not part of the faculty course requirement, the accounting game was handled outside the normal class activities and considered as part of the students' academic enhancement program. At the end of week four, the experimental group and the control group were requested to sit for the post-test. The score from the pre and post-test were recorded accordingly and compared. The comparison resulted in an increase, decrease or no change at all in the students' scores. To measure the increase or decrease in the score the following rule was designed; 1 represented a decrease, 2 no change and 3 an increase.

DATA ANALYSIS PROCEDURE

The data from the study were analyzed using the Statistical Package for Social Science (SPSS) software program. Descriptive statistics in the form of frequencies and percentages were part of the analysis made on the increase, no change and decrease between the pre and post-test result. To analyze the pre and post-test of both groups, paired sample t-test were used to compare means in the two samples that were correlated. Using the paired sample t-test, it could be statistically concluded whether or not the Accounting Balancing Game (*ABG*) had improved the performance of the students. The data of the questionnaires was also coded, entered and analyzed using SPSS. The data analysis procedure which examined the mean, median and standard deviation was based on similar methodology employed by Azriel *et al.* (2005).

FINDINGS

This section reports the research findings according to the objectives and hypotheses of the study. First, it reports the descriptive analysis of the variables by comparing the mean and standard deviation of the respective variables such as the pre and post-test scores and the absolute change in score for both the groups involved in the study. The frequency and the percentage in the changes in the score will also be analyzed and interpreted. Secondly, to find out whether the difference is significant, paired sample test was undertaken to determine whether there is significant difference in the pre and post-test scores among the experimental and the control group.

FOCUS GROUP OF THE STUDY

The focus group was identified based on the CGPA results for January-May 2008 semester. A total of 172 students fell within the range of the focus group criteria as mentioned in the methodology section earlier. Only 147 students (85%) out of the actual focus group turned up for the pre-test. Based on the methodology, fifty percent (73 students) of them had been randomly selected to be exposed to the accounting game and unfortunately only 50 students consistently came for all the game sessions and the balance of 23 students who could not make it were included as part of the control group (total of 97 students). The decision to exclude students who had not consistently showed up for the game sessions from the experimental group is similar to the methodology that had been adopted under a study made by Smalt (1999). In this study, the game was organized as an extra academic activity and was not part of the compulsory subject continuous assessment. As such there was no way to force the students to take part in the game and at the same time students gave excuses for not turning for the game due either to personal problems or other campus activities.

DESCRIPTIVE ANALYSIS FOR THE PRE AND POST-TEST

Table 1 shows the mean and standard deviation of the stated variables for experimental group and the control group. The mean score as stated under the pre and post-test was the percentage performance over 100%.

The mean score gained by the experimental group in the pre-test test was 70.19% and increased to 75.41% in the post-test. This shows that there was an increase in the mean score among the students in the experimental group with a difference of 5.22%. The mean score of the control in the pre-test was 66.83% (standard deviation of 13.52) and had increased only by 2.09% in the post-test. This result indicated that the experimental control had increased in their mean score after being exposed to the accounting game as compared to the control group which was not exposed to the accounting game. The standard deviation (Table 1) decreased by 3.73 (from 13.87 to 10.14) showing that the deviation of post-test score was closer to the post-test mean score after the students were exposed to the accounting game.

The difference between the pre and post-test scores were coded into a nominal value and the mean score was 2.56 (closer to the value of increase) for the experimental group. On the other hand, the mean score difference between the pre and post-test score of the control group was 2.206, which was slightly lower as compared to the experimental group's. The effect whether the score obtained in the post-test increased, remained static or decreased as compared to the pre-test (Table 2). Table 2 shows that the increase percentage is 76% (38 persons) by the experimental group and only 57.7% (56 persons) by the control group. On the other hand, from the median score perspective for both groups, the different effect between the pre and post-test was 3, which explained that more than 50% of them scored higher in the post-test. There is a possibility that at the beginning of the semester when the pre-test was conducted most of the students in both groups had not been able to recall their accounting principles upon returning from their long semester break. At the same time, the result showed that there was a greater percentage, which was 37%, by those who were in the control group decrease as much as 57% in their score during the post-test. The increased mark produced by the experimental group was 37%, which was higher compared to the control group, which only reached a maximum of 30%.

To further determine the significance of the findings as shown by the experimental group and control group in Table 1 and 2, a paired samples test was conducted where the mean score between the pre and post-test of both groups were analyzed. The outcome of the p-value from this test was

to resolve whether the study's alternative hypothesis (H_1 and H_2) could be accepted or rejected. The results of paired samples test of both groups in the study are presented in Table 3.

Table 3, at two-tailed test of significance at probability level of 0.05, shows a significant difference (p -value = 0.00) by the experimental group. This result further supported the earlier findings to reject Null Hypothesis 1 and inferred that there was a significant improvement between pre and post-test scores by the experimental group.

However, the result was not significant (p -value = 0.57) in control group's pre and post-tests. This result did not allow the researchers to reject null Hypothesis 2. Hence, there was no significant difference in the improvement between pre and post-test scores among those in the control group and the null hypothesis was accepted.

CONCLUSION AND RECOMMENDATIONS

In this study, the researchers examined the impact of the Accounting Balancing Game on the students' ability to recall accounting principles and tried to determine whether students who learnt these basic accounting principles in their financial accounting class would perform better after taking part in the game. The study found that there was a significant improvement between the pre and post-test scores by students in the experimental group after exposure to the Accounting Balancing Game and the increase was 76%. Secondly, the researchers found that the post-test score by the experimental group was better as compared to the control group's with an interval of 2 to 7 points and the difference in score was 5.2 points. It was also concluded that there was a significant difference between the pre and post-test scores. The study concluded that the use of Accounting Balancing Game had a significant impact or influence on students' performance. The students who played the Accounting Balancing Game performed better than those who did not.

The result of this study highlighted the importance of enhancing teaching and learning accounting using a game. It can be suitable and adaptable in the new teaching and learning environment. The present

generation of students is more exposed to new advanced technologies and it creates a different scenario as compared to previous generations who had less external exposure and influences. Hence the results of this study offered additional insights to enhance the use of teaching aids for the Financial Accounting paper for future accounting students in local universities. The university needs to identify opportunities to promote the Accounting Balancing Game through a greater collaboration between the accounting faculty and those developing the games. This Accounting Balancing Game can act as an additional tool to teach students in a fun way and develop students' interest in this subject. To further emphasize the value of this approach, the present Accounting Balancing Game creators have the intention to enhance the innovation by converting it to a compact disc in order to enable more students to be exposed to the innovation. This conversion too will encourage the use of interactive multimedia as a supplementary learning tool. Additional future studies should therefore be undertaken on students from other faculties taking accounting subjects to provide more comprehensive and conclusive findings.

Table 1: Mean and Standard Deviations of the Variables in the Experimental and Control Group

| | Experimental Group | | Control Group | |
|---|--------------------|---------------|---------------|---------------|
| | Mean Score | Std Deviation | Mean Score | Std Deviation |
| Pre-test score | 70.19 | 13.87 | 66.83 | 13.52 |
| Post-test score | 75.41 | 10.14 | 68.92 | 12.94 |
| difference in score | 5.22 | 9.16 | 2.09 | 11.34 |
| Result in differences (3 for increase, 2 for no change and 1 for decrease) | 2.56 | 0.81 | 2.20 | 0.95 |
| No of observation | 50 | | 97 | |

Table 2: Descriptive Analysis for the Change in the Pre and Post-Test Difference by the Experimental and Control Groups

| Difference in score between pre and post-test | Experimental group | | Control group | |
|--|----------------------------|-------------|--------------------------|-------------|
| | Frequency | Percent (%) | Frequency | Percent (%) |
| Increase in score | 38 | 76 | 56 | 57.7 |
| No change in score | 2 | 4 | 5 | 5.2 |
| Decrease in score | 10 | 20 | 36 | 37.1 |
| TOTAL | 50 | 100 | 97 | 100 |
| Median score (3 for increase, 2 for no change and 1 for decrease) | 3 | | 3 | |
| Range of score | | | | |
| Increase mark | Minimum (1.1) Maximum (37) | | Minimum (1) Maximum (30) | |
| Decrease mark | Minimum (0.5) Maximum (17) | | Minimum (1) Maximum (57) | |

Table 3: Paired Samples Test – Pre and Post-Test for the Experimental and Control Group

| | | Paired difference | | | | | |
|--------|---|-------------------|---------------|-----------|-------|----|-----------------|
| | | Mean | Std Deviation | Std error | t | df | Sig. (2 tailed) |
| Pair 1 | Pre and post-test score difference for experimental group | 5.2 | 9.16 | 1.30 | -4.03 | 49 | 0.00 |
| Pair 2 | Pre and post-test score difference for control group | 2.09 | 11.34 | 1.09 | -.573 | 96 | 0.57 |

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