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The Effect of Freemind on Students' Performance in an Advanced Financial Accounting Course

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Abstract

This study examines the effect of using an application of a computer-assisted teaching tool in enhancing the dissemination of knowledge to students in improving their understanding and performance of a course. This study was conducted on undergraduate students who sat for an advanced financial accounting course. The teaching tool known as Freemind was introduced in the class with the aim to mitigate the possibility of knowledge dissemination breakdown due to the reduction of meeting hours of this course from 4 to 3 hours and application of a mass lecture of over 90 students. Based on 160 students as the sample study, this study shows a significant increase in the results of the students when Freemind was adopted as the teaching tool compared to those students who were taught using PowerPoint. This study provides some evidences that students' performance in advanced financial accounting could be improved with the assistance of Freemind.

Keywords: Students' performance, Freemind, Undergraduate, Advanced Financial Accounting

1.0   INTRODUCTION

The importance of students' performance is not only evident to students but also to the universities as it forms as a measurement of their educational process success. Students' performance is often perceived as the demonstration of knowledge that the students have learnt in tests, quizzes, presentations and final examination (Barkley, 2004). Such perception does not only apply to studies at the primary and secondary levels but also at the tertiary level in the university. Malaysian universities are not an exception to such perception. Of consequence, universities often strive to find the best teaching tool to be used in the class in order to disseminate knowledge to the students effectively particularly for course such as advanced financial accounting.

Advanced financial accounting for undergraduate students in a Malaysian university often covers topics of Malaysian Financial Reporting Standards (MFRSs) related to the preparation of group financial statements. The technical complexity and large coverage of this course often provide difficulties for the academics to complete the course within the stipulated time. In most cases, academics teaching this course would need to provide additional meetings with the students for the purpose of assisting the students on their issues and

problems in tackling the questions related to group accounts. The consistent failure rate of about 30 to 40 percent has continuously increase concerns among academics which subsequently led them to find ways in reducing the percentage of failure rate of this course.

The recent reduction of meeting hours from 4 meeting hours to 3 meeting hours for this course have also increased the academics' concern and in a way motivate them to find and strategise ways of teaching tool for them to complete the course and subsequently improve the students' understanding of the MFRSs' concepts and technical procedures. One of the ways is the introduction of Freemind which has recently been used in teaching advanced financial reporting to undergraduate students in one of the Malaysian universities.

Using students who have enrolled in the course of advanced financial accounting, this study examines the effect of Freemind on students' performance. By comparing Freemind with another teaching tool known as PowerPoint, this study shows a significant increase in the results of students in the test and final examination when Freemind was adopted as opposed to students who were taught using PowerPoint. The remainder of this paper is structured as follows. The next section provides a review of relevant literature. Section 3 provides a brief description of Freemind and the application of this teaching tool in the context of this study. Section 4 discusses the research objective and hypotheses underpinning this study and section 5 outlines the research design. The results are presented in section 6. A summary and conclusion are provided in the last section.

2.0   LITERATURE REVIEW

One of the most eminent areas being examined in the education literature is on the factors that could influence students' performance. Most of the studies supported the hypotheses that students' performance could be affected by different socio-economic, psychological and environmental factors (Hijazi and Naqvi, 2006). These factors include gender (Anderson, Benjamin and Fuss, 1994; Deboer, 1994; Horne, 2000), similar learning styles between the students and instructors (Borg and Shapiro, 1996), sitting location in the class (Topping, 1994), attendance (Park and Kerr, 1990; Romer, 1993; Topping, 1994; Devadoss and Foltz, 1995; Durden and Ellis, 1995) and their previous results (Nordstrom, 1990).

Within the accounting education literature too, there are also studies that have examined the factors that influence university students' performance. Among the factors that have been examined are self-efficacy (Christensen, Fogarthy and Wallace, 2002, Tho, 2007); motivation (Yamamura, Martin, Campbell, Campbell and Frakes, 2000; Chen, Maksy and Zheng, 2006), study style (Chen et al., 2006), class length (Ewer, Greer, Bridges and Lewis, 2002) and pre-requisite of another subject (Campbell and Glezen, 1989). Examining these factors is consistent with the attribution theory that defines how individuals attribute their performance to events and behaviour (Weiner, 1986).

A study by Maksy and Zheng (2008) found target score, motivation, pre-requisite subject of accounting and GPA could influence students' performance in Advanced Financial Accounting in a public university. Using ANOVA, Pearson and Spearman analyses, the results of their study showed the factors chosen are significant influence on the students' performance. However, other than Maksy and Zheng's study, there is limited number of

studies on this area relating to advanced financial accounting course. This warrants for researching this issue since advanced financial accounting course often involving preparation of consolidated financial statements. Due to the nature of the course, it is expected that apart from having good CGPA and putting much study effort, the way the information is being delivered to the students or often known as the teaching tool is also important.

Teaching tool is one of the factors that have been examined in the education literature. Teaching tool refers to the way the knowledge is being delivered to the students by their lecturers A group of studies examined students' preferences on teaching tool in their learning environment (Sugahara and Boland, 2006; Amare, 2008). These studies found that most respondents prefer their instructors to use PowerPoint since this teaching tool often incorporates graphics, animation and/ or colour that lead to improving students' short term and long term memory. (Nouri and Shahid, 2005). Of consequence, PowerPoint could lead to better improvement in students' short term and long term memory.

Another group of studies focused on examining the effect of teaching tool on students' performance. These studies provided mixed findings with few studies showed that using appropriate teaching tool could improve performance such as students being taught using traditional teaching tool via whiteboard performed better (Bartsch and Cobern, 2003; Amare, 2006; Sugahara and Boland, 2006). Other studies show no significant influence of teaching methodology on students' performance (Harknett and Cobane, 1997; Rankin and David, 2001).

Studies that have examined issues relating to teaching format were conducted in various disciplines and in various countries. Many of these studies were conducted in the economics discipline (Blalock and Montgomery, 2005; Chen and Tsui, 2008; Selimoglu and Arsoy, 2009). Other studies were conducted in accounting discipline (Amare, 2006; Sugahara and Boland, 2006), psychology (Apperson, Laws and Scepansky, 2008; Susskind, 2008) and environmental science and geology (Nicholson, 2002). These studies were conducted in various countries including Turkey (Selimoglu and Arsoy, 2009), Japan (Sugahara and Boland, 2006) and USA (Blalock and Montgomery, 2005; Rankin and Hoaas, 2001).

Within the accounting education literature, there are studies that have linked teaching tool and students' performance. The number of these studies however is limited. These studies in general examined the link between teaching tool and students' preference and performance (Amare, 2006; Nouri and Shahid 2005; Sugahara and Boland 2006). The findings are mixed with few studies found teaching tool influences performance. However, these studies showed that using traditional style such as writing on the board performed better than using modern computer technology teaching tool such as PowerPoint. These studies also found that students' preference of using PowerPoint does not necessary improve performance (Nouri and Shahid 2005), instead using traditional style improves students' performance (Amare, 2006). These studies, however, often used students who were enrolled in either introductory or intermediate accounting as their participants.

Other studies, however, found that teaching tool does not influence students' performance. For example: Nouri and Douglas (2005) examined the use of PowerPoint on students'

learning and attitudes. Using 74 students divided into two groups to represent traditional teaching tool and PowerPoint teaching tool, their results showed no significant difference between PowerPoint and traditional teaching tool on students' short-term and long-term memory. However, there is a lack of study that focused on the link between teaching tool and students' performance in advanced financial accounting course.

The recent reduction in meeting hours in teaching advanced financial reporting to undergraduate students in a Malaysian university has led to an issue on whether the academics would be able to complete a course on time when using PowerPoint or the conventional white board. Subsequently, this issue leads to the question on whether there is an alternative teaching tool that the academics could rely on in teaching advanced financial accounting course. This study provides an insight on the use of Freemind, a computer-assisted teaching tool could improve students' performance in advanced financial accounting.

Figure 1: CSOFP using Freemind
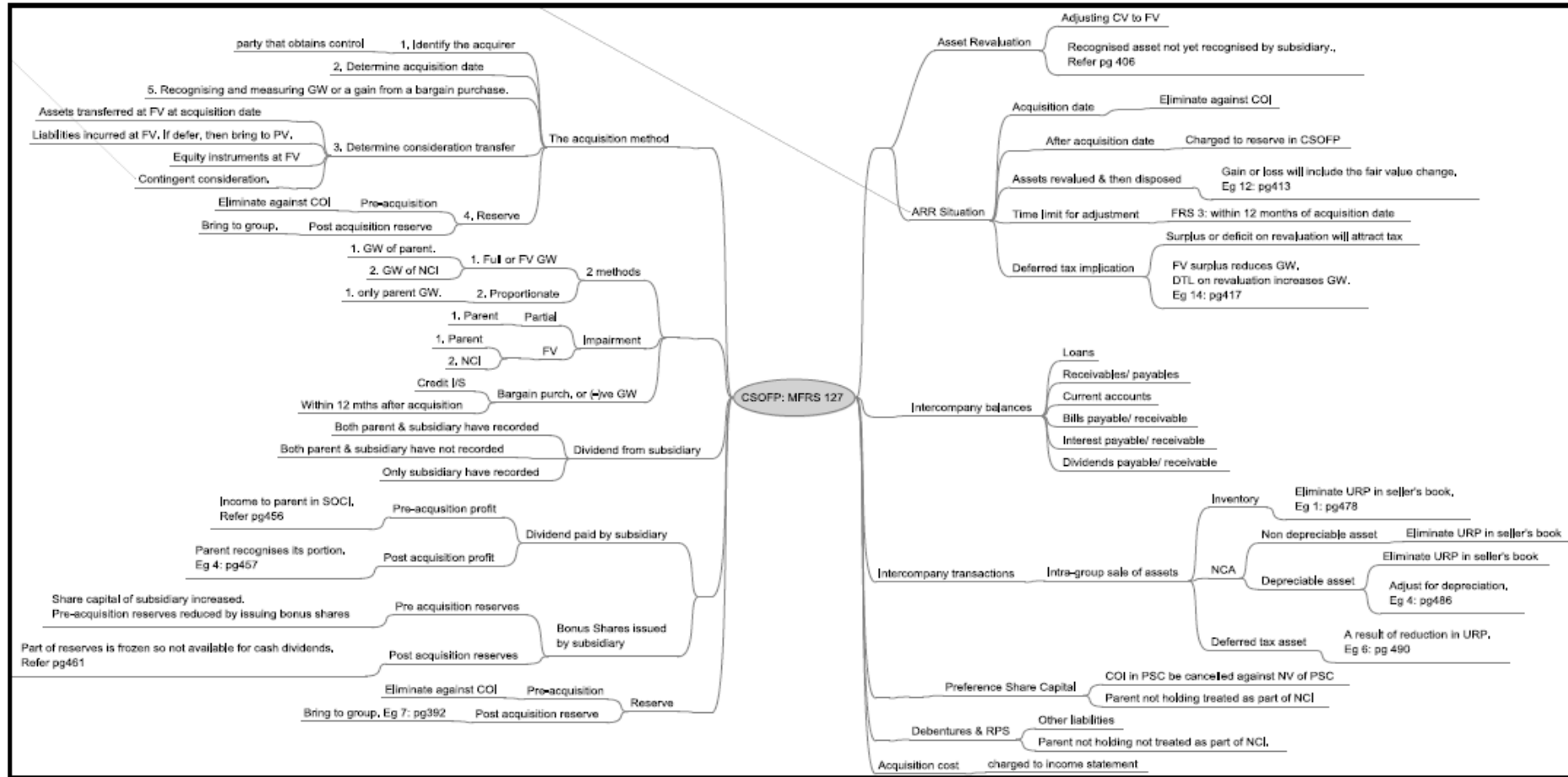
3.0   FREEMIND AS A TEACHING TOOL

Freemind is a computer-based, open source, mind-mapping software that is written in Java language as the teaching methodology. This software involves knowledge organisation tool that serves to use to bring out ideas from one or more users by placing a main idea of a topic in the middle of a paper and subsequently, branch out the main idea with related ideas (Kumar, 2011). The focus of Freemind is making an arrangement of words into a picture that present a key concept in the middle of a paper and related words and concepts linked with the key concept by way of lines and arrows (Kumar, 2011). This software helps the academic to organise the ideas and keep track of all the things that are involved in completing a task.

Using Freemind, the knowledge organisation of a main idea of a topic and the branching out of the idea with related ideas are shown. Figure 1 provides an illustration of how Freemind presents the information to the students. Based on Figure 1, the topic covers is basic consolidated statement of financial position (CSOFP).The main idea of this topic is the preparation of CSOFP and this main idea is then branch out into few branches which are related to CSOFP such as the method used in preparing CSOFP, intercompany transactions and intercompany dividends. As and when necessary, the branches are then branch out to cover sub components of the branch. In providing further understanding of the concept of CSOFP, referred examples are inserted at the branches as and when necessary. The examples are extracted from a referred text book.

Freemind provides the students a helicopter view of what CSOFP is all about and what are its sub components. The students can view the topics more easily since placing the topics in a page requires less cognitive effort (Frownfelter-Lohrke, 1998). By putting the main idea and sub ideas in one page allows the students to view, understand and recall the topics that have been placed in a page more easily knowing that memories capability of students may deteriorate as more knowledge are being inputted (Clements and Wolfe, 1998; Nouri and Douglas-Clinton, 2006).

4.0   OBJECTIVE AND HYPOTHESES DEVELOPMENT

4.1   Objective of Study

This study attempts to examine whether teaching tool influence students' performance. Specifically, the objective of this study is to examine the effect of Freemind, a teaching tool on accounting students' performance in as advanced financial accounting course. The objective of this study is achieved by way of a real experiment over a period of 9 months.

4.2   Development of Hypotheses

One of the factors suggested in the literature that could influence students' performance is teaching tool. Hogarty, Lang and Kromrey (2003) argued that using computer-assisted teaching

tool such as the PowerPoint is becoming more popular within a faculty and students alike and both shared the same view that this teaching tool could enhance students' performance (Hogarty et al., 2003). Others suggested using the traditional teaching tool such as writing on the board seems to be more effective (Amare, 2006; Bartsch and Cobern, 2003).

Within the accounting education, there are studies that have examined the effect of teaching tool on students' performance. The results of these studies, however, are limited to students in the introductory and intermediate accounting. Of consequence, such results could not be generalised to other courses such as the advanced financial accounting. This study expects to find consistent results as in the introductory and intermediate accounting. Therefore, the following alternate hypothesis is developed:

H1: *There is a significant relationship between teaching tool and students' performance in advanced financial accounting course.*

Another body of the literature provide findings found that there is no significant difference on the use of different teaching tools to teach the students. For example: Nouri and Douglas (2005) examined the use of PowerPoint on students' learning and attitudes. Using 74 students divided into two groups to represent traditional teaching tool and PowerPoint teaching tool, their results showed no significant difference between PowerPoint and traditional teaching tool on students' short-term and long-term memory.

This study however, believes that teaching tool could play an important role in determining students' performance. Of consequence, the choice of teaching tool that the academics used in disseminating their materials is deem to be important. Therefore, the following alternate hypothesis is developed:

H2: *There is a significant difference in students' performance between teaching tools in advanced financial accounting course.*

5.0   RESEARCH DESIGN

5.1   The Participants

The students who were enrolled in two different semesters over a period of 9 months are chosen as the participants in this study. There are 160 students in total divided into 2 groups. The students were allocated into 2 groups based on the semester they were in. The two groups are the PowerPoint group which were taught using PowerPoint and Freemind group which were taught using Freemind. For the PowerPoint group, the academic was given three sub groups of students of which the academic has taught the sub groups in three separate meetings of a total number of hours is 4 per group making the total meeting hours for the PowerPoint group as 12. The total number of students of PowerPoint group is 72. The first test was conducted during the semester of March to May 2014 for the PowerPoint group. This test

requires the students to prepare CSOFP of a parent and two subsidiaries of a fellow structure. The final examination was conducted at the end of the semester for the PowerPoint group.

For the other semester, the academic was also given three sub groups. This group represents the Freemind group. The total number of students of Freemind group is 88. For this group, the academic in charge was requested to teach based on a mass lecture of 2 hours and 1 hour tutorial for each group making total meeting hours for the Freemind group as 5. The test for this semester requires the students to prepare CSOFP of a parent and two subsidiaries of a mixed structure. The final examination was given at the end of the semester. Both groups were given final examination consisting of 4 questions which were designed in accordance to the scheme of work, outcome based education and JSU of this course, thus eliminating biasness on the type and structure of questions being set. The answer scripts of the students of both semesters were then marked and graded accordingly.

5.2 The Course

This section explains the course of advanced financial accounting in a Malaysian university. The advanced financial accounting course focuses mainly on the preparation of consolidated financial statements. Known as Financial Accounting & Reporting 450, this course specialises in group accounts which covers 10 main topics from basic principles of group accounts to preparation of consolidated cash flow statements. This course which is framework based relies on MFRS 3, MFRS 10, MFRS 107, MFRS 124, MFRS 127 and MFRS 128 in the dissemination of knowledge on group accounts to the students. The MFRSs involve preparation of group accounts of parent, subsidiaries, associate and joint venture. The academic in charge was required to complete these topics within 14 weeks in a semester. The students were assessed over the 14 weeks period and a final assessment was made towards the end of the semester to arrive to a final grade.

The assessment of this course include two components namely, continuous assessment of 40 percent and a final examination of 60 percent. For the continuous assessment component, the students were required to sit in for two tests and one assignment or quiz. In addition, the students were also required to do two group projects, one being given at the first meeting and to be submitted at the end of first month of the semester and the second project was given during the last month of the semester and to be completed in the class. The final examination was given towards the end of the semester and the academic in charge was required to mark and provide overall grade of the students. Students who did not succeed this course are required to re-sit again for this course in the coming semester.

6.0   RESULTS

6.1   Effect of Teaching Tool on Students' Performance
This section presents the results of testing hypothesis 1. Hypothesis 1 states that "*There is a significant relationship between teaching tool and students' performance in Advanced Financial Reporting course".* Pearson Correlation was used to determine the link between teaching tool and students' performance. Table 1 shows that there is a positive relationship between teaching tool and students' performance, suggesting that teaching tool that academics relied upon to disseminate their materials to the students does matter. The results show a significant positive relationship of r=0.000, thus supporting hypothesis 1.

Table 1. Teaching Tool and Students' Performance

		Teaching Tool	Students' Performance
Teaching Tool	Pearson Correlation	1	0.538
	Sig. (2-tailed)		0.000
	N	160	160
Students' Performance	Pearson Correlation	0.538	1
	Sig. (2-tailed)	0.000	
	N	160	160

6.2   Effect of Teaching Tool on Students' Test Performance

This section presents the results of testing hypothesis 2. Hypothesis 2 states that "*There is a significant difference in students' performance between teaching tools in Advanced Financial Reporting course".* T-Test analysis was used on the two groups namely, PowerPoint group and the Freemind group. This study performed two analyses in order to provide more robust findings. The first analysis was performed after the students completed their first test.

Table 2 presents the results of the analysis in providing evidence that Freemind group performed better than PowerPoint group in their first test. Upon comparing the results of the first test of the two groups, the academic found that the results of the test for the second group that have been taught using Freemind scored better than the first group that have been taught using PowerPoint. The mean score for the PowerPoint group is 19.1806 whereas the mean score for the Freemind group is 33.8920. Despite the sceptic perception of teaching advanced financial reporting based on mass lecture and reduced meeting hours, surprisingly the students that have been taught using Freemind performed much better. The results in Table 1 therefore supports hypothesis 2 showing p=0.000.

This study then proceeds to perform T-Test analysis between the two groups using their final examination score as their dependent variable. Table 2 presents the results. Panel A, Table 3 provides the descriptive statistics of the mean score between the PowerPoint group and the Freemind group. The results again show that on average, the Freemind group performed better than the PowerPoint group. The PowerPoint group has a mean score of 57.4 percent out of the 100 percent compared to the Freemind group that has a mean score of 66.5 percent out of 100 percent. The results indicate that those students who were taught using Freemind teaching methodology scored better in their final examination with an average scoring marks of 66.45 out of the 100 percent compared to the students who were taught using PowerPoint of which the average scoring marks as 57.36 out of the 100 percent.

Table 2. Teaching Methodology and Students' Performance in Test
Panel A: Descriptive Statistics

Nature of group	N	Mean	Std. deviation	Std. error mean
PowerPoint	72	19.1806	5.02900	0.59267
Freemind	88	33.8920	6.91427	0.73706

Panel B: Levene's test of equality of variance

Dependent variable: Test	F	Sig
Equal variance assumed	4.344	0.039

Panel C: T-Test for Equality of Means

	T	df	Sig.	Mean difference	Std. error difference	95% confidence interval of the difference	
						Lower	Upper
Equal variances assumed	-15.080	158	0.000	-14.71149	0.97557	-16.63834	-12.78464

Such results support the earlier results on the effect of the teaching tool on students' performance in their test. Based on equal variances assumed, the results show that there is a significant difference between the PowerPoint group and the Freemind group (*p*=0.000) as shown in panel C, Table 3.

Table 3: Teaching Tool and Students' Performance in Final Examination

Panel A: Descriptive Statistics

Nature of group	N	Mean	Std. deviation	Std. error mean
PowerPoint	72	57.3611	6.55917	0.77301
Freemind	88	66.4545	7.57326	0.80731

Panel B: Levene's test of equality of variance

Dependent variable: Test	F	Sig
Equal variance assumed	2.200	0.140

Panel C: T-Test for Equality of Means

	T	df	Sig.	Mean difference	Std. error difference	95% confidence interval of the difference	
						Lower	Upper
Equal variances assumed	--8.020	158	0.000	-9.09343	1.13389	-11.33297	-6.85389

The findings in this study are consistent with the findings in earlier studies that teaching tool is an important determinant to students' performance (Bartsch and Cobern, 2003; Amare, 2006; Sugahara and Boland, 2006). The results in this study therefore, again support hypothesis 2.

7.0   SUMMARY

This study presents the findings of a computer-assisted technology teaching tool beyond the generally used teaching tool of PowerPoint to a more effective computer-assisted technology teaching tool known as Freemind. The findings of this paper show consistent results with the studies in the educational literature that have shown teaching tool provides different impact on students' performance (Amare, 2006; Nouri and Shahid 2005).

This paper has some limitations. Firstly, this study is based on two groups of undergraduate students in two different semesters. The students of the two groups may possess different ability in attempting CSOFP due to the different batch of students. The questions asked in the tests and final examination also differ for the two groups. Also, the findings may be questionable due to different groups of participants. Secondly, the students are limited to a public university in Malaysia. Therefore, the findings of this study may not be generalised to other public universities.

In sum, this study provides some evidences that point to the fact that students' performance in advanced financial accounting could be improved with the assistance of Freemind. Therefore,

academics need to be aware of the importance of using different teaching tool in disseminating knowledge and materials to the students particularly the benefits of Freemind.

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