Teacher-Centered Mind Mapping vs Student-Centered Mind Mapping in the Teaching of Accounting at Pre-U Level – An Action Research

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Abstract

This study is to explore Teacher-Centered Mind Mapping versus Student-Centered Mind Mapping in an accounting class and the correlation between the two different methods of mind mapping with students’ achievement in their tests. A total of 50 students with and without accounting knowledge participated in this study. Both groups were taught for over a period of three months. The findings showed the following: (1) the Teacher-Centered mind mapping revealed a decline in the students’ tests scores, and (2) the Student-Centered mind mapping exhibited significant increase in the students’ test scores.

1. Introduction

“What is a Mind Map?

The ultimate organizational thinking tool, the easiest way to put information into our brain and to take information out of our brain. It is a creative and effective means of note taking that literally “Maps out” your thought.” Tony Buzan.

The human brain consists of 2 halves which are responsible for different purposes. The left side is in charge of logic, words, arithmetic, linearity, sequences, analysis and lists. The other side of the brain is in charge of multidimensionality, geometry and synthesis. Studies show that humans can respond very well to words, images, colour and direct association. Buzan defined these features of the human brain to develop a set of rules which is simple to follow in order to create a maze of information called the mind map (Buzan). Buzan believes mind mapping can increase memory retention and productivity (Buzan 1976, Buzan 1993).

The concept of mind mapping has existed for many decades but it was only made popular by Tony Buzan in the 1960s. His initial intention is to allow the user to organize and recall conceptual information in a more effective way. Mind mapping has an open flowing format to support the natural thinking process of the human brain, which is believed to go on randomly and in a non linear way and is thus, better than note taking.
In the past, mind mapping was done using pen and paper until the advancement of information technology allowed it to be easily constructed, processed, disseminated and presented using computer hardware and software.

2. Review of Literature

Uses of mind map in Education

Mind map have been widely used in education in brainstorming ideas, training and development, organizing ideas and problem solving.

The benefits of mind mapping for students

Some students have problems learning in class because the lecture notes provided by the lecturer does not suit their learning style. With mind maps, student can personalize their notes using familiar words, arrows, abbreviation to bring together new ideas. They can use images, borders and colours in their mind maps and it is then used as study review for entire lectures.

Compared to words, the human brain remembers images better then words; mind maps that show smooth flowing curves and variety of colour can assist students to understand and remember the subject matter. A study conducted by Christine, Donald and Thomas on students from business and other courses shows that even students with different learning styles (verbal, logical, spatial or interpersonal) can make use of mind maps to explore learning opportunities.

Psychology

Statt (1998) defined psychology as “the scientific study of mind and behavior”. Strickland (2001) stated that educational psychology encompasses cognitive development, pupils’ behavior, and classroom psychological atmosphere. According to Akinoglu & Yasar (2007), learning is accompanied by cognitive strategies for knowledge retention, cooperative and collaborative learning, problem-solving, critical thinking and transformative learning. Many teachers have faced difficulties in teaching their course effectively while many students have faced difficulties in learning the course taught. Hence, adopting the constructivist approach of using mind maps involves active learning where individual construct knowledge by making meaning of what they have learned, after analyzing their experience, observations and logical influences. Mind maps encourage students’ interaction and freedom to express their own creative thinking and thus improve their learning achievement.

Science

Science education involves active participation from students. Embracing the active learning methods, science education engages students in searching, implementation, experimentation, investigation or observation. However, science education does have its problems such as internalization of concepts, misconceptions, and lack of opportunities of learning by doing (Driver & Erickson, 1983, Harlen, 1985). Orhan (2007) showed significant positive outcomes in students’ concept learning, overcoming misconceptions, academic achievement and attitudes towards science courses when students take notes using the mind mapping method.

Mathematics

Pehkonen (1997) stated that mind mapping benefits students taking mathematics education. Mathematical thinking involves the 2 sides of the brain. The left side includes analytic deduction and arithmetic while the right side includes spatial task such as geometry. In mathematical education, constant emphasis on rules and algorithms are usually sequential and spatial ability. According to Pehkonen (1997) and Kirckhoff (1992), creativity is reduced when there is too much emphasis on logical deduction. Thus, a balance between logic and creativity is important. By using the mind maps, the 2 halves of the brain are able to cooperate, complement, and enhance each other, and have less conflict with each other.

Brinkmann (2003) described that mind mapping can be used in mathematics education in the following ways:

- to organize information,
- as memory aids,
- for repetition and summary,
- to summarise the ideas of several students,
• to meaningfully connect new information with given knowledge,
• new concept may be introduced by mind maps,
• let cognitive structure of students become visible, and
• foster creativity.

Accounting
Chei-Chang Chiou (2008) wrote that mind mapping help students in advance accounting courses. The mind maps made the students understand, integrate and clarify accounting concepts and to enhance their interest in learning accounting. Mind mapping also aids in the continuing of professional education. The professionals are able to internalize the new concepts involved and see how they are related.

Raval and Shimerda (2002) stated that students taking accounting information system courses could apply this method into their information systems view of accounting. Accounting information system course teaches a complex body of knowledge. AIS (Accounting Information System) merges both the information systems perspective and the accounting applications of information technology. Hence, the accounting course has 3 dimensions: accounting, systems and information technology. Students generally have narrow, non-systematic understanding of financial accounting and are not able to see the connection between financial accounting and information systems. The method is based on Ausubel’s theory of meaningful learning where it is a process of new information being related to an existing relevant aspect of an individual’s knowledge structure. Mind maps show a linkage between new information and previously acquired knowledge. Leauby and Brazina (1998) used maps in their auditing class successfully. Kristine and Vasant (2004) stated that it acted as a learning tool for the information system audit profession.

3. Terminologies

Teacher-Centred mind mapping versus Student-Centred mind mapping

<table>
<thead>
<tr>
<th>Teacher-centred mind mapping</th>
<th>Student-centred mind mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on teacher’s logical thought</td>
<td>Based on student’s logical thought</td>
</tr>
<tr>
<td>Active learning for teacher but passive learning for students (note: learning rarely occurs passively).</td>
<td>Active learning for students, student become “actively” engaged in learning.</td>
</tr>
<tr>
<td>Efficient map-training for teacher</td>
<td>Efficient map-training for students</td>
</tr>
<tr>
<td>Map belongs to teacher, teacher can personalize the map using the words that teachers are familiar with, but sometimes the words could be too technical or difficult to be understood by students.</td>
<td>Map belong to students, students can personalize the map using the words that they are familiar with at their level. Some students may prefer icon, image to capture their idea/understanding of a subject matter in mind map, so a teacher-centred mind map with too many words may not suit them, or vice-versa.</td>
</tr>
<tr>
<td>Does not empower students. Students are at the receiving end.</td>
<td>Empower student through knowledge of their own learning (Leauby and Brazinam 1998)</td>
</tr>
<tr>
<td>Teacher make meaning of what he/she understands of the lesson and not students.</td>
<td>Students make meaning of what they learned in their own mind-mapping style.</td>
</tr>
</tbody>
</table>

4. Methodology

This study involved 50 students. They came from 2 groups of students taking accounting as their first semester course. The first group consisted of 29 students with prior accounting knowledge. The second group consisted of 21 students without prior knowledge in accounting. Both groups were exposed to Teacher-Centered mind mapping and Student-Centered mind mapping over the duration of 3 months.

4.1 Teacher-Centred mind map
During the first part of the study, teacher centred mind maps were used in the classes in April 2010. After going through questions on the topic of Balance Day Adjustment, the teacher would show the summary of the points in the form of mind map on the whiteboard. The mind map was only 70% completed due to the time factor. The students were told to complete the mind map at home. This is one way they can create checklist for their revision. The students were given a test on this topic the following week.

The same process was repeated for next topic on the Inventory Control Systems. The teacher used a mind map to draw the overview of two Inventory Control Systems before the students are taught about these systems. This is to
get the students to see the differences between the two inventory control systems. The students copied the mind map constructed by the teacher and used it as revision for the test.

The teacher used mind maps to summarise the topics for semester exam. The students were tested on the 2 new topics that have not been assessed in the previous class tests. The new topics were Bad Debts and Provision for Doubtful Debts, and Inventory Control Systems. Students’ performance declined significantly during the duration where teacher-centered mind maps were used. Their results were reflected in 2 tests conducted (Teacher-centered test 1 and test 2).

4.2 Switching from teacher centered mind map to student centered mind map

The second part of the study began in July 2010. New topic was introduced in the class, i.e. Statement of cash flow. At the end of the session, the students were given a blank sheet of paper with the new topic in the centred of the paper. Students were taught the basic rules on how to construct an effective mind map. They need to show what they understood in the lesson in the form of mind map and to update the mind map whenever new knowledge was conveyed daily. Students were told to submit their mind map whenever required so that teacher can review their work and give relevant feedback for students to improve their mind maps.

The students were to construct mind maps and update them whenever new topics were introduced to them. Occasionally the teacher shared the good mind maps with all students by uploading them to the college student portal so they can learn and improve their own mind maps. Similar to the first part of the study, 2 tests were conducted for the topics learned where students constructed their own mind maps. Most students showed significant improvement in the 2 tests (Student-centered test 1 and test 2).

This study explores the relationship between:

a. Teacher-Centered mind-maps and students’ achievement in accounting tests.
b. Student-Centered mind-maps and students’ achievement in accounting tests.

5. Findings

The discussion on the findings of this study will be divided into 3 parts:

a. Part I – Students’ achievement in accounting before the introduction to mind- mapping.
b. Part II – Students’ achievement in accounting after the introduction to Teacher-Centered mind-mapping.
c. Part III – Students’ achievement in accounting after the switch to Student-Centered mind-mapping.

Part I: Students’ Achievement in Accounting Tests before the Introduction to Mind- Mapping.

Students with accounting knowledge and students without accounting knowledge sat for 4 standardized tests prior to the introduction to mind mapping.

Table 1 shows the test scores of students with accounting knowledge in the 4 standardized tests.

<table>
<thead>
<tr>
<th>Table 1 : Marks obtained by students with accounting knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>mean</td>
</tr>
<tr>
<td>std dev</td>
</tr>
<tr>
<td>highest</td>
</tr>
<tr>
<td>lowest</td>
</tr>
</tbody>
</table>

Table 2 shows the test scores of students without accounting knowledge in the 4 standardized tests.
From Tables 1 and 2, students with accounting knowledge in general exhibited higher average marks with mean score between 68.17 and 82.07. They also have smaller diversity in the range of marks throughout the 4 tests than those without accounting knowledge. Students without accounting knowledge obtained a mean score of between 60.38 and 75.83.

**Part II: Students’ Achievement in Accounting Tests after the Introduction to Teacher-Centered Mind-Mapping**

Table 3 shows the decline in the students with accounting knowledge test scores after the Teacher-Centered mind mapping skill was introduced compared to the test scores before the introduction to Teacher-Centered mind mapping. The mean score for tests after the introduction to Teacher-Centered mind-mapping is between 25.64 and 50.01.

Table 4 shows the test scores of students without accounting knowledge after Teacher-Centered mind-mapping skill was introduced compared to scores before the Teacher-Centered Mind-Mapping was introduced to the students. The mean score for tests after the introduction to Teacher-Centered mind-mapping is between 30.96 and 35.48.

The above findings suggested that irrespective of students with or without accounting knowledge, the introduction to Teacher-Centered mind-mapping did not improve the students’ tests scores. The tests scores showed significant decline in the students’ achievement in the last 2 tests where Teacher-Centered mind mappings were introduced into the accounting classes.

**Part III: Students’ Achievement in Accounting Tests after the Introduction to Student-Centered Mind-Mapping**

Table 5 shows the tests scores after the introduction of Student-Centered mind-mapping skill as compared to after the introduction of Teacher-Centered mind-mapping skill for students with accounting knowledge. For Teacher-Centered mind-mapping, the mean scores dropped from 50.01 in test 1 to 25.64 in test 2 while for Student-Centered
mind-mapping, there’s an increase in the mean test scores from 32.81 in test 1 to 69.97 in test 2. There is a significant improvement in average score from Teacher-Centered test 2 with a mean of 25.64 to Student-Centered test 2 with a mean of 69.97.

Table 5. Students with accounting knowledge

<table>
<thead>
<tr>
<th></th>
<th>teacher-centered test 1</th>
<th>Teacher-centered test 2</th>
<th>student centered test 1</th>
<th>student centered test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean</td>
<td>50.01</td>
<td>25.64</td>
<td>32.81</td>
<td>69.97</td>
</tr>
<tr>
<td>std dev</td>
<td>16.44</td>
<td>15.90</td>
<td>15.40</td>
<td>17.55</td>
</tr>
<tr>
<td>highest</td>
<td>90.00</td>
<td>67.59</td>
<td>58.57</td>
<td>93.33</td>
</tr>
<tr>
<td>lowest</td>
<td>18.33</td>
<td>5.56</td>
<td>-</td>
<td>16.67</td>
</tr>
</tbody>
</table>

A majority of the students benefited from the mind-map with the guidance from the teacher. Their tests scores are higher compared to Teacher-Centered mind-mapping where the teacher builds the mind-map based on his/her understanding.

Table 6 shows the tests scores for students without accounting knowledge after they were introduced to Student-Centered mind-mapping compared to their tests scores after they were introduced to Teacher-Centered mind-mapping. Students without accounting knowledge only sat for one test after the Student-Centered mind-mapping was introduced. They did not sit for test 2 due to time constraint.

Table 6. Students without accounting knowledge

<table>
<thead>
<tr>
<th></th>
<th>teacher-centered test 1</th>
<th>Teacher-centered test 2</th>
<th>student centered test 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean</td>
<td>35.48</td>
<td>30.96</td>
<td>60.83</td>
</tr>
<tr>
<td>std dev</td>
<td>17.05</td>
<td>11.63</td>
<td>14.80</td>
</tr>
<tr>
<td>highest</td>
<td>68.33</td>
<td>59.17</td>
<td>82.50</td>
</tr>
<tr>
<td>lowest</td>
<td>-</td>
<td>9.80</td>
<td>31.67</td>
</tr>
</tbody>
</table>

From the above data, the mean test scores of students without accounting knowledge for Teacher-Centered are lower compared to the mean test score after the introduction to Student-Centered mind-mapping. Student-Centered mind mapping has a higher mean score of 60.83 compared to Teacher-Centered mind mapping with a mean of 35.48 and 30.96.

The study conducted suggested that the students’ achievement is negatively correlated to teacher-centered mind map and positively correlated to student-centered mind map.

6. Conclusion

The findings from this study indicates that mind-mapping can be used in the learning and teaching of accounting subjects. Mind-mapping is one effective Student-Centered activity which engages students in subjects such as psychology, sciences, mathematics and accounting. Depending on how the teacher executes the mind-map, it could be Teacher-Centered when the teacher takes ownership of the mind-map or it could be Student-Centered when the students take ownership of the mind-map and keep on changing and adding new knowledge to it. In the Student-Centered mind-mapping, the teacher assumes the role of Facilitator.

The outcomes of this study are:

1. Teacher-Centred mind-mapping revealed a clear decline in the students test scores and
2. Student-Centred mind-mapping exhibited significant increase in the students’ test score.

The findings of this study provide an alternative teaching method for accounting teachers and learning methods for accounting students.

7. Limitation to Study

This study used students in a private educational institution and hence cannot be taken as the whole population of students taking accounting courses.

8. Suggestion and Recommendation for Future Research

Here are some suggestions for future study which could be looked into:

1. Students’ academic background
2. Demography
3. Gender

References


