



Using E-Mind Mapping in Learning at IBRI College of Applied Sciences

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Index Terms: *electronic mind mapping, digital mind mapping, software-based mind mapping, web-based mind mapping, computer aided mind mapping, smart phone mind mapping, dmm, emm.*

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Abstract The purpose of this study was to investigate the impact of Software based Mind Mapping (SMM) performed by tablets, mobiles, desktop, and web school work. The study determined the outcomes by using Electronic Mind Mapping (EMM) and the positive change in the students' responses. The research was performed on 29 randomly chosen first year students from Ibri CAS during the academic semester year 2014-2015. The research took ITDR1101 as a random course as an application for the study. Three sets of groups were self-selected study technique, paper and pen based MM and software based Mind Map (MM). The three groups were exposed to one of the presentations of the course ITRDR1101 course lessons for a 45-minute period. All the three groups were given a 30-minute time period to review and study the lesson materials using their own technique. They were requested to answer four structured open questions based on their technique for remembering the information presented in the class lesson.

In this research a qualitative research methods was used. Content analysis was made for the answers of the students.

Results of the research show that there was remarkable difference between the three methods used by the three groups to answer the questions. On one hand, MM is a more effective study technique than the self-selected study technique. On the other hand, although MM is more direct technique, EMM is more preferred by the students compared to MM.

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I. INTRODUCTION

There are several methods and learning strategies: the preparation, presentation or organization, understanding and accommodating used by learners in different learning environment.

Changing the tools for implementing these strategies depends on the change of the strategies. This research focuses on Electronic Mind Maps (EMM) or Software based Mind Map as a tool to conducting such strategies. This study compares the three samples of learners using 3 different tools: the classic traditional tool, Mind Map designed by hand and Mind Maps created by mobile or desktop applications. This paper gives clear definition of Mind Mapping and the

importance of it in learning through literature and previous studies. Then it explains the difference between normal and electronic Mind Maps.

According to Wenstein et al. (1983) good teaching includes teaching students how to learn, remember, think, and motivate themselves. Teachers enter the classroom with two distinctly different kinds of goals which are teaching students "what" to learn and teaching students "how" to learn. There are many new methodologies and strategies for classroom learning highlighting the role of the learner in organizing, observing, and controlling a suitable learning environment. Some real classifications of learning methods are (1) rehearsal strategies such as copying, underlining, or shadowing; (2) elaboration strategies such as paraphrasing or summarizing; (3) organizational strategies such as outlining or creating a hierarchy; (4) comprehension monitoring strategies such as checking for comprehension failures; and (5) affective strategies such as being alert and relaxed.[1] Our research subject focuses on (Electronic) Mind Mapping as a tool for achieving rehearsal strategies, elaboration strategies, and organization strategies and leaves comprehension monitoring strategies for future consideration.

In a journal with a title *The effects of note taking in science education through the mind mapping technique on student's attitudes, academic achievement and concept learning*, Akinoglu et al. (2007) state that there was a significant positive difference in students' concept learning, overcoming misconceptions, academic achievement and attitudes towards science courses by taking notes through the mind-mapping method.[2] Differentiation between the normal MM done by hand and digital map or electronic MM designed by software is not only expected but also exciting because of the following reasons:

- 1) Normal MM will not be used in the digital or electronic world of technology. Therefore EMM is essential in the IT field.
- 2) There are technical principles for EMM which is not for regular maps. For example, there is a clarity and type of color, contrast, resolution and some other standards for image and digital design. These standards control the quality of EMM which is totally different from the standards that exist in MM-designed by pen and hand.
- 3) There are some threatens in security and challenges affecting the transfer of EMM when it moves from

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one device to another. In the same context, there are specifications related to the bandwidth of internet, and networks protocols. On the other hand, these standards are not in MM.

- 4) Learning and E-learning by using MM and EMM is similar. There is no difference between regular MM and EMM in terms of main objective. The only difference is the special environment to be used and the way and the tools are designing in each of them.
- 5) EMM or digital MM design tools are always available. It is enough for the user to have a smart phone supported with a small program to design EMM.
- 6) The general trend today for most of the learners is to use technology such as smart phones, PDAs and Lap tops. According to Hwang (2014), the evaluation of smart learning systems with new mobile and sensing technologies will be the main focus for researchers from the fields of computer science and educational technology.[3] Therefore, EMM is best suited and more appropriate for that.
- 7) The design of EMM in terms of quantity, quality, and memory capacity is better compared to MM.

Using the maps digitally is different than normal maps. In pen-based mind mapping the learner is touching what he performs. On the other hand, in the digital-based mind mapping the touching is virtual.

In Digital based mind mapping the output is a software file (PDF, image file, and html) while pen-based is a paper. Therefore, it much easier to export the software file to any other software. Also, a supporting advantage is sharing this mind maps with other if it is needed. In addition, Digital-based Mind Maps can be linked with some other files i.e. Office files, Multimedia Files or Hyperlinks. For these reasons and others, it is clear how EMM or Digital MM are linked to the pen-based MM. From one point of view, the DMM is MM designed by either computer programs or smart phones applications or Web sites to be used in the digital or electronic world. From a different of view, they are the same in terms of the results and the concept of the creation process.

Mahmud (1999) claims that "Mind Mapping enhances the learning capacity in terms of number of ideas generated as well as improves presentation focus". [4]

In the same context, the study lists the technical requirements to be fit in the systems that use EMM. Also it exposed the most important programs and applications available for designing MM. Finally, the results of the study shows that the students prefer to use EMM compare to the other three tools. That is because it the fastest tool and it available anywhere any time in their hands.

II. LITERATURE REVIEW

EMM is another extendable concept for MM. To understand the terminology of EMM or software based MM or web based MM or any other synonyms of EMM such as digital mind maps, web based mind maps, and software based mind maps the study will clarify define Mind Mapping and then the reader can extend the meaning of it into the digital or electronic atmosphere of technology. However, the peculiarity of digital field should be taken in account.

Anthony J. Mento et al.(1999) defines the Mind Maps as "a revolutionary system for capturing ideas and insights horizontally on a sheet of paper. This paper illustrates the technique of mind mapping, and highlights its specific applications in a variety of contexts based on our work in executive education and in management development consulting". [5]

In the introduction of Davies (2011)paper, *Concept mapping, mind mapping and argument mapping: what are the differences and do they matter*, he argues that these concepts are a verity of tools that take different names. Following this further, the overriding objectives of these mapping tools are similar. However, there are differences in their application. First, Mind mapping allows students to imagine and explore associations between concepts. Then, concept mapping, allows students to understand the relationships between concepts and hence understand those concepts themselves and the domain to which they belong. Also, Argument Mapping allows students to display inferential connections between propositions and contentions, and to evaluate them in terms of validity of argument, structure and the soundness of argument premises. [6]

Mind maps use more visual aids than outlines i.e colors, size, fonts, images border styles and additional lines that display relationships according to Guerrero et al. (2015). They emphasis that MM almost 50% of learner brain is focused on visual processing. Also, they found that additional research that color visual increases the willingness to create by 80%. Following this further, if information is displayed visually, individuals are 17% more productive and need use 20% fewer mental resources. [7]

Wickramasinghe et al. (2011) pointed out that there is no statistical important difference between the two groups of medical students; one of them using MM and other using traditional learning techniques. However, all the participants using MM realized that it was a helpful way of memorizing information. Almost all (97%) from that group perceived the technique as a useful method of summarizing information and wanted to follow the technique for their future studies. [8] Pursuing this further, Mind Tools are a computer application that when used by learners to represent what they know, engages them in critical thinking about

the content they are studying. Mind software cannot be separated from critical thinking and efforts of the learner himself. Jonassen et al. (1998). demonstrate the concept "students cannot use Mind tools as learning strategies without thinking deeply about what they are studying." [9] The concept of EMM is not new in education and the learning environment. Hwang (2014) explores Jonassen (1998) defined Mind tools as "a way of using a computer application program to engage learners in constructive, higher-order critical thinking about the subjects they are studying". Mind mapping software is to some extent a matter of personal taste. The user likes the interface. Others like how to create branches and some likewise the look of the final output. Naturally, the new trend is making these tools available to iPhone, iPad and Android mobile platforms. There is even free mind mapping software available online. According to Devin (2013), internet marketer, the following are the top 13 Totally Free Mind Mapping Software Tools:

1) Bubble.us

Bubble.us is a great place to start. Simple and easy, there is plenty of free training available, too. The designer can start creating right off the bat. No need even to create an account.

2) Mindomo.com

Mindomo comes in a free and paid version. The free version limits the number of private mind maps to three and sharing is disabled. The output looks terrific, though. The mobile app is free.

3) Mind42.com

Why do the designers love Mind42? It's free, it's fun and it's fully featured. Publish, collaborate, brainstorm, import, export and revise.

4) Labyrinth

Labyrinth is a simple basic easy to use mind mapping software for Linux and Windows. Widely available, it's small in size, automatically saves your work, makes it easy to add images and offers a simple way to add notes (not all mind mapping software offers this). It's a great free way to the user brilliant thoughts a bright colorful new visual dimension.

5) WiseMapping.com

WiseMapping is another cool tool in the mind mapping arena. It is one of the newer players. It is open source and unlimited.

6) TheBrain.com

This is another offering with a free and paid version. Some sources say it is the most intuitive of all the mind mapping software today. Plus it enthusiastically asserts that user can organize and manage his entire business and personal life with one of their mind maps. Intriguing stuff, to be sure. Available for Windows, Mac and Linux. This software was previously called Personal Brain.

7) Blumind.org

Blumind for Windows is another fully featured mind mapping software with all the basic stuff you need. It has been around for awhile and has many fans.

8) Freemind.Sourceforge.net

FreeMind describes itself as the "premier free mind-mapping software written in Java." Even if the user has never mind mapped before, he has almost certainly seen somebody presenting live or on a webinar with a FreeMind mind map. More than 4,000 people download FreeMind every day. It's hard to argue with that kind of popularity. Plus people who use mind maps are smart to begin with.

They've been around for ages in Internet years and are still going strong. FreeMind was a finalist for a 2009 Community Choice Award in the category "Most likely to change the way the designers do everything."

9) XMind.net

Open source and ready for Windows, Mac and Linux, XMind may be the best looking of the crew. While there is a paid version, the free version should be robust enough for all designers needs. XMind and FreeMind are the top dogs of the free mind mapping software kingdom.

10) MindMeister has free and paid options but like most of the others, the free version is adequate for all but high voltage power users. It verges on being too simple, but that is its advantage. The controls are minimal.

11) ExamTime.com

Exam Time is a 100% free online mind mapping tool that is loaded with a ton of useful features including the ability to access your mind maps from various devices such as tablet & mobile device. ExamTime also has sharing options to easily share maps with your fiends via URL, social media, etc. This free mind mapping platform has many great features.

12) MindGenius

MindGenius is the leading business mind mapping software for brainstorming and planning all tasks, activities and projects. Includes a free 30 day trial.

13) LucidChart

LucidChart is a web-based mind map platform that allows the user to make not only mind maps, but also allows him to make floor plans, wireframes for software, UI mockups and many other things. [10]

In order to make smart phones which are a combination of PDAs and mobile phones suitable for education in general and for EMM in specific, they should have some features. Writing in the journal: Lifelong-learning support by m-learning example scenarios, Holzinger et al.(2005) argue that Mobile Learning Engine (MLE) has been developed by using

the Java 2 Micro Edition (J2ME) and runs on a broad variety of mobile phones.

Its platform-independency enables the handling of:

- Different operating systems (Symbian OS, Microsoft MS Pocket PC, Palm OS, etc.)
- A variety of different screen resolutions
- Different input possibilities (keypad, keyboard or pointer device). [11]

There are some software automation which can create mind maps automatically for users. Herbst (2008) points out, the system may display the subtopics to the user. The user may select one of the subtopics, in response to which the system may apply the same or different rules to the subtopic to identify one or more additional subtopics. This process may be repeated to any depth to create and explore an outline, mind map, or other representation of topics related to the original topic. [12]

III. METHODOLOGY

Holand et al. in 2004 performed an investigation into the concept of mind mapping and the use of mind mapping software (MindManager) to support and improve second year Digital Media students from the School of Art and Design (SAD) and first year students on the History of Computing module from the School of Computing and Information Technology (SCIT) academic performance. [13] However this study left the choice of choosing the Digital Based mind mapping technique to the learner. He or she was free to choose either, smart phone, desktop or web. Also, it was up to him or her to choose the kind of the software.

This study uses a qualitative experimental design. Its aim to develop better understanding why learners choose EMM as the best technique for their learning. It will use observation and content analysis as a method for data collection. Within this context on the first day, ITDR1101 students at Ibri CAS were given a practical introduction in a lab on how to use the top ten free applications and Mind Manager. Also, the learners knew the concept of MM from a short presentation given to them. The next day, a random lecture was chosen, the students were asked to organize the content of the lesson and memorize the key points. The students were free to use their own technique, pen-based mind mapping or any of the software-based mind mapping. The third day we asked them some questions regarding the same content. On the final day, a comparison of the results were conducted. The sample included 50 ITDR1101 course students selected for this study. There were 15 students in self-selected technique group, 20 in the pen-based MM group and 15 in the EMM group. Students were first year students. Students in all groups were taught by the same teacher. Students who did not

have a smartphone device or tablet used desktop or internet during the study.

IV. FINDINGS

After analysis, the first findings reflected the differences between the three groups in terms of time consumption, the quality of organizing and the accuracy of the answers across the four days of the study among the three groups. The students were given one hour to organize the content and make the material ready for memorization. Fig. 1 shows that the software-based MM group spent less time preparing the materials into MM while in the self-based technique students consumed more time.

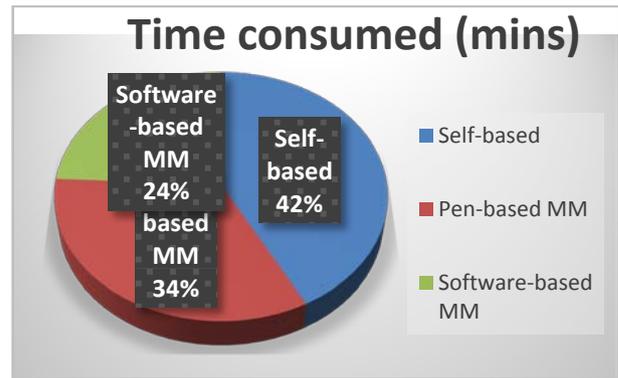


Figure 1: Time Consumed to organize the contents

The study chose four levels to figure out the quality of organizing the contents. They were: very bad, bad, good, and very good. Three qualified teachers evaluated the 3 groups of the students.

In Fig. 2 the most "very good" in preparing the materials of the contents was "software-based" MM group. This group covered all the topics mentioned in the lecture, put necessarily details, main and sub main subjects, detentions, numbers, drawings, and dates. None of the students organizing in this group were very bad while one student was bad. Both "self-based" students group and "pen-based" MM group were good in organizing the contents used.

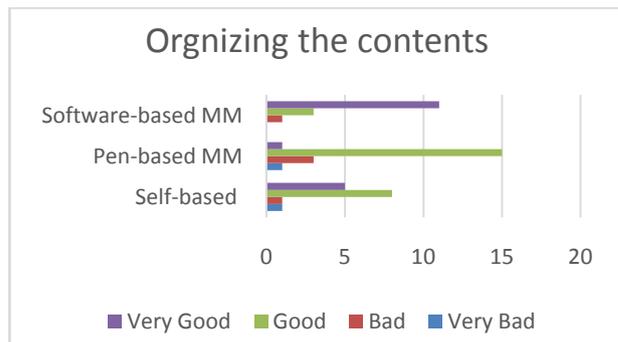


Figure 2: The Quality of the organization for the content

Fig. 3 shows that all three groups were corrected but by different accuracy percentages. The percentage of accuracy for software-based MM is the highest amount the other two techniques is located between (90-to 100) %. However, 67% of self-based students answers were (50-69) % corrected.

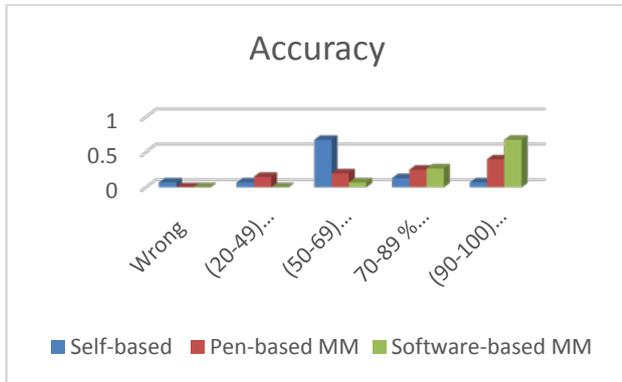


Figure 3 : The Accuracy of Students Answers

V. DISCUSSION

The software-based tools were supported by wizard and ready templates which meanless time consumption. On the other hand, the slowest technique was the self-based one. The logical reason might be the students have too many choices to start with in this kind of tool. Therefore, they spend more time to choosing the best or the easiest. A lot of time for choosing between them is taken up. By analyzing the students answer papers we can see some students wrote one choice then they deleted it and selected another choice.

The reason that the Software-based MM are more effective in designing the contents, are because of some extra tools facilitate the mission of organizing as stated by Holland et al. (2004).

A study for Swan (2011) found that three significantly influenced students' satisfaction and perceived learning are: clarity of design, interaction with instructors, and active discussion among course participants. It is clear that the factor; clarity of design were the best represented in software-based MM environment. This can lead to the following summary: clear design may lead to more accuracy and affect student's satisfaction and perceived learning positively. [14]

VI. CONCLUSIONS

There is an increasing reliance on rapidly changing new technologies into the learning environment. With this situation, EMM is more convenient for such environment. The study noted that recent trends have imposed the use of (Electronic) Mind Mapping in learning environment. The research categorize and labels these maps as "Electronic", "Digital", "Software-based", "Computer Aided" and

"Web-based" Mind Mapping. While useful, the study asserted that both approaches are sufficient to meet the current needs of the field. However, based on research findings the study proposes EMM to be used because of its superior features compared to the "self-based" technique or "pen-based" Mind Mapping in learning.

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