Interactive Technology and Smart Education
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Received 18 May 2015
Revised 23 July 2015
8 November 2015
Accepted 19 November 2015

Abstract

Purpose – The purpose of this study is to explore the use of iMindMap software as an interactive tool in the teaching and learning method and also to be able to consider iMindMap as an alternative instrument in achieving the ultimate learning outcome.

Design/methodology/approach – Out of 268 students of the management accounting at the University of Technology MARA (Terengganu), 97 students have participated in this survey to evaluate the effectiveness of iMindMap in teaching and learning.

Findings – Results indicate that the majority of the students acknowledged that iMindMap is more attractive than conventional teaching methods and found that iMindMap shows clearly how the points are all associated and linked together. Students could find that learning is an exciting experience and were able to visualize the whole course content remarkably via iMindMap.

Originality/value – This study presents an alternative instrument, which is innovative and interactive in teaching and learning, especially for accounting students where the students' technology acceptance could also be viewed.

Keywords Accounting students, Digital natives, iMindMap, Innovative tool, Teaching and learning

Paper type Research paper

Introduction

The advent of sophisticated technologies nowadays gives a great challenge to educators to continuously play significant roles in the borderless globalization of the information era (Wan Jusoh and Kamaruzaman, 2009). Unfortunately or fortunately, we cannot stop these complicated technologies from pervading our life style and ultimately change the landscape of today's teaching and learning approach to engage digitally native students. There are a number of competing terms that claim to identify a generation of young people who are now entering universities across the world. Three of the most

This paper is a full-text version of Invention, Innovative and Design (IID) poster presented at UiTM (Terengganu) on 20 September 2012. In that event, the poster won silver award under higher education staff category. The authors are grateful to Wan Zuhaila Wan Abdul Rahman, Norazidah Shamsudin and Azmira Abdullah for fruitful ideas and unbounded commitment in realizing this project. Last but not least, the authors also would like to record their everlasting appreciation to Mr Gopala Krishnan for assistance and comments.

Interactive Technology and Smart Education
Vol. 13 No. 1, 2016
pp. 71-82

1741-5659
DOI 10.1108/ITSE-05-2015-0012

common terms in circulation are "digital natives" (Prensky, 2001a, 2001b, 2009), "net generation" (Tapscott, 1998) and "millenials" (Oblinger and Oblinger, 2005).

Educators have pointed out that digital natives use technology differently and learn differently from their parents and teachers (Jukes and Dosaj, 2005; Oblinger and Oblinger, 2005; Prensky, 2001a, 2005). It is believed that their digital experiences with highly stimulating and interactive digital environments (Gaston, 2006) have changed not only the way today's young people communicate, socialize and entertain, but also fundamentally altered how they approach learning (Jukes and Dosaj, 2005; Prensky, 2001a; Trinder *et al.*, 2008). In fact, many people believe that the brains of today's youth have actually become rewired to accommodate the thousands of hours they spend in front of computer screens watching and creating video, listening to music, playing computer games (Shelly *et al.*, 2006), sending emails or using mobile phones (Prensky, 2001b). It also has been said that today's youth actually speak digitally. That is why, many have called this new generation the digital generation (Shelly *et al.*, 2006).

Digital learners prefer processing pictures, sounds, colour and video before text; conversely, many educators prefer to provide text before pictures, sounds, colour and video (Jukes and Dosaj, 2005), because they are primarily visual learners, a style which research has shown will almost certainly conflict with the learning style and habits of almost any instructor (Weiler, 2005). Thus, the relevance of using creativity processes in the classroom has been addressed by a significant number of researchers (Eriksson and Hauer, 2004) to accommodate digital students' needs in this borderless world (Wan Jusoh and Kamaruzaman, 2009). While there are a number of reasons to use technology to support teaching and learning, in reality, one of the more important educational goals is to improve students' knowledge and understanding (Kennedy *et al.*, 2009; Margaryan *et al.*, 2011). In this light, critical thinking is a process that is widely acknowledged in the literature to be crucial to the learning process, to cognitive development and to effective information seeking (Weiler, 2005).

Although these young people are said to have a natural aptitude and high skill levels when using new technologies compared to older people, who are characterized as being at least one step behind (Jones *et al.*, 2010), learning to teach digital natives does not necessary require advanced studies in technology, but rather the desire to engage them in the learning process (Gaston, 2006). Small changes in presentation, such as changing from pure lecture to incorporating hands-on activities, will help to hold students' interest and increase information retention (Weiler, 2005). Even though there are studies that show that students appear to conform to traditional pedagogies, albeit with minor uses of tools delivering content (Margaryan *et al.*, 2011), as lecturers we need to always be innovative and creative in delivering knowledge to achieve the optimum learning outcome. In this case, interactive mind map can be used as one of the alternatives in the teaching and learning method.

What is mind map?

Mind map was originally invented by Tony Buzan, a mathematician, psychologist and brain researcher, in the 1970s (Buzan, 1977) as a special technique for taking notes as briefly as possible whilst being as interesting to the eye as possible. Since then, mind mapping turned out to be usable in many different ways other than just simple note-taking (Brinkmann, 2003), and nowadays mind maps have been used by millions of people for brainstorming, project planning, decision-making and document drafting.

The reason is because mind mapping can be used as an effective way of getting information in and out of our brain; it is a creative and logical means of note-taking and note-making that literally "maps out" our ideas (Buzan, 2005). The mind map also shows clearly how the points are all associated and linked together (Khoo, 2006).

Similarly, with a traditional outline, a mind map is based on organizing information via hierarchies and categories. However, in a mind map, the hierarchies and associations flow out from a central image in a free-flowing, yet organized and coherent manner. Branches flowing from the central image capture major topics or categories associated with the central topic. Each branch is labelled with a key word or image. Lesser items within each category stem from the relevant branches (Budd, 2004). The use of single words reduce the ideas to their core; the use of graphics and the differences in the size of the branches and the associated words reinforces associations and adds emphasis; and the use of colour for different categories can make more powerful associations (Budd, 2004).

Hundreds of books and research articles were published about how to create mind maps and about evaluating mind maps' effectiveness in the field of education (Brinkmann, 2003; Dhindsa and Anderson, 2011; Lu *et al.*, 2013; Michelini, 2000), especially in the sector of higher education (Budd, 2004; D'Antoni *et al.*, 2010; Dixon, 2014; Edwards and Cooper, 2010; Eriksson and Hauer, 2004; Mento *et al.*, 1999; Rooda, 1994; Wickramasinghe *et al.*, 2011; Willis and Miertschin, 2006). Technically speaking, the only tools needed to construct a mind map are pencils (preferably coloured) and paper. However, today's digital natives prefer interactive media. Therefore, a number of interactive mind-mapping tools emerged (Zipp, 2011) to fulfil the digital natives' preferences including iMindMap, MindManager, MindMeister, MindNode and FreeMind. Furthermore, with the available current technology, it is possible to create attractive mind maps by using computer, which makes it easy to review, revise and save (Tungprapa, 2015).

How do students and lecturers benefit from the mind map?

Mind maps can benefit students in many ways based on their nature. Some benefits include helping students in organizing information, function as a memory aid, help in repetition and summary, meaningfully assist students connecting new information with the given knowledge and lets cognitive structures of students become visible (Brinkmann, 2003). Additionally, mind mapping also encourages creativity because it is more flexible than outlining (Brinkmann, 2003; Murley, 2007). Displaying all related topics on the same mind map, with emphasis and connections indicated by images, symbols and colours, improves memory retention. The maps are also easier to understand, and thus they save time and increases productivity (Murley, 2007).

As the process of building a mind map engages the learner with the content, it is an active learning strategy that can be used during class instead of traditional lectures (Willis and Miertschin, 2006). Using mind maps allows students to become more actively involved in their learning process (Edwards and Cooper, 2010) and consequently able to enhance students' critical thinking (Mueller *et al.*, 2002). Besides, it is important to note the use of icons and symbols in mind maps. One explanation of why students are able to deliver confident presentations without notes goes back to the inherent nature of mind mapping (Mento *et al.*, 1999) that associates not only words but also icons and symbols with certain key points. Interestingly, mind mapping also is a

good technique for group brainstorming because ideas can be captured as they are suggested, without worrying about where they fit into the hierarchy (Murley, 2007).

Having mentioned all the above advantages, mind maps do benefit lecturers in various ways. It is important for lecturers to have a wide variety of specific exercises to use in their classes. Moreover, the need for active and collaborative learning techniques in teaching has been well-documented in previous literature (Budd, 2004). In this regard, using mind map as an in-class exercise can be considered as part of active and collaborative learning activities (Budd, 2004). Other than active and collaborative learning, mind mapping also can be used in other situations including problem-based learning, small-group teaching, in a one-to-one context, as an examination tool and for personal revision (Edwards and Cooper, 2010).

Furthermore, mind map can be used as a teaching resource and as an aid to preparing and reviewing lectures; the technique allows notes to be written and reviewed quickly; and most importantly enables information to be easily updated (Edwards and Cooper, 2010). A wonderful and beneficial mind map could be produced and given to students as a summary for the coming term, tutorial or lecture. This would enable students to learn by focusing on key topics only, and not diverging at a tangent (Edwards and Cooper, 2010). In another scenario, whenever we teach or make a presentation, we want our audience to understand and remember the information that we present. Mind maps can be used instead of, or in addition to, PowerPoint and other presentations to provide a big-picture overview, connect the big picture to the small details, show relationships across subtopics and make the whole presentation easier to remember (Murley, 2007).

Problem statement

Many lecturers and students claimed that the conventional lecture approach in the classroom is less effective in the teaching and learning process. In the classroom, a lecturer usually controls the instructional process; the content is delivered to the entire class, as they tend to emphasize on factual knowledge. In other words, the lecturer delivers the lecture content and the students listen to the lecture. As a result, the learning mode tends to be passive and the learners play little part in their learning process (Damodharan and Rengarajan, 2007). In this case, lecturers have to decide whether to pull digital students away from their native digital world or to motivate digital students by tapping into their digital world and using their natural inclination and inquisitiveness about all that is digital (Shelly *et al.*, 2006). The choice is in our hands. Nevertheless, if we want to continuously grab students' attention, make them enjoy learning and create an exciting learning environment, we need to follow the current and not go against it (Wan Jusoh and Kamaruzaman, 2009).

In this regard, mind map can be an innovative and alternative tool in the teaching and learning method that is able to accommodate the digital-native students due to its inherent nature. Despite its proven effectiveness (Brinkmann, 2003; Edwards and Cooper, 2010; Lu *et al.*, 2013; Mueller *et al.*, 2002), mind mapping is a technique not often used or considered by many educators (Edwards and Cooper, 2010). However, there seems to be very little or no research findings regarding surveys on the effect of mind map on accounting students. Perhaps, lack of exposure hinders the educators from using this effective technique in the teaching and learning process. Hence, this study is conducted to uncover the impact of mind maps, more specifically interactive mind maps,

namely, the iMindMap, as an innovative tool in the teaching and learning methods used for accounting students.

In addition, based on lecturer's observation, students tended to ignore or had no attempt to answer theory questions in Test 1 at all. The methodology used in teaching the topics covered in theory questions is just normal lecture, where the students write the notes manually. Thus, the study is also conducted to investigate whether the students at least attempt to answer theory questions covered in Test 2 or not after the lecturer changed the teaching method using iMindMap.

Research methods

In this study, iMindMap has been chosen as an innovative tool in teaching an accounting subject, namely management accounting. This software has been developed by mind map's very own inventor Tony Buzan. This has given an advantage to iMindMap, as Buzan has done a lot of research and development on mind maps since 1970s. iMindMap becomes more credible when the original version of paper mind maps evolves and becomes the electronic version of online computer mind maps of today. In addition, based on researchers' observations, iMindMap is found to be among the most interactive, attractive and user-friendly tools compared to other mind map software thus far that enables the user to integrate various applications such as PowerPoint slides, video clips, Excel spreadsheet, websites and colourful icons and images, which works with stunning visuals including 3D view, branch art and flowcharts (see ThinkBuzan.com, 2015).

Management accounting has been selected in this study as one of the accounting subjects for diploma students to be taught using iMindMap. This selection is done based on the nature of the subject which involves mathematical computations and textual theories which requires the students to understand and memorize certain facts properly. In this regard, mind mapping is seen to be an innovative tool that is able to organize information effectively and assist students to understand the correlation between points clearly. In this study, iMindMap was used to teach one of the theory topics under management accounting.

The lecturer installed the trial version of iMindMap in the computer used for the lecture. Then, the lecturer explained the topics by using the basic form of mind map before extending it to a more complex format. To assess the impact of iMindMap on accounting students, questionnaires of lesson-evaluation form comprising 10 questions relating to four main aspects that the study focuses on, which includes the efficiency, interactiveness, timely information gathering and help in notes organization, were used. The questionnaires were distributed at the end of the lecture. In distributing the questionnaires, the lecturer first explained the purpose of the research. Students were invited to fill in the questionnaires, and no coercion had been made. In fact, the lecturer also highlighted that participation in the questionnaire will not affect students' score in final exam or in any of the subject assessment. In selecting the respondents, 107 out of 268 students who enrolled for the management accounting subject were selected for this study using the convenient sampling technique. The completed questionnaires were analyzed using SPSS. As the study is an exploratory study, the analysis conducted is descriptive in nature, focusing on the frequency analysis.

Results and discussion

Out of 107 respondents selected, only 97 responses were received from the students. Ten students did not participate in the survey, as they were absent during the class (which used iMindMap as the teaching tool). Figure 1 below shows iMindMap application, which was used as the lecture tool in class.

The reliability test was conducted to analyze the reliability of the questions. Based on the analysis, the study found that the Cronbach's alpha coefficient of all four items is 0.917. This indicates that the questions are reliable. As mentioned earlier, there are four main aspects that the study focuses on, namely, the efficiency, interactiveness, timely information gathering and help in notes organization. Students were asked whether the use of iMindMap in teaching accounting improves the four aspects mentioned above.

Based on the analysis, 49 per cent of the students strongly agreed that the usage of iMindMap in the lecture is an efficient method in delivering knowledge to the respondents (Figure 2). Few respondents also agreed that the lesson is more attractive, understandable, colourful, easy to handle and eye-catching. Therefore, the students are able to get a clear picture of the overview of the chapter through the mind map. In fact, prior studies also supported that the flexibility of mind mapping increases the creativity of the learners, encourages students to become more active and improves their critical thinking (Brinkmann, 2003; Murley, 2007; Edwards and Cooper, 2010; Mueller *et al.*, 2002).

On the other hand, 51 per cent of the respondents agreed that iMindMap is interactive and attractive (Figure 3). To ensure an efficient learning process, it is very important for the lecturer to ensure that the students enjoy the lesson. Enjoyment may lead to better understanding and better retention. As the younger generation are digital learners who prefer the use of technology in the learning process, the lecturer needs to ensure that they are interested in the lesson by using some technology in their class. Kennedy *et al.* (2009) and Margaryan *et al.* (2011) concur when they stated that the use of technology is mainly to improve students' knowledge and understanding. The use of pictures, sounds and some animations will attract students with different types of learning styles. Thus, the learning process will be more fun and meaningful.

As iMindMap helped in giving a comprehensive overview of topics that the lecturer has to cover, it certainly helped in achieving the objective. Of the respondents, 58 per cent strongly agreed that iMindMap is a fast way of gathering information (Figure 4). This is mainly because iMindMap summarizes key point in the form in a more interactive manner. This will reduce the time needed to read all the notes and the textbook on the subject. Mento *et al.* (1999) stated that the use of icons and key points in the mind map may also help in extracting the information quickly, while at the same time enabling the students to focus more on the discussion of the key terms only (Edwards and Cooper, 2010).

The majority of the respondents strongly agreed that the use of iMindMap helps in notes organization (Figure 5). The notes will be more attractive and may boost the retention process. This is also important to the respondents who are visual learners, as they enjoy learning through attractive pictures and notes. The students are able to see the connections between facts and concepts and this will certainly boost their memory retention. This will most certainly save time and help the students in managing their notes (Murley, 2007).

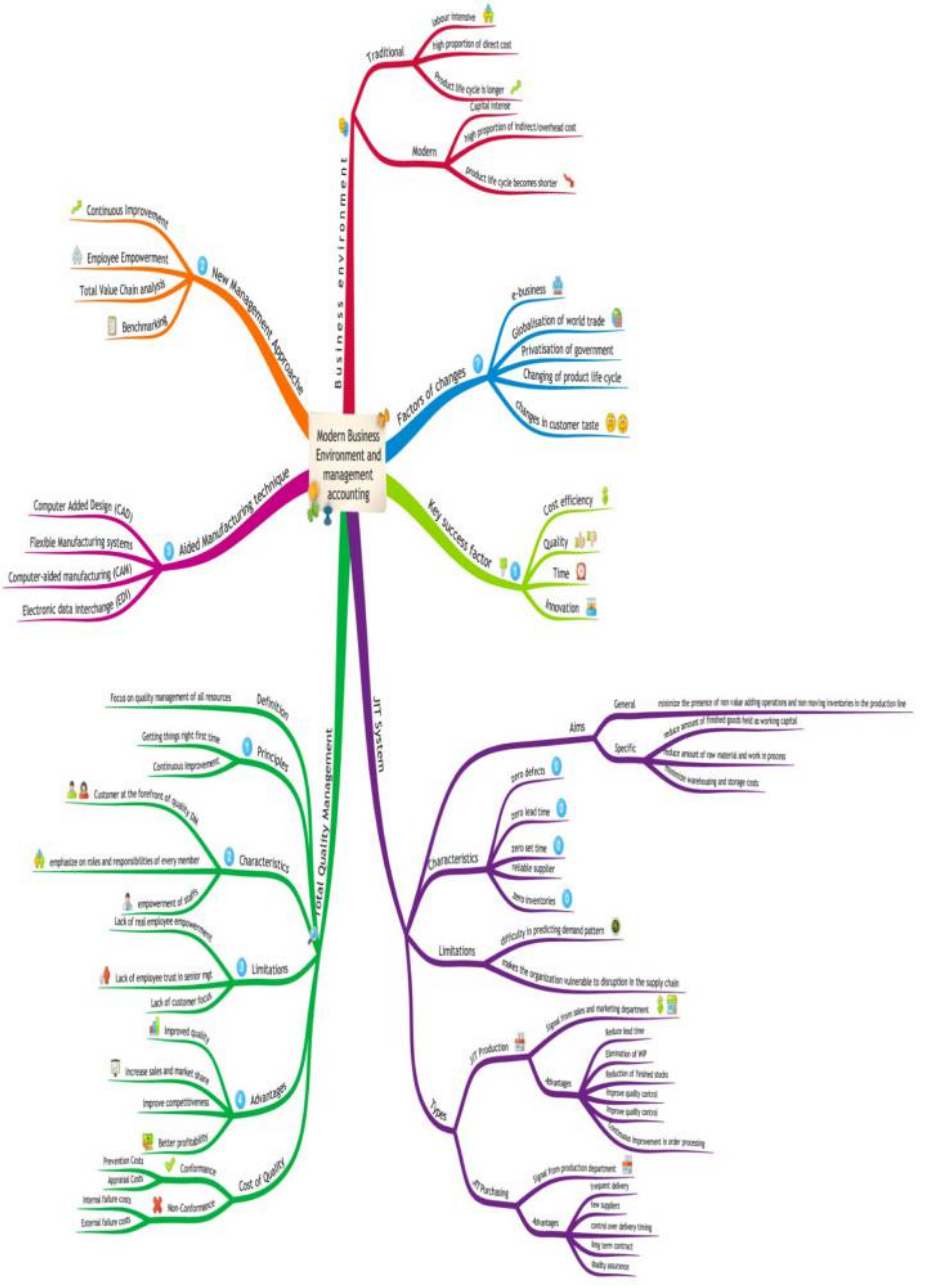

Figure 1.
Lecture notes using iMindMap

Interestingly, most of them enjoyed the teaching and learning styles that had been applied in the management accounting class. Below are some of the students' comments that were taken from the lesson evaluation form:

- Very good.
- I love it!
- Good software.
- Very helpful.

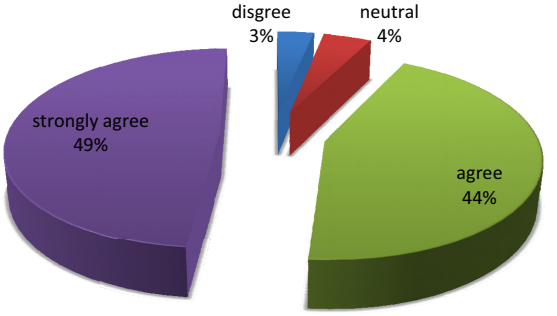

Figure 2.
Efficiency of using iMindMap in delivering knowledge

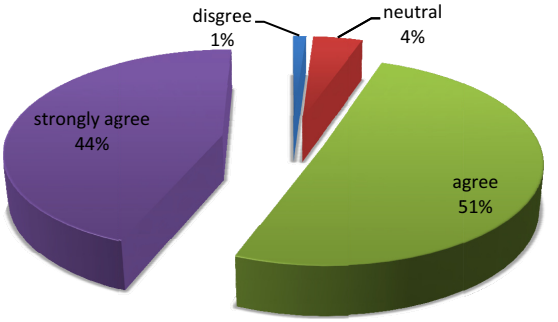

Figure 3.
Interactiveness and attractiveness of using iMindMap in lectures

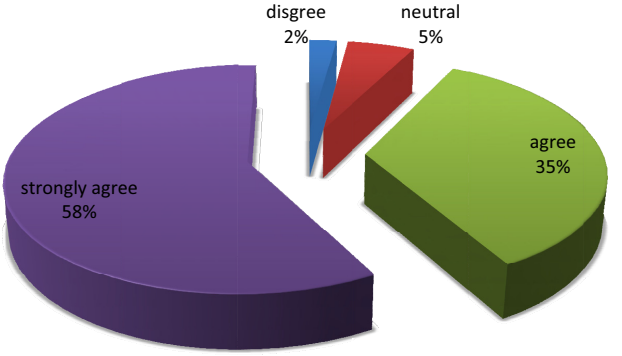

Figure 4.
Timely in gathering information

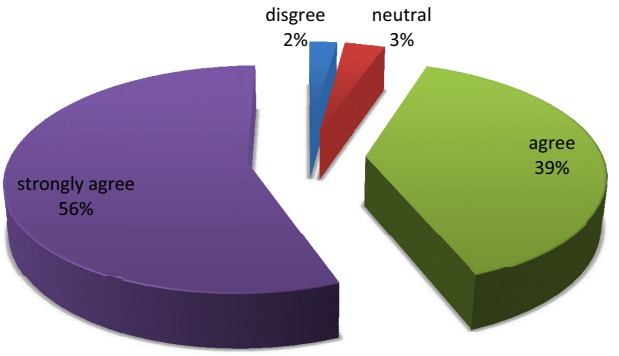

Figure 5.
Help in organizing notes

- The points are all clear.
- Colourful, easy to handle and attractive.
- The lesson is more attractive and understandable.
- iMindMap should be recognized at university level.

Based on the findings and students' testimonials above, it can certainly be argued that using iMindMap in class really gives an impressive impact on the teaching and learning process. Lecturer's observation also showed that there were students who attempted to answer theory question in Test 2 after she changed the teaching method using iMindMap.

Conclusion

Today's digitally native students expect to use more digital media devices in their daily lives and this device should be woven seamlessly into their classroom experiences. By using this software, students could find that learning is an exciting experience, and they would be able to visualize the whole course content remarkably. As a result, the learning process will be more interesting and entertaining where it may attract students who are visual, auditory or kinaesthetic learners. Undeniably, using iMindMap in class really gives an impressive impact to the teaching and learning process due to its ability to accommodate various students' learning styles. Thus, this study highly recommends the use of iMindMap in class to enhance the learning process of the new generation.

As this study is only an exploratory study, it was limited to only one group of students, one topic of syllabus and one specific computer mind-mapping tool. Therefore, future research can be extended by using the experimental research method. Future research may select two groups of students, one who learn using the iMindMap, while the other without the iMindMap. In addition, the future research may also analyze the impact of using iMindMap on students' performance, both in the examination and in the understanding of the subject.

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Appendix

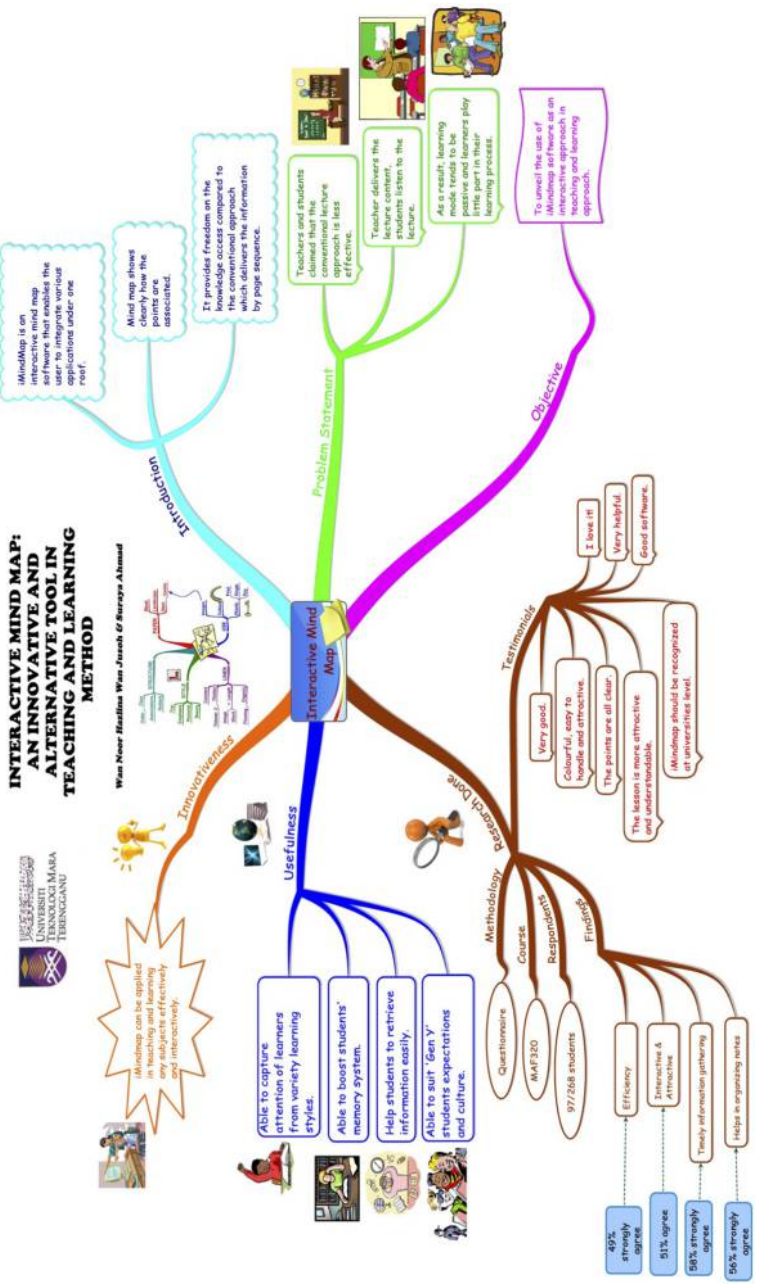

Figure A1.
An overview of the study content using iMindMap