The Use of Mind Mapping Approach

by Dosen Jurusan IP dan PIPS

The Use of Mind Mapping Approach to Facilitate Students' Distance Learning in Writing Modular Based on Printed Learning Materials

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Abstract: The study is intended to expose mind mapping used as strategy for learning which is able to assist students to write their writing assignments. Thirty students who registered in the Teacher Qualification Improvement Program of Universitas Terbuka (UT) was involved as the participants in this present study. The participants had to follow the face-to-face tutorial session of the Instructional System Design course (ISD) course. One of the given assignments of the course was writing the modular based learning materials for the primary school students. The participants had to study the required knowledge and skills of writing the printed modular based learning materials through the systematic and systematic ways. The mind mapping strategy was used to help the students to complete their writing assignments – the printed modular based leaning resources. At the beginning the participants felt uncertain about the writing assignment. The study was found that the use of mind mapping as learning strategy increased the students learning motivation and improve the ability to write the printed modular based learning materials.

Keywords: *Mind mapping approach, distance learning, modular based learning materials.*

Introduction

Universitas Terbuka (UT) offers an educational program to improve the qualification of the primary school teachers. This bachelor program was established regarding to the policy of the government of the Indonesia Republic to enhance the primary school teacher educational qualification. The government of the Indonesia provided a wide opportunity for the primary school teachers to enhance their teaching and instructional competencies. This teacher qualification improvement program is conducted through the distant learning system which requires the students to implement the self-directed learning approach.

In order to facilitate the students learning process, UT provides student learning supports in the form of face-to-face and online tutorial. These learning supports enable the students to do learning interactions not only with tutors, but also with their colleagues. Instructional System Design (ISD) belongs to one of the available courses in the study program. The course offers the students the knowledge and skills in analyzing, designing, developing, implementing, and evaluating instructional and learning program. The aim of this course is to teach the students to be competent in planning and producing an effective and efficient instructional and learning program for the primary school students.

One of the academic assignments the student had to complete was writing a printed learning material that can be used as a source of knowledge by the students. The participants had to write a modular based book on a specific subject regarding one of the provinces in Indonesia. In other words, at the end of the course the students had to submit a printed modular based learning material describing the socio cultural and geographical conditions of the selected provinces in Indonesia. At the beginning of the course, the majority of the students felt and showed difficulties to complete their writing assignments. This is due to lack of knowledge and experiences in writing an academic article like the printed modular based learning material.

In order to overcome this problem, it is essential for the tutor to figure out and implement a proper learning approach. It should enable to be applied as the main source and or supplementary for instruction. It remains as essential

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component of courses used to facilitate the students to complete their writing assignment - write a modular based printed material. Its proposed approach should be able to assist them to complete their writing assignment is using the mind mapping approach.

A mind map is considered as a graphical way to represent ideas and concepts. It forms a non-linear media to expose in correlating between ideas to ideas by the context in number (Onkas, 2015). The mind map represents the visual thinking tool that can facilitate the users in structuring information, helping to analyze, comprehend, synthesize, recall and generate new ideas better. It can be in the form of diagram to assist them in relating information and ideas into new construction (Brandner, 2020). Emergent ideas and visualization of a concept or a theme is allowed to be recorded by students in vast knowledge. It also includes reasoning, planning, coordinating, analyzing, and integrating as mindfulness skills of individuals (Thomas, 2011). It is the baseline for the essential category spreading from a central capture breaking down into sub categories to develop learning skills (Hanewald, 2012). It is characterized by beneficial strategies to facilitate students' development of critical thinking skills (Tsirkunova, 2013).

It is considered as efficient and effective way used in analyzing the ideas and their related topics. As a learning approach, it is applicable in varied learning situations – particularly in the process of generating ideas and brainstorming stage in the writing process.

The main function of mind mapping is to generate the ideas used for various activities. It enables students to gain the capabilities in problem solving, highlighting opinions, note taking, recalling information, and tasks' preparation and organization (Buran & Filyukov, 2015). Mind mapping is used as activities in taking- making notes and creative one. The use of mind mapping helps its users to maps out the ideas literally. In general, mind mapping is used in the following activities: (1) to take note during the individual or group meetings; (2) to sum up topic of discussion: (3) to brainstorm opinions and perspectives leading to further solutions; (4) to simplify the complicated ideas; (5) to overview of gathered information; (6) to perform easy and creative information referring to the format given (Elmansy, 2020). Similarly, it becomes the simplest and easiest way for the people to have data input, storage, and released from the brain as the central part (Azizah, 2013). The mind mapping concept also covers the correlation between what presented by image to its organizational framework (Ahlberg, 2013).

The mind mapping as a learning tool has five important characteristics which include: (1) a single point of idea as the main subject; (2) breaking down the main subject into several "branches" (3) containing interconnected printed words or images in each of branch by line; (4) the less significant subject is put in form of "twigs"; (5) the structure is in a nodal connection. It is a particular method which increase students' productivity by assisting them to establish and identify ideas for structural information (Bhattacharya & Mohalik, 2020).
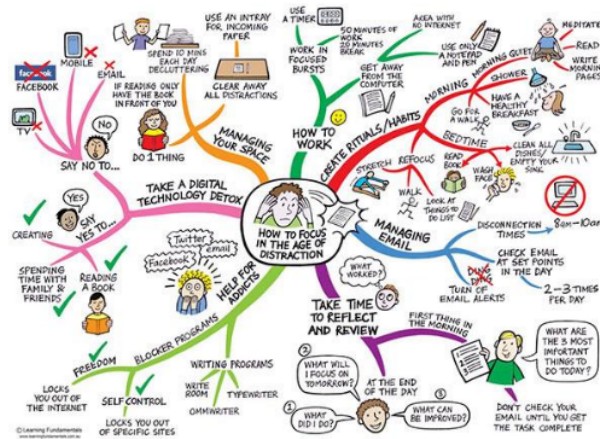

Figure 1. The examples of mind mapping: Breaking down complicated information (Genovese, 2021)

To improve retention by memory and productivity, it needs the whole brain system to work by imaging the mind map. Printed modular based learning material the instructional materials can be defined as print or other instruction used by the students to achieve an instructional goal (Dick et al., 2015). They also noted that in general the instructional materials consist of the content or substances used to facilitate the learners achieve the learning objectives. The materials can be written, mediated, or facilitated by the instructor. According to Guido (2014) a learning series in term of activities to promote student center experience to reach its goals through a dynamic process needed is called as a module.

The student uses the learning materials to attain the learning objectives. Instructional material refers to any preexisting materials being incorporated, as well as to those materials developed specifically for the objectives. Student workbooks, activity guides, problem scenarios, computer simulations, case studies, resources list, and other such materials are also part of the instructional materials.

The role of printed modular based learning materials is important to support students' learning process. The printed modular based learning materials can significantly enhance the outcomes by encouraging students' learning activities. For example, a worksheet may provide a student with important opportunities to practice a new skill gained in class. These materials facilitate the students to have self-guided learning. The printed modular is based learning materials that provides important contributions in facilitating the process of student learning.

Pua et al. (2015) conducted a study of applying mind-map as a media for students at elementary school level to have English vocabulary acquisition. It shows that the application of mind- mapping is positively to be effective to assist them for knowledge transfer well. It also has a goal to uplift students' English skill. It is not only effective in improving the student competencies, but also brings the higher learning motivation to students. The students felt that the use of mind mapping provide solution if they face trouble in doing their writing assignments.

Another study regarding the use of mind mapping was conducted by other researchers. The effect of using mind map learning activities contribute to enhance the students' motivation (Jones et al., 2012). Their study noted that in general the use of mind map activities has positive effects on increasing the students' learning motivation. Ardakani and Lashkarian (2015) conducted the study of making use strategy to meet reading skill. The findings of their study obviously show that the usage of semantic to map the reading aspect seen to be effective to uplift its skill as the domain strategy. It contributed to the acceleration of processing the text as a part of reading mastery. It was concluded that the application of mind-mapping to be recommended by satisfying result of completing students' learning outcomes.

The use of Mind maps serves as a media in pre-writing to help learners to generate ideas. Writing as one of the components in language acquisition could be achieved by applying mind- mapping strategy to encourage them in creative writing (Hwang & Wang, 2016; Lin et al., 2018). It gives them a guideline as the example in retaining their ideas to write the whole essay. It also provides benefits for the students at the stage of pre-writing. It is useful to expose ideas by generating them into thoughts in writing.

A mind map can be used a visual tool to result in gaining idea, taking note, organizing point of view, and developing the related issues. The mind map can generate the strong connections of the ideas. The mind map describes the connections of the central theme and sub theme in a hierarchical structure. It facilitates learners to elaborate and develop their ideas in visual ways to achieve learning goals (Aljaser, 2017).

Nodoushan and Maibodi (2017) studied the impact of its strategy on vocabulary mastery in writing skill. The findings of their study suggested that the implication of mind mapping strategy can be beneficial for learners, teachers, researchers, and curriculum designers in language teaching and learning.

Li et al. (2010) conducted study of using the mind map strategy in vocabulary acquisition. The results of the study suggest that it brings benefits in some ways such as; establishing knowledge of the field, constructing ideas and vocabulary mastery by the scope of categorization, synonym, and spelling.

The aim of this research is to point out whether the use of mind mapping approach is a significant way to gain students' skill in reading and writing modular based learning materials. This present article will expose the usage of mind mapping strategy to support students to write their writing assignments.

Methodology

Research Method

It is mixed method research by integrating both qualitative and quantitative data in one research sample/ project. The pre-test and post-test related to the course goal and learning objectives were implemented to get the information regarding the students gained knowledge and writing skills after learning with the mind map approach. In addition, the five participants had to engage in the interview sessions to gather the information concerning the impacts of using the mind map approach on the participants' learning motivational aspects.

Sample and Data Collection

Thirty students who enrolled in the Teacher Qualification Improvement Program of the Universitas Terbuka was involved as the participants in this present study. The participants had to follow the face-to-face tutorial session of the Instructional System Design (ISD) course. One of the given assignments of the course was writing the modular based learning materials for the primary school students. The participants had to study the knowledge and skills of writing the modular based learning materials in order to complete their assignments.

Additionally, an interview was conducted by involving five participants who were from similar background or experience to expose a particular topic of interest. It was done to explore the meaning of view/ opinion to certain interest which cannot be explained by statistic. It was seen to be beneficial to have more insights for different perspectives in the process occurred by providing questions to them. The interview section was done to the selected participants by giving them open-ended questions by one-to- one interview as the method to collect the data regarding to the mind map approach application. In analyzing the gathered data from the interview, it included three activities covering; data reduction, display and verification. The results showed that all five participants gave positive feedbacks concerning the impacts of using the mind map approach on the participants' learning motivational aspects as presented below;

"I have more options within elaborating complex concepts of certain subjects in easier ways by representing its concepts and ideas. I found it to be very beneficial in my writing class (AN, Female, 20 years)

"Yes, it helps me much to have meaningful learning especially in social sciences where they ask more to do more on memorization and retention (DN, Male, 20 years)

Analyzing of Data

This study implemented the research and development model of Gall et al. (2007) which adopts the model of Dick et al. (2015) as the systematic design of instruction which consists of the following systematic and systemic steps: (1) identification of learning purpose; (2) learning analysis; (3) context and learner analysis; (4) stating the aim of performance; (5) developing instrument for assessment; (6) material development and selection for learning; (7) expanding learning strategy; and (8) designing and conducting of evaluation in formative way.

Firstly, all information regarding to the preceded knowledge, academic writing experience, motivation and skill were gathered from the students as the basis of data. It was done to collect inputs in deciding the purpose of instructional activities. Referring to the first stage analysis, it resulted in determining the purpose of instructional to the tutorial program namely; "Having capability to write printed modular based learning material to support the primary school students learning activities for Instructional System Design completion." The students needed to be actively taking part and involving into the instructional process.

The process to analyze the instructional was implemented to define the sub-competencies that students required being able to write the printed modular based learning material. The process was applied to identify the subordinate knowledge and skills to gain the expected outcomes (Dick et al., 2015). It was continued by expanding the aims on writing relating to its goal.

Instruments development for assessment became the following stage of setting up the instructional purpose. The instruments were used to measure the students' learning achievement. In this step, rubric in writing academically was set and uplift to assess students' quality on submitted assignments. Materials' selection and development for instruction was the next stage to encourage the students learning process in writing the printed modular based learning material. The mind map approach was applied as the substantial strategy to back up students learning activities in direct meeting of tutorial sessions.

During its session, the tutors teach the course substances with the mind mapping learning approach. The course substances that the student had to learn include: (1) the concepts and characteristics of the printed modular based learning materials; (2) the use of mind map strategy to generate ideas; (3) analyze the audience; (4) the structure and components of the printed modular based learning materials; (5) the procedures for writing of the printed modular based learning materials; (6) writing the outline and introduction section; (7) writing draft of the printed modular based learning materials; and (8) evaluate the product. In this course the tutor provides the face-to-face and the online writing consultation for the students.

To add, this study presented of three evaluation steps through formative forms covering; one-to-one, group in small number, and session of field test to be applied in the research. The students were examined, interviewed (to have better understanding, comprehension, and explanation and exploration towards students' comments and opinions), and evaluated in accordance with the implementation of mind-mapping approach in the tutorial program of writing the printed modular based learning material. It was conducted to obtain reliable information towards their obstacles to write printed modular based learning materials.

Within the eight consecutive weeks the students submitted their completed assignments - the printed modular based learning materials. The modules were assessed based on the pre-designed rubrics of the printed modular learning materials which describes the following aspects:

1. the accuracy of the content;

2. the clarity of the content;

3. appropriateness the module with the audience conditions;

4. the structure and lay out of the module;

5. the quality and the functions of the visual illustrations;

6. learning activities and strategy to engage students;

7. the physical quality of the modules.

The rubrics applied to assess students' their submitted assignments by giving the score for each aspect as scoring criteria for each category ranging from 1-10. The module's rubric shown on the table below:

Table 1. Module designed rubrics

Category	Scoring Criteria	Total Points	Score
	Attention-getting, well - problem lay out, and exposes framework for the rest of the module.	5	
	Well-defined in language appropriate of technical terms for the learners.	10	
Content Accuracy, Clarity & Appropriateness'	Module inovolves accurate information.	10	
(50 points)	Relevant materials to the overall message/purpose.	10	
	Amount of material reflect its significance appropriately.	10	
	Clear conclusion of the modules in brief.	5	
	Clearly observable organizational pattern	5	
	Appropriate and relevant ideas within the context of the module	5	
	Presented pictures	5	
Structure, lay out, Visual illustrations, & physical quality	Project is edited with only quality for printed clarity	5	
(50 points)	Well prepared, informative, effective, and not distracting of visual illustrations.	10	
	Totals pages fit in the assigned topics.	10	
	well communicated information.	10	
Score	Total Points	100	

Regarding to data analysis based on the rubrics above, it uses the type of holistic one where single criteria rubrics (one-dimensional) used to assess participants' overall achievement on an activity or item based on predefined achievement levels; performance descriptions are written in paragraphs and usually in full sentences.

Findings

Referring to the pre-writing data gained from the need analysis of writing the modular learning materials, it exposed that most of the students were in a category of low-level knowledge in writing. Moreover, they had no any related background of experience to do so. On the other hand, their self-determination and motivation were at the highest level in writing the module. One of the reasons as it is very essential for them in establishing their future career to be a teacher in how to write modular learning materials properly.

Based on the result of the data analysis on rubrics, it showed that students' submitted assignments of modules are mostly meet the criteria given. The detail gained score for each aspect can be seen on the following table.

Table 2. Writing outcome rubric score distribution of writing the modular learning materials (30 students)

Writing Outcomes	% (#) of students			
	Below Expectation	Approaching Expectation	Meeting Expectation	Above Expectation
Appropriate Content Accuracy & Clarity	10% (3)	20% (6)	50% (15)	20% (6)
Appropriate Structure	5% (2)	10% (3)	75% (22)	10% (3)
Appropriate Visual illustrations, & physical quality	0% (0)	5% (2)	55% (16)	40% (12)

Referring to the data on the table presented above, those three aspects on writing outcomes covering; first, content accuracy and clarity reached the score of 10% of below expectation, 20% of approaching expectation, 50% meeting expectation and 20% above expectation. Second, structure aspect gained the score of 5% of below expectation, 10% of approaching expectation, 75% of and meeting expectation and 10% above expectation while on the visual illustrations, & physical quality aspect. It achieved the score of 0% of below expectation, 5% of approaching expectation, 55% meeting expectation and 40% above expectation. Based on the data presented above, it can be inferred that students' outcomes of writing the modular learning meet the criteria by reaching the percentage above 50% for all aspects to meet the expectations.

In determining the students' sub-skill mastery, the stated goal of instructional was analyzed through its process. It was done to make sure that they were capable to write the modular learning materials on certain theme by following its rules.

The tutorial program of printed modular based learning materials was set and constructed by looking at the previous stages and its analysis as the baseline. It involved in experts on content and design to be sure with the effectiveness of built program.

The process of instructional analysis towards its topics and objectives resulted in some aspects going as follow: (1) to explain the concepts and characteristics of the printed modular based learning materials; (2) to implement the mind map strategy to generate ideas in writing; (3) to analyze the audience; (4) to write the structure and components of the printed modular based learning materials; (5) to implement the procedures for writing of the printed modular based learning materials; (6) to write the outline and introduction section of the modular learning materials; (7) to write the draft of the printed modular based learning materials; and (8) to evaluate the product. In this course the tutor provides the face-to-face and the online writing consultation for the students.

Figure 2. The example of the student submitted assignment (Indonesian version and English translation)

Prior to conduct the writing printed modular based learning materials tutorial, the students had to take pre-test regarding the entry knowledge of the writing skills. After pre-test the participants followed the tutorial session of the printed modular based learning materials writing. In this present study the participants took the post-test which related to the course objectives. The pre-test and post-test results were analyzed to get the information regarding the students gained knowledge and writing skills after learning with the mind map approach.

The pre-test and post-test related to the course goal and learning objectives were implemented to get the information regarding the students gained knowledge and writing skills after learning with the mind map approach. In addition, the five participants were engaged in the interview sessions to gather the information concerning the impacts of using the mind map approach on the participants' learning motivational aspects. The gathered data was analyzed confronts to the advantages and obstacles of applying the strategy of mind mapping to write the printed modular based learning materials. The following table indicates the statistical analysis results of the pre-test and post-test scores of the participants (N=30).

Table 3. Pre-test and post- test analysis results

Groups		N	$\bar{x}$	SD	Sh_x	t-test		
						t	df	p
Experiment	Pre-test	30	87.24	19.00	2.70			
	Post-test	30	97.40	23.40	4.62	6.80	36	0.000
Control	Pre-test	30	89.80	20.30	3.00			
	Post-test	30	94.20	21.26	3.90	5.20	32	0.000

The statistical significance by comparison of the two groups classes (experiment and control) in pre- test and post-test results in a p-value of less than 0.01, below the alpha value of 0.05; therefore, there is a statistically significant difference between the two groups of classes. With the significant level of $p < 0.05$, the statistical analysis indicates that there is significant improvement between the pre-test and the post-test of the participants' scores. It can be concluded that the use of mind mapping learning strategy was help the students to write the printed modular based learning materials.

Discussion

As a technique to assist students to acquire retrieval and knowledge by utilizing visual pointers such as colors and pictures, mind mapping becomes is able to record a single pace of leaners through memories. It helps them to set personalized, attractive and varied to recall the materials from the past as it is easy to manage. In addition, the practice on mind map diagram encourages them to apply their own technique on the learning process. It is an effective strategy to help students to relate new information to their gained knowledge.

Qualitative analysis of the participant interview indicated that the implementation of mind-mapping strategy increased students' motivation in completing their writing assignment - the printed modular based learning materials. Rowntree

(1994) noted that the graphic learning in mind map facilitate to encourage students' learning motivation and develop self-learning abilities. Khusniyah (2019) summarizes her study of using the mind mapping learning strategy to improve the student descriptive writing ability. She noted that mind mapping implementation in learning has increase the students' motivation of descriptive writing. In addition, the students can make a good imagination in writing with mind mapping.

Generating Topics

The use of mind map helps the students to generate the topics and sub topics which can be used in generating the outline of the module writing. Mind mapping triggers the creativity to connect each sub topic in the students writing outline. Mind mapping learning strategy makes the ideas flooding out when start writing. It assists students to have meaningful of learning experience through generating ideas for topics to develop text writing (Yang, 2015). It is considered that mind map is to be prospective way to foster creativity through setting and carrying them to be visualized in an integrated structure in generating new ideas for topics to write (Malycha & Maier, 2017).

Connecting Ideas

The mind map learning strategy which is defined as graphical tool for generating and connecting ideas facilitates the students to connect students' previous and present knowledge. The mind map strategy makes possible for them to create in line ideas and themes which are significant in writing activities. In general, the use of mind map learning strategy gives them easiness in choosing any correlated themes/ topics to breakdown. Additionally, the use of mind map facilitates the students to develop an outline for their writing assignments. Writing with mind map enables to ascend their motivation to learn. It influences students' behavior and options towards daily situations dealing with considering for decisions in learning to be objective, knowledgeable, meaning construction, reliable and factual transfer of ideas (Zydbel, 2020).

Conclusion

The implementation of mind mapping as the strategy in writing activities for students offered some following advantages: (1) assisting them to create and come out to fresh ideas to write; (2) supporting them to explore any coherent topic and proposition to correlate with; (3) permitting them to write the themes and issues required in writing clear properly; (4) guiding them to integrate occurred concepts; and (5) giving them chance to improve their knowledge to develop the topic. Besides, the use of mind mapping learning strategy engages and increase the students' motivation in pursuing writing activities. It allows students to have visual representation of their opinions and knowledge to be influential in implementing the basis of theoretical reviews on constructivist approach. It gives chances for students to interact with events and objects straight away as the effective strategy for the skill of thinking

Recommendations

The future research and study concerning the use of the online constructive feedback should be implemented in different online learning context and subject. The results of this present study can be used to improve the better practices and methods in conducting the online learning programs in the open and distant learning higher education. It is necessary for the teachers or educators to give directions on how to construct the mind mapping strategies towards writing materials for the independent learning to students. To add, there should be developed e-learning material on modular of printed materials to be more varied in gaining their new concept comprehension and creativity.

Limitations

There are two main limitations to this research which can be discussed in future research. First, the study focused on one area in Indonesia and was only carried out for a short time. Second, this study did not involve lecturers to confirm the data collected from teacher.

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