Mind Mapping Method in Improving Conceptual Knowledge in Workshop Modules for Teacher Professional Education Students

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ABSTRACT: The aim of this research is to determine the effectiveness of the mind mapping method in increasing professional teacher education students' knowledge of 21st century learning materials. This research is a classroom action research conducted in a class of 15 Islamic religious education teachers. Action research was carried out in two cycles, each cycle including the stages of planning, implementation, observation and reflection. The research results show that the mind mapping method can increase the conceptual knowledge of professional teacher education students, this can be seen from the results of knowledge tests through pretest and posttest. Students got a maximum score of 82.67 from the results of the knowledge test, in the calculation of the N-gene normality test it reached 75.96% so that the maind mapping method is a high criterion for increasing student knowledge. By mastering the conceptual knowledge of the workshop module, students can improve their skills in preparing learning plans that can be implemented well in the learning process.

KEYWORDS: mind mapping, classroom action research, professional teacher education, 21st century learning

INTRODUCTION

One of the most important things for teachers who take professional teacher education is to master knowledge about preparing learning tools. The workshop module is a learning tool module prepared to be studied by Teacher Professional Education (PPG) students, especially Islamic Religious Education teachers in schools. The learning tools module has four learning activities designed to provide broader and deeper insight and strengthening in designing constructive, contextual and meaningful learning for students.

The material presented in this module consists of 4 learning activities. The main points discussed are: 1). Study of graduate competency standards, core competencies, basic competencies and designing annual learning programs; 2). Development of materials, learning models and learning media; 3). Development of learning assessment Instruments; 4) Development of a learning implementation plan.

The success of achieving educational goals depends greatly on the effectiveness of the ongoing learning process carried out by lecturers and students. Learning is effective if the relationship between educators and students is active and the required goals can be achieved within the specified time frame (Cahyono et al., 2022). The effectiveness of learning is greatly influenced by the methods used by lecturers and the mastery of technology by both lecturers and students (Nurlailli et al., 2022).

The effectiveness of student learning is influenced by the approach or strategy and learning methods that have been chosen and designed philosophically. Post-learning activities can take the form of enrichment, and can also take the form of providing remedial teaching services for students who have learning difficulties (Sartika, 2022). Providing independent learning in the place where teachers teach is an alternative in increasing students' knowledge about the concept of preparing learning tools.

The various of methods available in learning, there is an interesting method to study, namely maind mapping or concept maps. Through the mind mapping method, students will be actively involved in developing the potential within themselves, including the process of thinking, asking questions, discussing, etc. Students are required to be directly involved in the knowledge discovery process. The application of the mind mapping method in the lecture process is expected to make students more motivated in participating in learning and increase understanding of concepts. The mind mapping method aims to build students' knowledge in learning systematically, namely as a technique for increasing students' knowledge in mastering the concepts of a subject matter.

The application of this mind mapping learning model is also carried out on various variables such as motivation, interest in learning, learning achievement, critical thinking skills, learning outcomes and other variables (Kara & Liru, 2021). Based on the results of a literature review conducted by (Wati, 2022) that the mind mapping learning model in improving learning outcomes, while testing the magnitude of the influence of the mind mapping learning model in improving student learning outcomes in schools

is in the medium, feasible category, so that educators who have never implemented the model Mind mapping learning can be tried in learning.

Various studies reveal that the main mapping method shows significant things in increasing knowledge, skills, motivation and students. The research results of Saharah & Indihadi, (2019) show that mind mapping has an effect on students' summary writing skills, Darmuki, (2020), Hidayati, (2020) and Kara & Liru, (2021) Students feel that learning using mind maps is more fun and not boring, because they can learn creatively and not monotonously. Learning using the mind map method has generally succeeded in increasing students' interest and learning outcomes in speaking skills.

Fatmawati, (2014) research results show that students are still unable to demonstrate their creative thinking abilities using mind maps on fermentation material. Learning using the mind map method places more emphasis on activeness and creative activities in solving problems with various variations. (Nashiroh et al., 2020) Based on the results of the research and data analysis carried out, the following conclusions can be obtained. First, there is a significant influence from the application of the jigsaw type cooperative learning model assisted by mind mapping on the mastery of pedagogical material in the education and training program development course. Second, the application of the jigsaw type cooperative learning model assisted by mind maps is effective in improving students' pedagogical abilities in training program development courses.

Apart from being able to increase student creativity, the mind mapping method can also increase students' pedagogical knowledge. This is also in line with the research results of Syaputra (2021) that main mapping can increase student understanding. Nursafitri & Fanny, (2021) research results show that mind mapping assignments in online learning can improve students' presentation skills. Presentation skills in this research include translation skills, interpreting skills and extrapolation skills.

From the results of this research, researchers are interested in implementing the maind mapping method in online learning for teacher professional education in order to increase conceptual understanding of 21st century learning material in the workshop module. Where as the output of learning results from this workshop, teachers can prepare learning plans by adopting 21st century learning.

RESEARCH METHODS

This type of research is research with a qualitative descriptive approach, this classroom action research consists of two cycles, each cycle consisting of planning, implementation, observation and reflection. The subjects of this research are students in one class, namely Islamic religious education teachers at stage 2 in 2022. The number of students who are research subjects is 15 students, they have an average of more than 5 years of teaching experience. The data source in this research is the online teaching and learning process in the workshop module on learning activities for 21st century learning materials. Data collection uses observation, interviews and documentation.

Observation instruments are used to collect data about the learning process in the classroom during initial observations, cycle one and cycle two. Observations use student observation sheets and lecturer observation sheets in the online learning process. Interviews were used to collect lecturer response data regarding the use of the initial interview learning method, during cycle one and cycle two.

This research data collection technique uses documentation, which is used to collect information in the form of documents related to the research carried out in the form of knowledge test results. To determine the increase in knowledge concepts using test instruments. The test was carried out through pretest and posttest to compare the results before and after the action. The performance indicator in this study was 90% with a minimum threshold of 80.

RESULTS AND DISCUSSION

Mind Mapping is a technique of utilizing the whole brain by using visual images and other graphic tools to form impressions. Mind mapping works by combining and developing the working potential of the two hemispheres of the brain in the learning process so that it becomes easy to organize and remember all forms of information, both information obtained through writing and verbally.

Setyarini's (2019) mind mapping learning method can be interpreted as a learning method whose system uses brain management principles to unlock all hidden creativity, potential and brain capacity. His contribution is in helping students with active, innovative, creative, effective and fun learning and critical thinking.

Mind Mapping Method Learning Steps

According to Sutanto Windura in Adimah, (2022). The steps for creating a mind map to make it easier for students to create a mind map model from their own work must meet the following criteria: 1). Prepare a sheet of plain white paper, 2). Prepare equipment such as pens, colored pencils or markers, at least 6 contrasting primary colors, 3). The paper is placed and positioned horizontally, 3). Determine the topic for which you want to create a mind map, usually the main topic that represents the processing of material or the main topic of a lesson chapter for a collection assignment, 4). Make the center of the mind map in the middle of the paper in the form of a central image of the mind map, which is usually called a central image because it is located right in the

middle of the paper and must be an image, 5). Create a main branch, which is a branch that comes directly from the center of the mind map. The main branch of this task is to combine and group similar or similar information. Use different colors for each branch, 6). The information written above the branch and number only consists of one word, namely in the form of keywords, 7). Developing a parent branch with other branches that create information from the parent branch. Use the same color as the main branch color, 8). Images should always be added to reinforce information or assist in thinking, especially in the main branches, 9). Review the final results of the mind map that has been carried out, and 10). Carry out these steps systematically, paying attention to the mind map rules discussed previously.

The steps in implementing the mind mapping learning method according to Asmani in Triana et al., (2021) include: 1). The teacher conveys the competencies to be achieved, 2). Form groups, each group consisting of two to three people, 3). Each group (randomly) reads the results of their discussion and 4). From the data from the discussion, students are asked to make conclusions or the teacher provides comparisons according to the material concluded by the students.

Based on observations, researchers found that professional education students for teachers in Islamic religious education classes have not yet mastered the concepts of 21st century learning. The low conceptual ability regarding 21st century learning is because students only read modules without being accompanied and directed towards mastering the concepts with effective learning methods. Learning carried out online is arranged in meetings with lecturers through learning contracts, so that lecturers can continuously monitor student progress which is carried out through the learning management system on the Syncronus or video conference feature.

Based on the results of these initial observations and through online interviews, it shows that students do not yet understand the concepts of 21st century learning in depth, then the researchers and lecturers carried out collaborative research on improving learning using the mind mapping or concept map method.

Next, the researcher started the learning activities by giving instructions to students to read the workshop module, then students were assigned to create a maind mapping or concept map related to learning activities in module 4, namely the 21st century learning module. Students were given time to read the module, analyze and create a concept map. independently. After students create a concept map, students are then asked to explain it online through synchronous activities.

The workshop module learning process is carried out within one month, while the online learning activities are set up as depicted in table 1 below:

Table 1: Online Learning Activities

Activities	Lecturer	Student
Synchronus 1, week 1	Lecturers convey learning objectives and problem orientation	Setting up the module
Synchronus II, week 1	Lecturers give assignments and accompany students in studying workshop modules	Students create concept maps and continue independently
Synchronus III, week 2	The lecturer facilitates students to present and discuss the results of mind mapping	Presenting the results of mind mapping
Synchronus IV, week 2	The lecturer gives questions via Google form	Students work on questions
Synchronus V, week 3	Lecturers give assignments and accompany students in studying workshop modules	Students create concept maps and continue independently
Synchronus VI, week 3	Lecturers facilitate students to perform and discuss mind mapping results	Presenting the results of mind mapping
Synchronus VII, week 4	The lecturer gives questions via Google form	Students work on questions

Examples of student work in implementing mind mapping in the 21st century learning material workshop module can be seen in Figure 1 below

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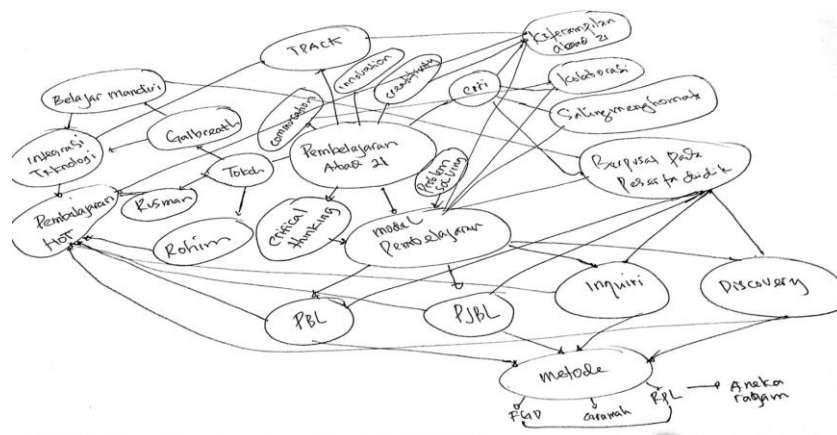
Figure 1: One of the concept maps (mind mapping) made by students in the workshop module on 21st century learning

Conceptually, 21st century learning is learning that combines literacy skills, knowledge abilities, skills, behavior and mastery of technology. In this century, students are not only required to be proficient in science, but students must also have skills in using technology, become literate people, and have good morals.

The competencies that must be possessed in the 21st century are called the 4Cs which include creativity and innovation, collaboration, communication, and critical thinking and problem solving. So learning in this century must be based on HOTS (high order thinking skills) or high order thinking skills. To support 21st century learning, you can use problem based learning models, project based learning, inquiry learning and discovery learning. The results of the class actions for cycles, cycle 1 and cycle 2 can be seen in table 2 below:

Table 2: Action Results Data for Cycles 1 and 2 Based on Student Knowledge Test

No	Student name	Pre-Cycle Score (pretest)	Cycle 1 Score (posttest 1)	Cycle 1 Score (posttest 2)
1	Adnan Miftakhur Rosyid	50	70	90
2	Aekal Lukman Hakim	30	60	80
3	Afia Susilo	35	70	80
4	Agus Pramono	40	80	90
5	Agus Rumahno	20	50	80
6	Ah. Zanin Nu'man	50	80	90
7	Ali Mustofa	20	70	80
8	Ali Rosyidi	20	80	90
9	Alyayas Hanifah	20	60	80
10	Andy Kustowo	30	80	80
11	Apri Adnan Al Biruni	30	70	80
12	Ar Rafi' Kusumarachman	10	50	80
13	Badarudin Muhammad Khadam	40	70	80
14	Miftahul Jannah	10	60	80
15	Muh Kurniawan Syafi'i	10	50	80
	Average score	27,67	66,67	82,67
	Highest score	50	80	90
	Lowest score	10	50	80

Meanwhile, to measure learning outcomes between before the action and after the action is to use N-gain (normalized gain). N-gain is used to measure the increase in cognitive learning outcomes by comparing before and after being given an action.

The most likely way to do this is to measure the increase in the extent to which the target is achieved from the beginning before treatment (initial ability test) to the target learning outcomes after treatment (posttest). The target to be achieved is of course 100% of the material mastered by students, and a minimum score of 80 has been achieved.

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To test the effectiveness of the main mapping method, manual calculations were used, namely the N-Gain effectiveness formula. The normalized gain test (N-Gain) was carried out to determine the increase in conceptual knowledge of the 21st century learning workshop after being given treatment. Calculate the normalized Gain score based on the formula according to Archambault, (2008), namely:

$$\text{N-Gen} \quad \frac{\text{Posttest score} - \text{Pretest score}}{\text{Maximum Score} - \text{Pretest Score}} \quad \text{X } 100$$

The results of the normalized gain calculation are then interpreted based on the n-gain interpretation table according to Hake, (1999)

N-Gen Percentage	Classification
100-71 %	High
70-31 %	Medium
30-1%	Low

Below the researcher presents the results of the N-gain calculation in cycle one, namely comparing the results of the pretest carried out in the pre-cycle with the results of the action treatment in cycle 1

Table 3: Data from N-Gen Test Count Results in Cycle 1

No	Student name	Pre-Cycle Score (pretest)	Cycle 1 Score (posttest 1)	N-Gen Score	N-gen Score %
1	Adnan Miftakhur Rosyid	50	70	0,40	40
2	Aekal Lukman Hakim	30	60	0,43	43
3	Afia Susilo	35	70	0,54	54
4	Agus Pramono	40	80	0,67	67
5	Agus Rumahno	20	50	0,38	38
6	Ah. Zanin Nu'man	50	80	0,60	60
7	Ali Mustofa	20	70	0,63	63
8	Ali Rosyidi	20	80	0,75	75
9	Alyayas Hanifah	20	60	0,50	50
10	Andy Kustowo	30	80	0,71	71
11	Apri Adnan Al Biruni	30	70	0,57	57
12	Ar Rafi' Kusumarachman	10	50	0,44	44
13	Badarudin Muhammad Khadam	40	70	0,50	50
14	Miftahul Jannah	10	60	0,56	56
15	Muh Kurniawan Syafi'i	10	50	0,44	44
	Average score	27,67	66,67	0,54	54,09

From table 3 above, it shows that the results of actions or treatments in learning in cycle 1 show an increase in students' knowledge of the conceptual knowledge of workshop modules on 21st century learning materials. The results of the N-gen score in percent form show an average of 54.09%. When entered into the N-gen interpretation table, it shows that it is in the medium category because it is in the range of 70-31%, so the mind mapping method is quite effective in increasing student knowledge, however the average score on the knowledge test results in cycle one is average. The score is 66.67 so it still hasn't reached the planned performance target, namely achieving an average score of 80.

Because the average score from the knowledge test was still below 80, the researchers took action in the second cycle while still using the maind mapping method. The results of the N-gen data calculation analysis in the second cycle can be seen in the following table 4:

Table 4: Data from N-Gen Test Count Results in Cycle 2

No	Student name	Pre-Cycle Score (pretest)	Cycle 1 Score (posttest 2)	N-Gen Score	N-gen Score %
1	Adnan Miftakhur Rosyid	50	90	0,80	80,00
2	Aekal Lukman Hakim	30	80	0,71	71,43
3	Afia Susilo	35	80	0,69	69,23

4	Agus Pramono	40	90	0,83	83,33
5	Agus Rumahno	20	80	0,75	75,00
6	Ah. Zanin Nu'man	50	90	0,80	80,00
7	Ali Mustofa	20	80	0,75	75,00
8	Ali Rosyidi	20	90	0,88	87,50
9	Alyayas Hanifah	20	80	0,75	75,00
10	Andy Kustowo	30	80	0,71	71,43
11	Apri Adnan Al Biruni	30	80	0,71	71,43
12	Ar Rafi' Kusumarachman	10	80	0,78	77,78
13	Badarudin Muhammad Khadam	40	80	0,67	66,67
14	Miftahul Jannah	10	80	0,78	77,78
15	Muh Kurniawan Syafi'i	10	80	0,78	77,78
	Average score	27,67	82,67	0,76	75,96

Table 4 above shows that the results of the action or treatment in cycle two showed a significant increase in student knowledge. The average score value of the knowledge test results in cycle 2 reached an average of 82.67. And for the N-gen score it exceeded 0.7 so that the calculated results of the N-gen score in percentage terms reached an average of 75.96%. These results show that the mind mapping method can increase the knowledge of professional teacher education students.

Seen in the N-gen interpretation table, the level of effectiveness of the mind mapping method is in the high category, namely 75.97%, in the range of 100 -70%, so that the main mapping method has an effect in increasing the knowledge of professional teacher education students in 21st century learning materials in the workshop module.

The average score in the second cycle of action has met the targets and performance indicators in the classroom action research carried out, reaching an average score of 82.67 and the indicator is 90%, so this research is ended and no longer requires further action. This finding is strengthened by the findings of (Kara & Liru, 2021); (Darmuki, 2020) and (Hidayati, 2020) that the mind mapping method increases students' knowledge and abilities. Maind mapping is quite significant in improving student learning achievement (Fanita, 2021). Umam & Ahyani, (2017) said that there were differences in student learning outcomes between before and after the mind mapping method treatment in the experimental group. Several previous studies showed that mind mapping was effectively applied to the learning process.

Meriani et al., (2023) Mind mapping is a learning model that is able to provide easy understanding and improve memory in the learning and teaching process, students are given opportunities as a means of thinking, memorizing and interacting. This learning strategy will improve the quality of students physically and mentally. Meriana emphasized that the use of the mind mapping learning model can unite the left and right parts of the brain to foster student creativity.

Through the mind mapping method, students can also construct their own knowledge, thus encouraging students to increase their knowledge. This is in line with what Budiono et al., (2023) said that mind mapping is a tool in building students' knowledge. In Jean Piaget's great theory, the knowledge process is formed through analyzing reading text, then organizing the knowledge and then creating a scheme. Creating a knowledge scheme using maind mapping is a process that must be followed in conveying knowledge.

CONCLUSION

The mind mapping method can be used by teachers and lecturers in carrying out the learning process. The research results show that the mind mapping method is quite effective in increasing students' knowledge in understanding workshop modules, especially in 21st century learning materials. The mind mapping method is also a learning method that prioritizes the left brain and right brain so that the learning process can foster student creativity. The research results showed that professional teacher education students increased their conceptual knowledge about 21st century learning materials after lecturers used the mind mapping method. This can be seen from the results of the knowledge test that students in the first cycle of action had an average score of 66.67 compared to the pre-cycle results, namely an average score of only 27.67. In the second cycle it then increased again, reaching an average score of 82.67. The results of the knowledge test which were normalized with N-Gen showed that the N-Gen score in percentage terms reached 75.95% and was in the high category in the 100-70% range. So it can be concluded that the main mapping method is effective in increasing student knowledge. Further research is needed to test this method on complex learning materials.

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