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Profile of Mind Mapping Utilization in Learning During 2018-2022

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ABSTRACT

Mind mapping is an innovative learning strategy that has an impact on learning. This research aims to define and analyze the use of mind mapping in learning. This research is qualitative-descriptive with library research type. The results of the research show that the use of mind mapping not only has advantages, but also various disadvantages when used in learning. To minimize these weaknesses, this research reviews 20 journals (2018-2022) both nationally and those that have been selected through Google Scholar. The steps in reviewing the research literature are collecting journals/articles about mind mapping, reducing journals/articles for the last five years (2018-2022), analyzing the definition of mind mapping, synthesizing the opportunities and impacts of using mind mapping in learning, analyzing obstacles to mind mapping utilization in learning, and making conclusions. Based on library research, it is found that one way for teachers and students to maximize learning is by designing mind mapping with other learning models or tools. Another finding is that teachers can use various applications to make it easier for students to make mind maps. With this research, it is hoped that learning will be fun and improve students' thinking skills.

INTRODUCTION

Education is very important for humans. Education is one way to improve the quality that exists in humans (Yulianti et al., 2022). Human resources are expected to have *soft skills* and *hard skills* to survive in the future. Changes in knowledge, technology, and society are very rapid in the future. Therefore, the task of the teacher is very heavy. Learning is said to be good and cannot be separated from the role of the teacher (Abdilla & Turmudi, 2019). When learning, the teacher is required not only to teach concepts to students but also to teach students to find facts and information and develop it into something useful for themselves. In addition, teachers can be said to be successful if they can design various alternative learning methods according to the times (Fitriani et al., 2017).

The learning carried out by teachers in the field has not been maximized. This is evidenced by the problems in the field, namely: 1) at the time of learning the teacher is less varied in using learning methods so that students often have difficulty understanding the material (Palufi et al., 2022); 2) learning is only limited to memorizing information, so students easily forget and the desired learning outcomes are not maximized (Elita, 2018); 3) teachers deliver material using the lecture method so that students feel bored (Khasanah, 2018). The problems that have been mentioned cause learning to be passive so that learning activities and student learning outcomes are less than optimal. To overcome these problems, teachers can develop innovative teaching strategies so that learning becomes active and fun.

One of the innovative strategies that teachers can use in learning is mind mapping. Mind mapping is a learning strategy where students can organize their thoughts and

write them in the form of pictures or thought schemes (Untari & Susanto, 2022). Mind mapping is also often called a radiant way of thinking so that students can optimize their brain work system. The utilization of mind mapping in learning is very practical so that teachers and students can develop it easily (Lukman & Ishartiwi, 2014). Therefore, the utilization of mind mapping is very important to help teachers or students in various ways such as planning ideas, remembering information well, focusing attention, practicing creative thinking, solving problems, and learning more effectively.

Several studies have examined the utilization of mind mapping in learning, such as the utilization of mind mapping in developing learning resources (Gustina et al., 2021), the utilization of mind mapping to motivate students to learn (Rofiqah et al., 2016), and the utilization of mind mapping to improve students' thinking skills (Suhartini et al., 2016; Ananda, 2019; Winata & Rahmat, 2022). To find out more about the utilization of mind mapping, library research was conducted. This research aims to define and analyze the utilization of mind mapping in learning through qualitative-descriptive type library research. This research is expected to give an overview of the opportunities, impacts, and obstacles in the utilization of mind mapping so that it can assist teachers in preparing appropriate mind mapping-based learning designs.

RESEARCH METHOD

This research is a literature research. A literature research is a series of activities in collecting library data, reading and taking notes, and analyzing research materials. This research aims to define and analyze the utilization of mind mapping in learning. This literature research is sourced from previous researchs, both international and national. This library research analyzes twenty articles/journals on mind mapping obtained through Google Scholar with publications between 2018 and 2022.

The analysis process carried out in the literature research of the utilization of mind mapping in learning includes; (1) collecting journals/articles about mind mapping, (2) reducing journals/articles for the last 5 years (2018-2022), (3) analyzing the definition of mind mapping, (4) synthesizing the opportunities and impacts of using mind mapping in learning, (5) analyzing the obstacles to using mind mapping in learning, (6) fundamental result. The process of analyzing the literature research is interpreted in Figure 1.

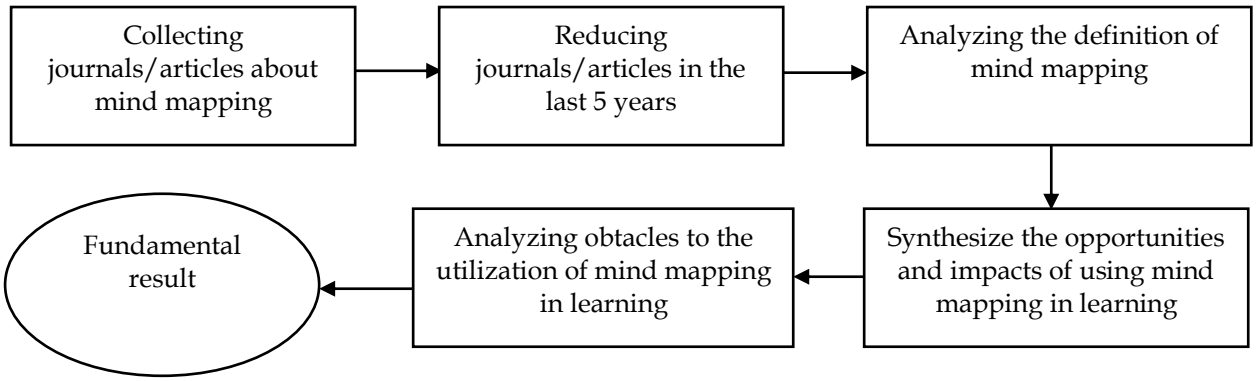

Figure 1. Flowchart of the research profile of the utilization of mind mapping in learning.

RESULTS AND DISCUSSION

Definition of Mind Mapping

Detail library research of the utilization of mind mapping in learning (2018-2022) in Table 1 (attachment). Mind mapping is one of the strategies used in learning. Mind mapping is the easiest way to put information into and take it from outside the brain (Aprinawati, 2018). In this case, mind mapping is a creative, effective way of taking notes and mapping human thoughts (Sulichah, 2018). The way to map the mind can be by making interrelated ideas with the main topic in the middle and subtopics as its branches. To make mind mapping easier, determine the theme, sub-theme, and keywords first (Phanata & Suci, 2020). After that, start drawing a mind map by imagining that a tree is a theme, while roots are a sub-theme. Making mind maps can also be given pictures and colors so that the brain more easily understands the concepts that have been drawn. Thus, the practice of making mind mapping can make it easier for students to optimize their minds.

Mind mapping can also be used to generalize, visualize, organize, record, and classify thoughts in learning (Isa et al., 2019). In the learning process, the teacher can use mind mapping so that students can understand the concepts being taught. The technique of noting mind maps, makes students have to record or summarize learning material using keywords and pictures (Ananda, 2019). The presence of pictures and keywords makes students interested in learning the material and easy to remember. Mind mapping can be done manually or using technology. The manual method can use cardboard and colored markers (Sulfemi, 2019). Meanwhile, how to make mind mapping using technology can be done with the android application, and iMindMap (Dewantara, 2019; Hartanto et al., 2021). Thus, the utilization of mind mapping can be designed in online and offline learning with the application. Based on previous researchs, it can be seen that mind mapping is one of the learning strategies by recording or mapping the mind of information manually or using applications in a creative form so that it is easy to understand and remember in the brain.

Opportunities and Impacts of Utilizing Mind Mapping

Mind mapping is an expression of radiant thinking because it fits the natural function of the human mind (Tenriawaru, 2014). Mind mapping can be applied in every learning because it uses the performance of the human brain. Based on the library research, the utilization of mind mapping can be applied at the school level, both elementary school, junior high school, senior high school, vocational high school, and university. The library research of the articles that have been carried out includes three articles on mind mapping at elementary school level, one article on mind mapping at junior high school level, six articles on mind mapping at senior high school level, two articles on mind mapping at vocational high school level, and seven articles on mind mapping at university.

Based on previous research, the utilization of mind mapping can be taught using various learning techniques. The forms of application of mind mapping that are mostly done include mind mapping being taught as a model or learning method (Ruhama & Erwin, 2021; Sulichah, 2018; Astriani et al., 2020; Elita, 2018); Mind mapping is taught by designing strategies or other learning models including POGIL, problem-based learning, and discovery learning (Sumanik et al., 2020; Rikha et al., 2018; Dwijayanti et al., 2020), mind mapping is taught by combining technology or applications including android, ImindMap (Dong et al., 2021; Hartanto et al., 2021; Dewantara, 2019), mind

mapping is taught online (Nyagblormase et al., 2021; Harahap et al., 2021), and mind mapping is taught by developing teaching materials, such as e-books, and pocketbooks (Cahyanti et al., 2021; Gustina et al., 2021).

The utilization of mind mapping as a model or learning method can be done in various ways. For example, using mind mapping in learning by asking students to make mind maps to solve the problems being studied (Ruhama & Erwin, 2021). Mind mapping is also used as a tool to deliver learning materials that encourage students to think critically to solve problems. When students can solve their problems, it affects their ability to think creatively and student learning outcomes. This is supported by research that the mind mapping learning model or method can improve students' creative thinking skills and learning outcomes (Ananda, 2019; Ruhama & Erwin, 2021). The utilization of mind mapping can be designed with other learning models, such as problem-based learning, discovery learning, and POGIL. If mind mapping is combined with other learning models, then the syntax is adjusted to the model that has been selected. One of the models combined with mind mapping is the POGIL model which consists of five stages, namely (1) orientation, (2) exploration, (3) concept formation, (4) application, and (5) closing. The utilization of mind mapping in the POGIL learning model is found in one of the syntaxes, namely concept formation. At the stage of forming the concept of giving mind mapping assignments, it makes it easier for students to associate the concepts learned (Sumanik et al., 2020). Another learning model combined with mind mapping is discovery learning. In the discovery learning model, students are required to be active in learning by finding their knowledge and putting it into creative ideas in the form of mind mapping (Dwijayanti et al., 2020). Thus, the combination of other learning models with mind mapping makes learning more meaningful.

Learning is also meaningful when applying mind mapping through technology/ applications, such as iMindMap. iMindMap is one of the software used in making mind mapping. This software makes mind mapping easier, faster, and more interesting than drawing using paper and markers. In addition, the iMindMap application was created using the mind mapping method which is commonly used in brainstorming, organizing thoughts, thinking creatively, and designing plans for something (Dewantara, 2019). The utilization of mind mapping using applications makes students happier because there are instructions in making mind mapping through pictures, charts, lines, or writing. The use of the application also makes learning more flexible, because students can make it online or offline. The utilization of mind mapping can help to learn during a pandemic. During a pandemic, learning is carried out online so that it has a negative impact, namely difficulty understanding a concept. Therefore, teachers can apply one of the learning strategies that can be used during a pandemic, namely mind mapping. Mind mapping can be carried out through various platforms such as Google Classroom, Whatsapp, or other media. As with the research of Nyagblormase (2021) that the utilization of mind mapping can be given in Google Classroom to assist teachers in explaining a concept that is difficult to understand. In addition, teachers can also identify students' misconceptions in learning. With mind mapping, it is hoped that students can be trained to change long concepts of information into an organized and easy-to-remember chart according to how the brain works when solving problems (Faelasofi, 2016).

Another way that the problems given by the teacher are easily understood and solved is by developing learning tools designed with mind mapping strategies, such as

teaching materials, worksheets, or others. For example, the development of an e-book encyclopedia combined with mind mapping is effectively used during learning. The application of the e-book helps students understand the learning content, and learning becomes flexible because it can be done anywhere (Cahyanti et al., 2021). In addition, there is an example of developing a mind mapping-based pocketbook to help students who have difficulty remembering material (Masita & Wulandari, 2018). It is hoped that the development of mind mapping-based learning tools can support learning to improve student learning outcomes (Elita, 2018; Ruhama & Erwin, 2021; Sulichah, 2018).

Furthermore, mind mapping can also attract students' reading interest in learning (Sulfemi, 2019; Purwiningsih et al., 2022). The existence of student interest in learning makes students more challenged in mapping their minds so they can understand a concept (Rikha et al., 2018). If students already can understand a concept, it will also affect students' thinking skills (Astriani et al., 2020; Hartanto et al., 2021). Students' thinking skills can not only be trained during offline learning but also online. At the time of learning, the utilization of mind mapping strategies can improve students' creative thinking, critical thinking, and metacognitive skills (Ananda, 2019; Cahyanti et al., 2021; Hartanto et al., 2021; Wu & Wu, 2020; Astriani et al., 2020). Based on the library research, it can be seen that mind mapping is one of the learning strategies that has advantages as a teaching aid in the form of pictures/charts/diagrams to optimize the way the brain works so that it can attract students' reading interest in learning a concept so that it can practice concept understanding skills, critical thinking, creative thinking, and other.

Obstacles to the Utilization Mind Mapping

The utilization of mind mapping in learning has various benefits. The benefit of mind mapping is some teachers use it as a teaching aid, identify misconceptions, and even see the understanding concepts. However, there are times when using mind mapping there are obstacles and criticisms. The obstacles found after reviewing the literature on the application of mind mapping, namely: (1) Teachers must encourage students to develop creative ideas gradually (Dong et al., 2021); (2) Students find it difficult to connect their minds with the images to be made (Fatmawati, 2016); (3) Sometimes the idea of mind mapping that is made does not match the content of the material (Isa et al., 2019); (4) Students who are familiar with mind mapping for the first time find it difficult to use it (Nyagblormase et al., 2021); (5) If using the iMindMap application, students find it difficult to add pictures that support the ideas in the mind mapping branches (Suhartini et al., 2016); (6) In making mind mapping takes a long time (Wu & Wu, 2020); (7) The utilization of mind mapping is less effective in practicing practical problem-solving skills (Wu & Wu, 2020); and (8) Teachers find it difficult to condition the class (Ariyanti, 2018). Based on these things, in the implementation of learning using a mind mapping strategy, careful planning is needed, and the teacher should motivate in making mind mapping.

Suggestions for Utilization Mind Mapping

Research trends show that the mind mapping model can be designed with learning models or other teaching materials by the material developed by researchers. For example, the problem-based learning model is integrated with mind mapping to train students' conceptual understanding (Rikha et al., 2018), and the development of mind

mapping-based pocketbooks in science learning (Masita & Wulandari, 2018). Utilization of mind mapping can also be done by adding other models, changing the material used in previous research, or adding different thinking skills.

CONCLUSION

Based on findings from library research on the utilization of mind mapping in learning, it can be concluded that mind mapping is a learning strategy in mapping the mind in a creative, interesting, and flexible way. The impact of using mind mapping is that mind mapping has the advantage of being a teaching aid in the form of pictures/charts/diagrams to optimize the way the brain works so that it can attract students' reading interest in learning a concept so that they can practice concept understanding skills, critical thinking, creative thinking, and others. The utilization of mind mapping can be designed in learning models, designing them with learning tools. Opportunities for using mind mapping are that learning is easy to understand, creative ideas can emerge, and learning can be done both online and offline. The obstacles in using mind mapping in learning are that it requires good time planning, creative ideas, and requires applications that support the making of mind mapping. In future research, library research can assist teachers in minimizing the use of mind mapping.

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Attachment

Table 1. Library research of the utilization of mind mapping in learning (2018-2022).

Author/Year	Sample Characteristics	Research Design	Finding
(Purwiningsih et al., 2022)	The research subjects were ten students in tenth grade, majoring in multimedia two at Vocational High School 1 Nganjuk	The research is descriptive-qualitative with a case research approach. This research collects through interviews and learning outcomes tests.	The application of mind mapping attracts students' interest in learning so that students more easily understand the concept of nomenclature of chemical compounds and improve learning outcomes.
(Winata & Rahmat, 2022)	The research subjects were seventy students in eleventh grade, Senior High School 1 Majalengka with eleven natural science one-classes (thirty-five students) as the experimental class, and eleven natural science three-classes (thirty-five students) as the control class.	The research is quantitative research with a quasi-experimental approach. This research collects data using questionnaires and tests that are adjusted to the indicators of student creativity.	The implementation of the digital mind mapping learning model is effective in increasing student creativity.
(Cahyanti et al., 2021)	The research subjects were fifteen random sample students of ten grades with different academic abilities.	This research is a modification and development (R&D) research. The learning tools in this research were teaching materials in the form of an e-book encyclopedia. Data collection was carried out using a questionnaire method and a test via a google form. Analysis of pretest and posttest data was processed using correlation analysis on SPSS 23. Data analysis of skills to make mind mapping by scoring method.	Development of an e-book encyclopedia with an effective mind mapping strategy and trains the creative thinking skills of tenth-grade senior high school students on insect's material. The utilization of mind mapping in e-books helps students in problem-solving and developing ideas.
(Harahap et al., 2021)	The subjects of this research were thirty-six students of tenth-grade Vocational High School 3 Padang sidimpuan	The research is experimental research with two groups pretest-posttest design. Data collection techniques with questionnaires, observations, and written tests. Data analysis with normality test, homogeneity, and t-test.	The use of concept maps in offline learning has a good influence on the learning outcomes of vocational students because it can make learning more interesting.
(Hartanto et al., 2021)	The research subjects were thirty-nine-second semester students of the media subject of the Pancasila and citizenship research program, faculty of teacher training and education at PGRI Yogyakarta University.	This research is classroom action research. Data analysis with descriptive qualitative. The research data collection with observation, tests, and documentation. The learning tools used are e-learning modules which lesson plans, materials, presentations, discussions, assignments, and evaluations.	Students' creative thinking skills increase after using mind mapping with the android application. The android application also helps students how to make mind mapping easy, interesting, and creative
(Dong et al., 2021)	The research subjects were thirty-five first-semester students majoring in industrial design at the Zhejiang University of Technology, China.	This research is experimental design with the procedure are introduction of the task, making a mind map, and completing the mind mapping design creatively. Data analysis with a scoring	The utilization of mind mapping affects the creativity of students when making projects.

Author/Year	Sample Characteristics	Research Design	Finding
		system with 7 levels, and correlation test.	
(Astriani et al., 2020)	The research subjects were thirty-three students of science teacher candidates, Science Education Research Program, State University of Malang	The research is pre-experimental with one group pretest-posttest design. The research instrument is the mind mapping assessment rubric, metacognitive skills essay tests, and their rubrics. Data analysis is descriptive and quantitative with t-test and correlation test	The application of mind mapping in learning syntax can improve students' metacognitive skills tests.
(Sumanik et al., 2020)	The research subjects were students of class eleventh natural science at Senior High School 7 Malang with details: In expert class 1, as many as thirty-three students were taught with POGIL accompanied by a mind mapping task Experimental claimentalss 2 as many as thirty-four were taught POGIL with summary assignments	This research is quasi-experimental with posttest-only design. The research instrument is divided into two, namely the treatment instrument and the measuring instrument. The treatment instruments are the syllabus, lesson plans, and worksheets. The measuring instrument is fifteen multiple choice questions referring to Bloom's taxonomy consisting of C2 to C5, mind mapping and summary assessment rubrics, and learning implementation observation sheets. Data analysis with normality test, homogeneity test, and paired t-test	In the first experimental class using the POGIL learning model with mind mapping tasks, the learning outcomes were 79.97 higher than the second experimental class with a summary task of 75.59. Giving mind mapping assignments is superior because students think more about concepts in doing assignments, giving colors makes students more interesting in doing assignments.
(Isa et al., 2019)	Lhokseumawe State Islamic Institute who were selected randomly.	The research is classroom action research refers to Kemmis and Taggart's model. The research method is the mixing method. The research instrument was a descriptive writing test, pretest and posttest, and a questionnaire with a Likert scale. Data analysis using SPSS.	Implementation of the utilization of mind mapping affects improving students' writing skills
(Dwijayanti et al., 2020)	The research subjects were sixty-nine students of class eleventh social grade at Senior High School 1 Tenggarang with a simple random sampling technique	This research is quasi experimental with pretest-posttest control group design. Data collection techniques are tests, interviews, questionnaires, and documents. Data analysis was normality test, homogeneity test, independent sample t-test, and paired sample t-test through SPSS.	The implementation of the Discovery Learning model with Mind Mapping has a higher influence on student learning success, especially in learning, because mind mapping makes history learning more interesting and meaningful.
(Swestyani et al., 2018)	The research subjects were thirty-one students in the class eleventh second semester of Senior High School Batik 2 Surakarta, Indonesia.	The research is qualitative descriptive. Collecting data through observation on the mind mapping test data analysis using the Ohassta mind mapping rubric which has four levels. Qualitative analysis using Miles and Huberman's.	Mind mapping has a relationship with students' logical thinking. Mind mapping is one of the measuring tools to see logical thinking ability because mind mapping is a record that contains the demands of thinking and information that students learn.
(Elita, 2018)	The research subjects were thirty-two students of class eleventh mathematic natural science 5 consisting of fifteen boys and seventeen girls	This research is classroom action research with Kemmis and Taggart models. Data collection techniques with observation. Data analysis refers to the Miles, and Haberman method, which	The Mind Mapping learning method can improve biology learning outcomes for students of class eleventh mathematic natural science 5 Senior High School 2 Dumai with an increase

Author/Year	Sample Characteristics	Research Design	Finding
		consists of stages of data reduction, data display, and data verification	from cycle I to cycle II of 12.83%. The utilization of mind mapping can help optimize the right and left brain to be balanced.
(Ruhama & Erwin, 2021)	The research subjects are 64 students in fourth grade at Elementary School of Sawangan 07, Depok City consisting of thirty-two students in grades IV-A and thirty-two students in grades IV-B	The research method is a quasi-experimental design with pretest-posttest nonequivalent control group design. The research instrument is a multiple-choice pre-test and post-test with as many as 25 questions via a google form. Data analysis through normality test, homogeneity test, and t-test	The experimental class using the mind mapping learning model obtained higher science learning outcomes compared to the control class using the TCL learning model in online learning during the Covid-19 pandemic.
(Rikha et al., 2018)	The research subjects were thirty students of Elementary School 5 Puyoh	The research is mix method designed in explanatory sequential form. The quantitative method uses a pre-experimental design, with a one group pretest-posttest design. Qualitative method using qualitative descriptive Data collection techniques are test and non-test. Data analysis with paired sample t-test	The implementation of the PBL model with the mind mapping method improves understanding of the concept with average results for each indicator in the medium category.
(Nyagblormase et al., 2021)	The research subjects were seventy-one first semester students in Elementary Education at Kibi Presbyterian College of Education which were taken by purposive sampling	The research method is experimental design. Collecting data through tests and questionnaires which were scored using a Likert scale. Data analysis is paired sample t-test using SPSS version 27.	The utilization of mind mapping in learning online chemistry has a positive impact on students' memory knowledge and procedural knowledge, however, limits understanding of the concept. This is because in using mind mapping, students tend to memorize concepts rather than under concepts.
(Wu & Wu, 2020)	The research subjects were sixty-four nursing students at a class A tertiary hospital in Fuzhou City.	The research is intervention research. Collecting data using a questionnaire with a Likert scale. Data analysis was paired t-test using SPSS 17.	The implementation of the mind mapping method has a positive effect on improving students' critical thinking skills. Because it helps improve their memory recall in acquiring knowledge systematically.
(Dewantara, 2019)	The research subjects were fifteen students of Physics Education at Lambung Mangkurat University	The research is pre-experimental with one group pretest-posttest design method. Data collection techniques are pretest and posttest. Data analysis with paired t-te using SPSS.	The implementation of learning with the mind mapping method using the iMindmap application can improve student analyst skills because it can be used to sort out important information preferred and supporting information.
(Sulichah, 2018)	The research subjects were seventy-three students of VIII grades Junior High School Taman Adult Ibu Pawiyatan who were taken by random sampling technique and divided into class VIII-A as exper class VIII-B as control class.	The research is quasi-experimental with pretest design. The statement experimental was taken with 30 multiple choice test questions and a questionnaire of 40 items of learning motivation. Data analysis is the ANOVA test with the help of SPSS 16.	Students' learning motivation in the learning model with mind mapping is better than the expositortong model so at-posttests to improve the science learning outcomes of class VIII students at Taman Adult Ibu Pawiyatan Junior High School. Mind mapping encourages both internal and external to students.
(Gustina et al., 2021)	The research subject is class XI MIPA 3 (small	The research is research & Development (R&D) with 4D	The development of a mind mapping-based chemistry

Author/Year	Sample Characteristics	Research Design	Finding
	scale trial) consisting of 9 students and XI MIPA 4 (large scale trial) consists of thirty students.	models. The research instruments are validation sheets, response sheets, and test sheets. Data analysis using SPSS version 23.	pocketbook book is feasible and improves students' understanding with 80% of students scoring above the KKM.
(Masita & Wulandari, 2018)	The research subjects were twenty students of class V Elementary School Patemon 02	The research is research & development (R&D). Data collection techniques are test and non-test techniques. Data analysis is by testing validity, validity test, reliability test, level difficulty, discrepancy, t-test, and n-gain score.	The development of a pocket based on mind mapping is valid, feasible, and effective for use in science learning. The existence of mind mapping in pocketbooks attracts students' reading interest so that science learning outcomes increase.