Examining the Mind Mapping Model in Mathematics Learning for Elementary School Students: Self-Efficacy and Motivation

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A B S T R A K

Tantangan belajar siswa di era 4.0 harus diimbagi dengan penguasaan keterampilan abad 21. Penguasaan keterampilan harus diimbagi dengan kematangan mental siswa. Kematangan mental belajar siswa dapat dikembangkan dengan penerapan model belajar yang efektif. Model pembelajaran mind mapping memiliki berbagai keunggulan untuk membentuk kematangan pola berpikir siswa. Penelitian ini dilakukan bertujuan untuk mengkaji penerapan model mind mapping untuk self-efficacy dan motivasi siswa. Subjek penelitian yakni 10 siswa kelas IV sekolah dasar. Metode penelitian ini merupakan penelitian quasi eksperimen dengan membandingkan nilai pretest dan posttest. Teknik pengumpulan data yang dilakukan yakni dengan teknik hasil observasi dan wawancara yang dikonversi menjadi nilai 1-100. Analisis data yang dilakukan yakni secara kuantitatif dan kualitatif. Hasil penelitian yakni ada kenaikan self-efficacy pretest ke posttest 1 sebesar 12,4 poin, dan kenaikan posttest 1 ke posttest 2 sebesar 9.4 poin. Hasil pengamatan motivasi siswa pada tahap pretest ke posttest yakni 10,8 poin, dan kenaikan signifikan dari hasil posttest 1 ke posttest 2 yakni 23,6 poin. Temuan penelitian yakni model mind mapping meningkatkan self-efficacy siswa, meningkatkan motivasi siswa, dan mind mapping memiliki keunggulan signifikan untuk siswa sekolah dasar. Temuan menarik yakni mental siswa dapat lebih stabil dengan penerapan mind mapping dengan indikasi kemandirian, inisiatif, keberanian, dan adanya perubahan persepsi terhadap matematika.

A B S T R A C T

The challenges of student learning in the 4.0 era must be balanced with mastery of 21st century skills. Mastery of skills must be balanced with students' mental maturity. The mental maturity of student learning can be developed by applying an effective learning model. The mind mapping learning model has various advantages for shaping the maturity of students' thinking patterns. This research was conducted with the aim of examining the application of the mind mapping model for self-efficacy and student motivation. The research subjects were 10 grade IV elementary school students. This research method is a quasi-experimental study that compares pretest and posttest values. The data collection techniques used were observation and interview techniques, which were converted into a value of 1–100. Data analysis was carried out, both quantitatively and qualitatively. The results of the study showed that there was an increase in pretest self-efficacy to posttest 1 of 12.4 points, and an increase in posttest 1 to posttest 2 of 9.4 points. The results of observing student motivation at the pretest to posttest stage were 10.8 points, and a significant increase from the results of posttest 1 to posttest 2 was 23.6 points. The research findings are that the mind mapping model increases student self-efficacy, increases student motivation, and has significant advantages for elementary school students. An interesting finding is that students' mentality can be more stable with the application of mind mapping, with indications of independence, initiative, courage, and a change in perception of mathematics.

1. INTRODUCTION

The expected target of a learning process is satisfactory learning outcomes. The learning outcomes obtained by students are a measure of the effectiveness of the learning process that has been organized by the teacher. Individually, the learning outcomes obtained by students are a measure of the success of students in participating in learning personally (Herrenkohl et al., 2019). Learning outcomes and achievements are still the benchmark for student learning success. Instructionally, the success or

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completeness of student learning is measured by the minimum completeness criteria (KKM) for each subject. Success in following learning can also be measured by students' self-reflection shown through changes in students' attitudes (Kalil et al., 2012; Peatfield, 2015). Student activeness in the learning process will affect student learning outcomes. The development of students' abilities and maturity can be obtained through the process of interaction between students and educators and learning resources in a learning environment (Poekert et al., 2016; Verenoze., 2022). In learning mathematics, teachers tend to implement learning activities centrally. Mathematics is one of the fundamental subjects that has an important role in students' academic development. Many elementary school students face challenges in understanding complex mathematical concepts (Carroll, 2020; Napitupulu, 2020; Umam & Azhar, 2019). Teachers have an urgency to identify effective learning approaches to helping primary school students understand and master mathematics.

Mathematics is difficult (Saralar-Aras & Birgili, 2022; Store, 2018). Mathematics often involves abstract concepts and mathematical symbols which are not always easy to understand. Some mathematical concepts may be difficult to visualize or are outside of everyday experience. Some people may have negative experiences or negative beliefs about math, which can get in the way of understanding and solving problems (Hargreaves, 2019; Nurharyanto & Retnawati, 2020). Lack of self-confidence in math skills can cause fear and anxiety that hinder the learning process. Mathematics is a subject where the interrelationships between concepts are very important. If certain basics are not well understood, then more complex concepts can be difficult to understand and apply. Sometimes, difficulties arise because of a wrong understanding or common mistakes in certain mathematical concepts (Klemer et al., 2019; Lechner et al., 2021). Errors of this kind can become a hindrance in solving more complex problems.

One of the characters that students must have in learning mathematics is self-efficacy. Self-efficacy refers to an individual's belief in their ability to execute certain tasks (Dawson & Shand, 2019; Kaskens et al., 2023). In the context of learning mathematics, students' level of self-efficacy can affect their motivation to learn and try harder . Students who believe they are capable of succeeding in mathematics tend to be more motivated to overcome obstacles andtry alternative solutions when facing difficulties (Beisiegel et al., 2019; Rakhmawati & Mustadi, 2019). Motivation plays a crucial role in the learning process. Motivated students tend to be more focused, diligent and resistant to frustration in facing learning challenges (Bans-akutey et al., 2022; Sari, 2020). Motivation can also affect the level of student participation and involvement in learning activities. Motivation acts as an effort to prepare certain conditions, so that someone wants and wants to do something. Motivation is an important thing that every learner must have which leads to a tendency to act to produce one or more effects (Akamatsu & Gherghel, 2021; Novariandhini & Latifah, 2012). Learning motivation can arise due to intrinsic factors, in the form of desire and desire to succeed and encouragement of learning needs, as well as hope to achieve life goals. The extrinsic factors for motivation are appreciation, a conducive learning environment, and interesting learning activities (Eriany & Ningrum, 2013; Neumann et al., 2021). Motivation tolearn is an impulse that arises because of self-efficacy or self-belief to get progress anddevelopment within. In addition, motivation also affects the development of an individual's self-efficacy. A person's response to learning can be seen from the motivation to pay more attention to learning. This factor can arise either because of the desire of students to get better. In addition, there are external factors, namely the way teachers teach, learning models, or learning media that teachers use (Damayanti et al., 2021; Tualaulelei et al., 2022). One of the important external factors is the use of a model, namely the mind mapping model. The mind mapping model is a visual technique that can helps students organize and connect information in a more structured way.

Mind mapping can help students visualize mathematical concepts, make connections between ideas, and organize information hierarchically. Mind mapping has the potential to improve understanding of mathematical concepts and increase students' confidence in overcoming difficult material (Berlin et al., 2021; Ö. Polat & Atış-Akyol, 2021). Mind mapping as an application gives us meaningful information to understand in a simple way. The mind mapping technique prepares the mind in such a way that information can be used logically and imaginatively to create concepts (images) in the brain (Akanbi et al., 2021; Sezer, 2022). In the mind mapping technique, first determine the main idea and then divide it into detailed thoughts. It is useful for self and group which can give more effect than written review. This method is suitable for teachers and learners because it is repetitive and easy to understand difficult topics. The form for mind maps is as a visual form or image,so it is easy to see, imagine, explore, share with others, and review in the form of discussion. Furthermore, mind mapping can be interpreted as a method used for someone to explain something by means of the method of recognizing and memorizing then writing on paper according to understanding which is arranged based on the main and branching according to understanding (Ö. Polat et al., 2022; Takaria & Palinussa, 2020).

The urgency and novelty of this research is to fill the space for further research. Although there are several studies on the effectiveness of mind mapping models in learning, especially in the context of

mathematics, there is still room for further research especially at the primary education level. This study can help fill the knowledge gap and provide further insight into how the mind mapping model can influence students' self-efficacy and motivation in learning mathematics in primary schools. The purpose of this research is to encompass an understanding of the challenges of learning mathematics in primary schools, the importance ofpsychological factors such as self-efficacy and motivation in the learning process, and the potential benefits of using mind mapping models to improve mathematics learning and related psychological factors.

2. METHOD

This research is a quasi-experimental research by comparing pretest and post test scores. The data collection technique used was observation and interview. The data analysis carried out is quantitative and qualitative. Qualitative data and analysis are only as reinforcing and supporting data in this study. This study aims to examine in depth the self-efficacy and motivation to learn mathematics of students through the application of mind mapping learning models. Usage This learning model is intended to match the characteristics of students who like to gather, liketo move, like to move. So that later it is hoped that with students doing these activities will make learning more meaningful. The research location, namely fourth grade students of SD Negeri 1 Panggang, which is located on the slopes of Mount Merapi, is a border school of the Central Java province whichis directly adjacent to the Special Region of Yogyakarta province. Students in this class which amounted to 10 children who became the subjects of this study. The research subjects were used as a whole. Self-efficacy indicators are shown in Table 1.

Table 1. Indicator of Self Efficacy

No.	Aspects	Indicator
1	Reception to the challenge	Taking initiative in solving math problems
		Independence in doing tasks
2	Business and perseverance	Not giving up easily
		Strive to achieve golas in learning
3	Be Positive	Using various strategies in dealing with difficultes
		Able to bounce back from mistakes and failures

(Rakhmawati & Mustadi, 2019)

Self efficacy refers to an individual's belief in their ability to succeed in a given situation. In the context of elementary school students, self-efficacy has a significant meaning in their academic and personal development. Self-efficacy influences how students view their abilities in a variety of subjects, including math, languages, science, and others. Students who have high self-efficacy tend to be more confident in dealing with academic tasks and are more motivated to learn. Students with high self-efficacy tend to have higher learning motivation. They feel confident that they can overcome challenges and achieve academic goals. This motivates them to strive hard, participate actively in learning, and achieve better results.

Motivation helps students to remain diligent and persistent in facing challenges. They don't give up easily when they experience difficulties, but instead seek solutions and try to overcome obstacles. Students who are motivated tend to have a focus on academic and personal achievement. Strong motivation encourages them to set goals, work hard, and achieve better results. Motivation stimulates students to actively participate in learning. They are more likely to discuss, ask questions, collaborate with classmates, and engage in learning activities. Self-motivation indicators consist of six aspects which have been adapted to this research study as shown in Table 2.

Table 2. Indicator of Self Motivation

No	Aspect	Indicator
1	Self Activity	Active engagement in learning activities
		Interest in participating in learning activities
2	Self Development	Have a desire to develop skills
		Complete tasks diligently
3	Responsibility	Setting specific learning objectives
		Responsible for obligations that must be fulfilled

(Novariandhini & Latifah, 2012)

Indicators on self-efficacy and motivation to provide a picture of the influence of the mind mapping model for students. Data analysis is carried out by looking at the in-depth impact of each category on self-efficacy and self-motivation. This indicator is in the form of conversion from score to value with a range of 1-100.

3. RESULT AND DISCUSSION

Result

Qualitative Data

At this observation stage, during the pretest, many students were still found to be less active in participating in learning. But in meeting 1 there has been an improvement. Learners are willing to join in to observe the discussion process. Learners have begun to build theirmotivation. At meeting 1 learners have started to be confident to ask questions and provide ideas for making concept maps. There is an increase when compared to the results in the pretest. The research was carried out for 4 meetings, which began on February 21 to March 14, 2022. In this planning stage, researchers carry out activities to plan and organize activities tobe carried out. Based on the pre-research stage, researchers designed a learning model as outlined in the lesson plan, Student Worksheet and power point which will be used as learning media. After completion, then make LKPD which will be used as material for discussion and evaluation for students. At this stage the researcher carries out the activities that have been planned at the planning stage. This implementation stage begins with praying together, giving greetings, taking attendance, conveying learning objectives and apperception. Furthermore, researchers provide learning materials using learning media in the form of powerpoints. The next stage is that students receive LKPD which is used for discussion. Learners are divided into several groups which will later work together to create mind mapping about learning material. In this discussion activity, the researcher helps direct and encourage students to make mind mapping.

Quantitative Data

The next stage is for students to present their work in the form of *mind mapping* or concept maps that have been made. In turn, each group conveys the results of their work. The results ofstudents' self efficacfy are obtained from the observations in Table 3.

Table 3. Student Self Efficacy Observation Results

No	Name Code	Pretest	Posttest 1	Postetst 2
1	DP	61	73	83
2	FNH	67	81	90
3	J	63	76	86
4	LDP	55	69	78
5	PAH	63	75	84
6	SR	63	81	90
7	TWS	58	72	81
8	NM	53	56	66
9	APF	61	81	92
10	PP	56	70	78
	Average	**60**	**73.4**	**82.8**

The self-efficacy results in Table 3 show an increase from pretest to posttest 1 of 12.4 points, and an increase from posttest 1 to posttest 2 of 9.4 points. The results of students' motivation are obtained from the observations in Table 4.

Table 4. Results of Observations of Student Motivation

No	Name Code	Pretest	Posttest 1	Posttest 2
1	DP	48	56	80
2	FNH	56	68	88
3	J	44	60	86
4	LDP	36	56	72
5	PAH	56	56	88
6	SR	44	48	92
7	TWS	60	68	90

No	Name Code	Pretest	Posttest 1	Posttest 2
8	NM	36	44	56
9	APF	52	68	92
10	PP	40	56	72
	Average	**47.2**	**58**	**81.6**

The observation of student motivation from pretest to posttest is 10.8 points, and the significant increase from posttest 1 to posttest 2 is 23.6 points. This increase will be discussed in more depth in the discussion section.

Data Analysis

At meeting 1, there was a satisfactory increase but it still did not reach the target set by the researcher. This must be done or continued to meeting. The weakness that occurred at meeting 1 was the low motivation of students. After the reflection and improvement process at meeting 2. Researchers at this stagecompiled lesson plans, LKPDs that were in accordance with meeting 1. Task are given as a medium for discussion and evaluation. The material will be delivered through a presentationon the power point. In this stage, the learning process begins with greetings, prayers together and attendance. The next activity is to convey the learning objectives that must be achieved by students. Researchers convey material using power point media. LKPD handed over to learners for their guidance and evaluation. Students are distributed LKPD which will be used as a reference in conducting discussions. During the discussion, researchers circulated in each group to organize and direct discussion activities. After the discussion process is complete, each group presents the results of its discussion in the form of a concept map. After discussion and presentation activities, students carry out evaluation activities. At meeting II, the results achieved were very satisfying. It can be seen from the learning outcomes of students who have reached the target set by theresearcher. Learners have been actively involved in the learning and discussion process. They argue with each other about the concept map they will make. The results obtained at meetingII have reached the established completeness criteria. With these results, this class action research has been successful.

Discussion

Self Efficacy on Student

The most important finding in this study is that the mind mapping model makes children more active in critical thinking. Learners are prompted with various content triggers to stimulate their thinking. Learners try to explore the big theme and various things related to the big theme. In this study, the theme used is building space, so children try torelate things related to building space. When students try and explore the things that exist in building space, in this processstudents carry out a critical thinking process. This research is in accordance with previous research. The right and wrong process is a reflective thinking process which is one of the indicators of critical thinking (Rakhmawati & Mustadi, 2021; Sezer, 2022). Learners try to find things that suit friends with various sources such as books and the internet. Things that are new and interesting for students to do. The next finding is that students show initiative to solve math problems. The attitude of not being afraid of being wrong, and continuing to try, trying to solve problems until completionis very visible to increase from the pretest process. Most prominent is that students are not afraid to try. Math is considered a difficult problem for students, but that fear can be reduced through peer discussions (Cropp, 2017; Store, 2018). The results of the study are in accordance with the findings of this study, because the presence of peers makes students more confident to express their abilities. The next indicator is independence in doing tasks, which is addressed by learners who have the desire to complete tasks independently in groups. It is interesting that learners do not want the teacher to tell the answer, and are active in finding answers independently. They try to solve the problem with their own abilities and cooperation with the group. Independence plays a very important role in the formation of self-concept (Ishak et al., 2020; Jaffe, 2020). Independence can mean freedom in thinking and working, thus students can continue to develop. Self-efficacy can affect the level of enthusiasm and interest of students towards mathematics. Students who feel confident in their ability to understand material tend to be more enthusiastic about following lessons and learning more deeply. Students who have high self-efficacy may perceive themselves as effective role models in learning mathematics. This perception can motivate them to take an active role in learning and serve as a role model for other classmates.

Some indicators overlap with motivation, namely the attitude of not giving up easily. The challenge factor in mind mapping provides the fact that students dare to get learning challenges. This factor is influenced by the presence of peers in sharing thoughts and discussions. Not easily giving up is shown from the desire of students to complete the task to completion and get maximum results. The mind mapping

model provides opportunities for individuals to process thinking (O. Polat et al., 2017; Semilarski et al., 2022). This process shapes the personal self into a strong self-efficacy character for students. Another overlapping factor is the goal to be achieved. This goal can be in the form of a desire to form a work that can be proven from the performance of students who can create a mind mapping framework that is presented to other friends. The process of thinking and sharing can be completed with a strong desire, and it can already be addressed by students.

The indicator that is an interesting finding is the existence of strategies in dealing with difficulties. In pretest activities, when getting learning difficulties, students easily give up. Do not want to try to solve the problem or task given. The application of this mind mappingmodel provides an opportunity for students to develop strategies in dealing with learning difficulties, for example when there are difficulties they take the initiative to find out through the internet, discuss, and try to find solutions. Things that are really different and visible to students. This is in line with research who stated that self efficacy can overcome individual difficulties by trying to find solutions (Kaskens et al., 2023; Moon-seo et al., 2021). The indicator that is not so visible is rising from failure. Because the meeting and application of the model were so short, this indicator was not so visible. A small failure that appears is when they make a mistake in making a mind mapping framework, they try to finish it completely. Trying to give their best despite the various obstacles they face, such asdifferences in concepts with friends, or mistakes that require them to start from scratch.

The implication are students who have high self-efficacy are better able to overcome failure. They see failure as a normal part of the learning process, and they don't give up easily when faced with obstacles. Self efficacy can improve students' social interactions. They feel more confident in interacting with classmates and can act as leaders in group work or other group activities. Students with strong self-efficacy tend to have better problem solving skills. Their self-confidence in facing challenging tasks allows them to deal with problems more effectively. Self efficacy helps students feel better prepared to face future challenges. Confidence in their abilities helps them plan their careers and future goals with more confidence.

Learning Motivation

The description of mind mapping done by learners is carried out in collaboration. Learners work together with peers. The process of discussion and cooperation increases student motivation (Kapofu & Kapofu, 2020; Stigberg et al., 2022). This is the finding of this study, that one of the indicators oflearner motivation increases with an indication that learners become more active in learning and have an interest in learning. The interesting thing is that when learners answer incorrectly, other friends try to help and find the right answer. Thus, learners are not afraid wrong answer, the perception that mathematics must be done alone can be minimized with thisgroup learning condition. The application of mind mapping triggers the indicator of developing abilities and skills to increase. This can be seen from the results of pretest, posttest 1, and posttest 2 on increased learning motivation. The increase in abilities and skills is influenced by mind mapping patterns that are interesting and provide challenges for learners. Learners show that the ability to build space can increase from the point of view of concept knowledge and application of material in everyday life. The results of this study are in accordance with research which states that mathematical knowledge can increase due to the applicationof the mind mapping thinking process (Akamatsu & Gherghel, 2021; Takaria & Palinussa, 2020).

The challenge of the task provided a new picture that learners are ready for challenges in learning. The visible finding is that learners are diligent in completing the task. Even though time is up, they try to complete the task until it is finished. This indicator is a motivation indicator that looks prominent and very different when before the use of the mind mapping model. Thus, it shows that the mind mapping model can increase students' perseverance, to complete the task to completion. When learners try to solve problems, it means they already have a specific goal in achieving something. This is the most powerful inner motivation, which is when you have a goal to achieve. Individuals who have goals have the desire to achieve with the effort made (Herrenkohl et al., 2019; Knight & Skrtic, 2021). The implementation found is that students have a simple goal of finding appropriate and useful mind mapping. How they achieve this goal can be seen from their effort and perseverance.

Self-efficacy influences how students set learning goals. Students with high self-efficacy may set more ambitious goals because they believe they have the ability to achieve them. This self-confidence can increase motivation to achieve these goals. Self-efficacy can affect the extent to which students remain persistent and diligent in facing difficulties or obstacles in learning mathematics. Students with high self-efficacy are more likely to continue trying to overcome difficulties, which in turn can maintain their learning motivation. Students with high self-efficacy tend to see failure as part of the learning process and as an opportunity to learn from mistakes. This can affect their motivation to keep trying and improving their skills in mathematics.

The goals they achieve have a burden of responsibility that must be fulfilled. This indicator still needs to be explored from students. Responsibility is an indicator that cannot necessarily be achieved and improved in a short time (Coskun, 2020; Transinata, 2018). This indicator still needs time to be developed as an important character trait for learners. However, learners showed moreeffort to fulfill the tasks given. Before the application of the model, learners tended to ignore the tasks given. Some copied and pasted other friends' assignments. Self efficacy and motivation have a close relationship in the context of learning mathematics. High self-efficacy tends to have a positive impact on learning motivation. Students who believe they have the ability to understand and solve math tasks tend to be more motivated to take on challenges and strive to learn better. Self efficacy can be influenced by social support and feedback provided by teachers, classmates, and parents. Positive feedback about students' abilities in mathematics can increase self-efficacy and positively influence their learning motivation. The strength of motivation in learning mathematics has a very important role in the development of elementary school students. Mathematics is a basic subject that involves fundamental concepts. High motivation helps students to be more actively involved in learning mathematics, helping them build a solid understanding of basic concepts. A good understanding at a basic level will help them more easily tackle more complex concepts in the future. Some students may feel anxious or afraid of math (Oktay et al., 2021; Stoehr & Olson, 2023). Strong motivation can help overcome this fear by stimulating interest and interest in understanding and learning mathematics. Success in learning math can increase a student's overall self-confidence. When students feel capable of coping with math tasks, it can help them feel more confident in various aspects of life.

The implication are athematics involves problem solving skills which are important in many aspects of life. A strong motivation in learning mathematics helps students develop analytical and critical thinking skills, which will be useful in solving problems outside the classroom context. Mathematics is the foundation for many science and technology subjects. Motivation in understanding mathematics helps students build a strong foundation for understanding other subjects that involve mathematical concepts. Studying mathematics involves developing the ability of logic and rational thinking. Motivation to learn mathematics helps students practice logical thinking skills and make good decisions.

Mind Mapping Advantages

Self-efficacy is an individual's belief in his or her ability to succeed at specific tasks or achieve goals. Mind mapping is a visual technique that can help a person plan, organize, and connect ideas and information in a more structured and understandable way. The relationship between the two can be seen from the advantages of mind mapping, namely the visualizationof abilities, the organization of ideas, and the enhancement of skills planning. Mind mapping allows one to visually depict goals, plans, and the steps needed to achieve those goals. This process helps individuals see more clearly what needs to be done and how they can do it (Gavens et al., 2020; Mani, 2012). The advantage of mind mapping is that it can see the relationship between concepts. By organizing ideas in the form of a mind map, learners can see the relationship between different concepts and how they are interrelated. This helps individuals feel more structured and prepared to tackle complex tasks. Mind mapping helps individuals plan the concrete steps needed to achieve their goals (Ö. Polat & Atış-Akyol, 2021; Takaria & Palinussa, 2020). By having a clear plan, one feels more prepared and confident in overcoming challenges. In this case, it can be seen from the role of mind mapping in shaping the character of students.

Mind mapping has a close relationship with learning motivation. This technique can have a positive impact on students' learning motivation. The creative and interactive process ofcreating mind maps can increase student engagement in the learning process (Gunuc et al., 2022; Muhlisin, 2019). When students feel involved in designing and organizing their own ideas, they tend to be moremotivated to learn more deeply. By using mind mapping, students can plan their learning objectives visually. This helps them see clearly what needs to be achieved and how they will achieve it. This visualization of goals can motivate students to work harder and be more focused. Mind mapping allows students to connect different concepts and see the relationship between ideas. This can help them understand the material more deeply (Sezer, 2022; Xiao et al., 2019). Better understanding can often boost students' confidence and motivation to continue learning. Seeing mind maps develop and evolve along with increased understanding and knowledge canprovide positive feedback to students. This can stimulate their motivation as they can see the tangible progress they are making. The strength of mind mapping can help students overcome boredom or monotony in learning (Gündüzalp, 2023; Hariyadi et al., 2018). By utilizing visual and creative elements, this technique can make learning more interesting and fun, which in turn can increase motivation to learn. Mind mapping gives room for creativity and self-expression. Students can depict their ideas with colors, images, and symbols that suit their learning styles and preferences. This helps spark motivation as students feel more engaged and in control of their learning.

This process can provide a sense of accomplishment and satisfaction when students see their ideas well-organized and able to deal with the problem difficult tasks. The advantages of using mind mapping have been proven in this research study. Self-efficacy and motivation play a crucial role in helping individuals face the complex and dynamic challenges that exist in the 21st century. Mind mapping helps students plan solutions or approaches to solving a task or problem (Akanbi et al., 2021; Tambychik & Meerah, 2010). The challenges of the 21st century often involve rapid change and uncertainty. Self efficacy helps individuals feel confident that they have the ability to cope with change and adapt to a changing environment. Motivation provides encouragement to remain persistent and try to face new challenges with confidence. The implication are the challenges of the 21st century require the ability to continuously learn and innovate. Self efficacy encourages individuals to feel able to understand new concepts and develop new skills. Motivation helps them maintain interest and enthusiasm in learning, encourages the exploration of new ideas, and creates innovative solutions. In an increasingly connected world, teamwork and collaboration have become very important. Self efficacy in the context of teamwork helps individuals feel confident in contributing, sharing ideas, and overcoming conflicts in groups. Motivation helps maintain the spirit to collaborate and interact positively with others. The challenges of the 21st century often require critical and creative thinking skills to tackle complex problems. Self efficacy in developing this skill gives confidence that individuals can solve problems with a unique approach. Motivation stimulates the search for creative solutions and encourages individuals to overcome obstacles. Technological advances and digitization are becoming an integral part of the 21st century. Self-efficacy helps individuals feel able to cope with new technologies and learn to use them. Motivation directs them to develop digital literacy and use technology wisely.

4. CONCLUSION

The study of this research is that the mind mapping model in learning mathematics for elementary school students has a positive impact on students' self-efficacy and learning motivation. This study shows that the use of mind mapping can increase students' confidence in their ability to understand and cope with mathematical materials, and can stimulate their motivation to learn with more enthusiasm. Teachers can utilize mind mapping techniques to help students understand mathematical concepts better and increase their engagement in the learning process. An important implication of this study is that the use of mind mapping can help improve students' self-efficacy towards their abilities in mathematics. Teachers can design mind mapping activities that allow students to plan steps and strategies to overcome math problems, which in turn can strengthen their self-efficacy. This research shows that mind mapping can trigger students' learning motivation. Teachers can design more interesting and interactive learning sessions by incorporating mind mapping techniques, so that students feel more motivated to follow the lessons and achieve the learning objectives.

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