

Mindmeister's Influence on 4C Skills in Indonesian Subject Grade 6 Elementary School in Surabaya

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Abstract: This study aims to determine the influence of MindMeister on 4C skills in the Indonesian language subject in grade 6 elementary school in Surabaya. A combined research method was used, involving data collection carried out through in-depth interviews with students, observation, taking pre-test and post-test scores 3 times each in the control class and experimental class. Quantitative results showed no significant effect of using MindMeister on 4C skills (significance values of $0,100 > 0,05$). However, the qualitative result based on the student's perspective gained through interviews and observations is that most students can apply 4C skills while using MindMeister. In conclusion, it is proposed that MindMeister may influence 4C skill levels in the Indonesian subject in this particular context. It is hoped that these findings contribute to the use of MindMeister in other subjects in any grade of elementary school in Indonesia.

Keywords: 4C Skills, Mindmapping, Mindmeister

INTRODUCTION

Technology enables students to access learning material ubiquitously regardless of time and place (Alimuddin et al., 2023). MindMeister is one of among many technologies that has been used widely in education. There are already more than 13 million people who use the MindMeister platform to brainstorm, make weekly plans, or create other creative works (Widiyono, 2021). It helps users to create mind maps and to deliver teaching material (Hidayati et al., 2022). Moreover, the features on its platform enable users to work collaboratively (Widiyono, 2021) and creatively (Tucker et al., 2010) since it has a wide variety of templates. Given that students are regularly required to demonstrate 4C skills (Critical Thinking, Creative Thinking, Communication, and Collaboration), MindMeister is an ideal platform to hone and apply these skills. They are useful in preparing students to become competent learners in the future (Rudianto, 2022). It is in line with the statement given by Supriano, the Director General of Teachers and Education Personnel, Ministry of Education and Culture, that 4C skills are important for students as they face the challenges of the 21st century (Kemenag, 2022).

As future employees, students need to develop these skills as the basic foundation for their readiness before jumping into the workplace. Critical thinking skills as the main instrument for generating problem-solving and decision-making (Tarihoran et al., 2022). Besides that, thinking creatively also requires to deliver new problem solving (Budiwaluyo & Muhid, 2021). After they can generate new ideas to solve problems, communication skills are needed so they can convey their message accurately and effectively (Cultom, 2023). These aspects are part of the skills in demonstrating respect for others regardless of individual group differences to achieve the collective goal. School is the best place to exercise these skills. Thus, teachers should bring this topic into the highlight of their classroom agenda. Previous studies reported the various teaching

methods to nurture these skills such as Problem-based learning in biology class (Harahap et al., 2023); and project-based learning in science class (Illahi et al., 2022).

This study adopted an idea to implement technology to sharpen the students's 4C skills. We believe sharpening these skills from a young age will benefit more for the student's future. We introduced MindMeister as an online mind-mapping tool as the main activity in the classroom. A study reported that MindMeister is a user-friendly interface and a helpful tool for developing English-speaking skills (Dang & Do, 2024). Literature summarized the use of MindMeister in teaching Indonesian ethnic and cultural diversity (Pratama et al., 2022); self-learning (Nitchot & Gilbert, 2024); critical thinking skills (Sehrawat, 2021); and English-specific purposes (Selevičienė, 2024). Therefore, this study opted to use MindMeister in an Indonesian language class to sharpen the targetted skills through some topics. As Bahasa Indonesia is a compulsory subject for elementary (Syatauw et al., 2020), so introducing this media into the learning setting is a new thing. Thus, the research questions are formulated as follows: How is the implementation of MindMeister on students's critical thinking skills, creative thinking skills, communicative skills, and collaborative skills in Indonesian language classes in primary school?

LITERATURE REVIEW

Fostering 4C skills is crucial in today's age for our students. Our school agenda should internalize these skills through the teaching and learning process. In this part, we highlight the importance of 4C as an essential skill, especially at the elementary level. The first critical thinking skill is the ability to assess and evaluate information received (Bailin, 1987). Students need to develop thinking skills as young as possible thus this becomes a habit. This critical thinking is also usually called good thinking or thinking well (Pithers & Soden, 2000). Since this is not an innate ability, teachers and parents should help students by promoting learning activities that cultivate it (Franco et al., 2018). Providing the habit of questioning what they have learned from class is a way to train critical thinking (Santos, 2017).

The second is creative thinking. To nurture students' creative thinking skills, primary school teachers are also required to be creative. Various activities should be prepared. The activities to hone children's creative thinking skills in a real-life setting can be in the form of verbal and nonverbal tasks. Different physical environments may have different effects on children's creative capacity (Shah & Gustafsson, 2021). One activity, group discussion, is good to be used in the language class to promote interaction and learning, encourage motivation, and develop an appreciation towards different ideas (Rahmat, H., & Jon, R. B., 2023). Meanwhile, creative thinking skills can be upgraded with writing and reading activities through cooperative learning (Marcos et al., 2020).

The third is communication. In this part, communication does not merely mean the ability to talk. It refers to the art of delivering messages to the receivers. By having these skills, students can help understand the information and messages conveyed, respond, express ideas or opinions, and dare to ask questions properly when having difficulty digesting information (Putri et al., 2020). Students need to be trained in these skills since they will become members of society in the future. There are many ways to teach communication to elementary students such as using interactive media (Sinaga & Oktaviani, 2020) and discussion (Dos Santos, 2020). The goal is to equip students with the art of communication so they could be adaptive members of society. Teachers play a significant role in shaping student's communicative skills. Study indicates that classroom management has a positive relationship with primary students' communicative skills (Khansari, 2020). This skill is an initial start-up for interpersonal relationships (Qobilovna, 2023).

Teaching students how to communicate their ideas effectively with respect is a way to empower their communicative skills. A presentation project is one of the teaching projects that is an effective instrument to teach communicative skills (Giang, 2024). This activity provides an opportunity for students to practice in front of classmates in delivering their ideas. It also gives a chance to respond to the audience's questions. The discussion process enables students to improve and manage their oral skills and self-regulated (Tsang, 2020).

Last is collaboration. As social creatures we cannot live independently, thus we need to socialize in our daily lives. A study reported that high-order thinking skills are big influences on working collaboratively with peers (Alharbi, et al., 2022). Working in pairs shows significant improvement in students' computational thinking and efficacy in elementary school students (Wei et al., 2021). Thus, training students to work collaboratively with peers would give a lot of benefits for the children, such as: sharpening students' high-order thinking skills, computational thinking, and efficacy. Soft skills are needed for success in most careers. However, students need to be guided to exercise and practice their soft skills a lot in reality (England et al., 2019). The earlier they practice, the more soft skills can be sharpened. Hence, primary school teachers need to play an important role in shaping these skills in their classes. Based on these explanations above, it is believed that mind mapping is a useful teaching approach that can nurture students 4C skills. Previous study reported that it can sharpen communicative skills through writing (Tarihoran et al., 2022).

METHOD

This study implemented a mixed approach to collect and analyze data. This quasi-experimental study was conducted in a primary school located in Surabaya, West Java, Indonesia. The experimental group consisted of fourteen students from grade six and the control group consisted of 4 students from grade four and 4 students from grade five. Grades four, five, and six were chosen due to being in the same category, that is, upper primary. There are four consecutive weeks for the experimental procedure. Students from both control and experimental groups were given a pre-test and post-test about 4C. The questionnaire consisted of 20 items measuring critical thinking (Sakti, 2014), creative thinking (Putri & Alberida, 2022), communication (Maulida et al., 2021), and collaboration (Pratiwi et al., 2024) before conducting the experiment, a pilot study was conducted to check the validity and reliability of the instrument. A statistical analysis yielded a good reliability score which was Cronbach's Alpha 0,833.

The teaching procedures lasted for forty minutes each meeting. With the experimental group, she used MindMeister, while the control group was taught via manual mind mapping using paper. The first author who was also the teacher taught Indonesian language class. There were four topics for the class material. After students completed the post-test, they were invited to participate in the group interview. The interview questions were originally from the questionnaire that was verbally articulated. The purpose was to get students' confirmation, either to ensure students' comprehension of the questionnaire or to get additional data on how MindMeister influenced the 4 C skills.

RESULTS & DISCUSSION

This part presents the results of *the pre-test* and *post-test*, followed by the in-depth interviews, and the students' perceptions from both control and experimental groups.

Table 1. Test of Normality Pre-Test and Post-Test

		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Result	Control	.119	22	.200*	0.922	22	0.082
	Experiment	.102	39	.200*	0.972	39	0.438

The researcher used the Shapiro-Wilk normality test because the number of samples was <50 people. The significance level of the Shapiro-Wilk normality test is > 0.05 to be able to say that the data is normally distributed. From the table above, the value obtained is > 0.05 so the data can be said to be normally distributed.

Table 2. Test of Homogeneity of Variance

		Levene Statistic	Df1	Df2	Sig.
Result	Based on Mean	14.331	1	59	.000
	Based on Median	10.716	1	59	.002
	Based on Median and with adjusted df	10.716	1	40.011	.002
	Based on trimmed mean	14.063	1	59	0.000

The table above shows that the significance value based on the mean for the control and experimental classes is $0.000 < 0.05$, so it can be concluded that the data is not homogeneous.

Table 3. The Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				95% Confidence Interval of the Difference		
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Result	Equal variances assumed	14.331	.000	-1.672	59	.100	-6.28904	3.76201	-13.81681	1.23872
	Equal variances not assumed			-1.433	28.254	.163	-6.28904	4.38977	-15.27744	2.69935

This study used an independent samples test to compare the average of two unrelated groups (Santoso, 2006) in this case the control class (grades 4 and 5) and the experimental class (grade 6). The requirement for using an independent samples test is that the data must be normally distributed and homogeneous (not absolute). The table above demonstrates that the significant value in the equal variances assumed section is $0.100 > 0.05$, so it can be concluded that H_0 is accepted and H_a is rejected. Thus, it can be concluded that there is no influence on critical thinking, creative thinking, communication, and collaboration skills in students in both the control class and the experimental class.

The results of in-depth interviews showed that mind mapping in general helps some students to apply creative thinking skills, while using MindMeister helps all students to think more creatively in class. This can be reflected in an excerpt interview:

"This app helped me to easily build keywords for further idea. I can develop many keywords so MindMeister helps me become more creative (private interview on December 14, 2023)"

Regarding communicative skills, many students felt that manual mind mapping did not increase communicative skills. Some had difficulty communicating because of the necessity to draw or create mind maps. In addition, some students said that they did not experience any improvement in their communicative skills because they were basically able to communicate so they could still answer, ask questions, and make presentations while using mind mapping.

In addition, the app provided more chances to gather accurate information by making keywords. MindMeister also assists students in having presentable yet interesting layouts while doing group presentations. It proved that Mindmeister can increase students' communicative skills. This excerpt supports this result.

"Presentation by using MindMeister is more enjoyable because I can present all materials in one slide. Last time, without MindMeister, I need ten slides of powerpoint for just one article. Private interview on December 7, 2023)"

Mind mapping creates an enjoyable learning experience (Dayani et al., 2021; Rianita & Juliani, 2017). Students from the control group reported that traditional mind mapping made

them tired because it took time to draw ideas on physical paper. On the other hand, using MindMeister was much more interactive because they could easily record, edit, and add group members in one worksheet. MindMeister provides features that allow users to share ideas with others (Widiyono, 2021; Sokoy, 2018).

While manual mind mapping can apply students' critical thinking skills, and their understanding of material, and can lead them to a conclusion, MindMeister takes students further in all of these areas. Critical thinking is the ability to think logically, reflectively, systematically, and productively (Simanjuntak, 2019). It helps students to comprehend material easily (Ulya, 2021). However, not all students can apply critical thinking skills because of their physical limitations often exacerbated by frequent absences from class.

Although both traditional mind mapping and using MindMeister could nurture collaboration. Students from the control group stated that they found it difficult to work with their mates because some of them were passive. Whereas, students from the experimental group reported that this app facilitated the application of collaborative working. We conclude that MindMeister works more effectively because of individual factors such as attitude and ability.

There are several reasons for the differences in quantitative and qualitative research results in this case. First, it introduced a certain degree of boredom and monotony. Repetitive pre-and post-tests for each time resulted in careless responses. Second, the qualitative approach helps gain more information, for example, about students' attitudes resulting in poor relationships between students in the classroom. This situation makes the learning atmosphere in the classroom less pleasant and students experience pressure that can interfere with student learning (Paramita, 2013).

CONCLUSION

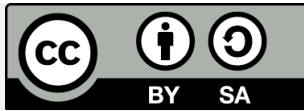
Being innovative educators requires more work but it will help students to gain more benefits. This study proves that mind mapping is a useful teaching method that nurtures students' 4c skills. In addition, inserting technology such as MindMeister resulted in greater benefits. The mixed-method approach provides insightful detail on how MindMeister affected students. However, this study is limited to the small sample size. A similar study needs to be replicated with different participants and subjects to corroborate our findings. Also, this study was implemented in an Asian country, studies with similar cultural background are encouraged to be replicated. Since, young learners around the world are friendly to technology usage, similar studies on technology usage can be conducted with different software but still focusing on the 4Cs.

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